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Carmine Gambardella

XII International Forum

Le Vie dei Mercanti

BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT

FROM THE WORLD TO POMPEII

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Landscape,
Cultural Heritage and Territorial Governance
BENECON Research Centre of Competence of
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La scuola di Pitagora editrice

Fabbrica della Conoscenza numero 46
Collana fondata e diretta da Carmine Gambardella

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Collana fondata e diretta da **Carmine Gambardella**

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Best practices in heritage conservation and management From the world to Pompeii

Le vie dei Mercanti _ XII Forum Internazionale di Studi

Carmine GAMBARDELLA

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Carmine Gambardella (a cura di)

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Best practices in heritage conservation and management From the world to Pompeii

Le vie dei Mercanti
XII Forum Internazionale di Studi

Aversa | Capri
June 12th- 14th, 2014

Conference topics:

Heritage

Tangible and intangible dimensions, History, Culture, Collective Identity, Memory, Documentation, Management, Communication for Cultural Heritage.

Architecture

Surveying, Representation, Modelling, Data Integration, Technology Platforms, Analysis, Diagnosis and Monitoring Techniques, Conservation, Restoration, Protection, Safety, Resilience, Transformation Projects, Technologies, Materials.

Landscape

Cultural landscapes, Territorial Surveying, Landscape Projects, Environmental Monitoring, Physical Parameters, Government of the Territory, Sustainable Development, Social Sustainability, Economic Sustainability.

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Peer review

Scholars has been invited to submit researches on theoretical and methodological aspects related to Architecture, Industrial Design and Landscape, and show real applications and experiences carried out on this themes.
Based on blind peer review, abstracts has been accepted, conditionally accepted, or rejected.
Authors of accepted and conditionally accepted papers has been invited to submit full papers. These has been again peer-reviewed and selected for the oral session and publication, or only for the publication in the conference proceedings.

Conference report

238 abstracts received from:

Australia,
Brazil,
China, Colombia, Cuba, Cyprus,
Denmark,
Egypt,
France,
Greece,
Indonesia, Italy,
Japan,
Madagascar, Malta, México,
Portugal,
Russia,
Saudi Arabia, Slovakia, Spain, Sweden,
Turkey,
United Kingdom, U.S.A,
Yemen.

About 400 authors involved.

196 papers published.

Preface

The XII International Forum Le Vie dei Mercanti has the aim of promoting a debate on local and international experiences relating to the themes of the conservation and management of cultural, architectural, archaeological, landscape and environmental heritages. This debate is particularly relevant in Italy, with it not only being responsible to the world for housing the largest number of UNESCO sites but also having a natural and landscape heritage of great variety and beauty in a region characterised by an intrinsic geological fragility.
The management of this vast heritage requires both a serious planning of the interventions as well as adequate funding. The same goes for the protection of the landscape, which in the past was systematically devastated within a myopic perspective that did not take into account the enormous amount of damage caused by wild speculation and hydrogeological instability.
Furthermore natural disasters, such as earthquakes, have led to the transformation and loss of environments which reflect local identity no less than the cultural heritage, in addition to economic damage and in terms of human lives.
In order to conserve and manage the heritage, it is necessary to adopt an integrated and resilient approach in which different skills contribute to the development of improvement and restoration projects, carried out through knowledge, sharing of decisions and proactive sharing, taking into account the social and environmental sustainability of interventions that should characterise the design method in all its aspects.
The key issue is the exchange of ideas so as to give life to a *technological humanism*, understood as the union between the cultural vitality that has characterized humanism and the Renaissance, producing excellent results in all fields of knowledge, and the possibilities currently offered by technological innovation to create platforms in order to support this knowledge. Thus, Pompeii, the most famous archaeological site in the world, is taken as the prime example of the need to adopt a virtuous cycle of conservation and management, supported by the dialogue between the different skills that interact by sharing the same technological platform.
The international debate can be an opportunity to share prime examples of the conservation, management and development of the archaeological, architectural, landscape and environmental heritage through the integration of ideas and experiences of specialists working in different disciplines as well as geographical and cultural contexts.
The conference is open to multidisciplinary experiences on one or more of the proposed themes. Scholars are invited to present research on either the theoretical and methodological aspects or concrete applications carried out on these issues.

Carmine Gambardella

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Best practice in heritage conservation and management From the world to Pompeii

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[…]
Non vivere sulla terra come un inquilino
O come un villeggiante stagionale.
Ricorda:
in questo mondo devi vivere saldo,
vivere
come nella casa paterna.
Credi al grano, alla terra, al mare
ma prima di tutto – all'uomo.
Ama la nuvola, il libro, la macchina,
ma prima di tutto – l'uomo.
Senti in fondo al tuo cuore
il dolore del ramo che secca,
della stella che si spegne,
della bestia ferita,
ma prima di tutto – il dolore dell'uomo.
Godi di tutti i beni terrestri,
del sole, della pioggia e della neve,
dell'inverno e dell'estate,
del buio e della luce,
ma prima di tutto godi dell'uomo.
[…]

[…]
Don't live in the world as if you were renting
or here only for the summer,
but act as if it was your father's house…
Believe in seeds, earth, and the sea,
but people above all.
Love clouds, machines, and books,
but people above all.
Grieve
for the withering branch,
the dying star,
and the hurt animal,
but feel for people above all.
Rejoice in all the earth's blessings –
darkness and light,
the four seasons,
but people above all.
[…]

NAZIM HIKMET

From: *Last Letter to My Son*
Moscow, 1955
Translated by Randy Blasing and Mutlu Konuk

With Best Practice in HERITAGE, the theme of this year's International Forum "Le Vie dei Mercanti", I would like to return to the centre of the issues of Man, hence the reference to the poem by Nazim Hikmet, who, in his interrelations with others and the responsibility that he assumes in academic, cultural and participatory contexts as well as in the governance of public affairs, has carried out or is planning the conservation, protection and regeneration of cultural heritage.
In order to conserve and manage the patrimony, an integrated approach is necessary in which different and resilient skills contribute to the development of the requalification and restoration projects, carried out by means of knowledge, sharing of decisions and proactive sharing, taking into account the social and environmental sustainability of interventions that should characterize the design method in all its aspects.
The international debate, in fact, is an opportunity to share good examples of conservation, management and enhancement of the archaeological heritage, architectural, landscape and environment through the integration of ideas and experience of specialists working in different disciplines and different geographical cultural contexts.
The key issue is the exchange of ideas and experiences in order to create a technological humanism, understood as a union between the cultural vitality that has characterized humanism and the Renaissance, producing the highest results in all fields of knowledge, and the possibilities currently offered by technological innovation to create platforms in support of knowledge.
Nevertheless, we must act with due care in the use of technology, asserting a predictory record. It is worth thinking of Leonardo, who with his will power "measured sand grain by grain just as mathematicians do", had already laid the conceptual foundations of digital knowledge several centuries earlier. The "grain / pixel" is the carrier/code, and therefore multidimensional, capable of integrating knowledge and skills in relation to the measurement and representation of cultural heritage objects in different scales from the city to the territory of the landscape, the code with the potential to interact and integrate data and information capable of providing results that are always implemented in the pipeline that Leonardo himself refers to as "the endless reasons that are by nature" and which wants to strive to give useful answers to the progress and development of society.
That said, digital technology allows us to have dynamic and biological knowledge. Dynamic since it is possible to discretize, measure and continuously monitor the inherited patrimony in order to re- establish it through knowledge, as biological knowledge and skills acting homeostatically, regenerating, through remedial agents of the genetic heritage in the same way as of stem cells on the roots, identity, contamination, historical social urban fabric, the territorial infrastructures, the environment, the production of art work.
Increasingly, indicating that the fate of the city, the territory is linked to the ability of the people to create Knowledge Factories, to transform its own resources, used as raw materials, with a production cycle that is only valid when the human capital is high, I have proposed a synergetic alliance between the University, Business , Public Administration and institutions bearers of great ethical and social values to make a competitive territory.
Some examples that we have analyzed as an interdisciplinary research group are paradigmatic and among them, it is worth mentioning, Pompeii, the vast territory of the Province of Caserta with an extra extension falling within the boundaries of the Province of Naples which borders the Terra dei Fuochi, the design of anaerobic biodigester of Santa Maria Capua Vetere and the Bourbon Palace of Carditello.
More recently, starting from Pompeii, we have surveyed with sensors such as aviation transported Lidar, Hyperspectral, Thermal not only the area of the excavation site but the entire City.
The complex representation activities of the sensors mounted on aircraft of the Guardia di Finanza and the cartographic data processed in the laboratory are merged into a "data cloud and monitoring knowledge" that with the innovative mobile mapping technologies of Topcon allowed us to compare surveys and aerial monitoring with terrestrial data. (Fig. 1)



Fig. 1: Pompeii Data cloud and monitoring knowledge.

Even for a larger-scale survey and monitoring with an entire bounded territory such as Terra dei Fuochi, suffering from serious pollution, we used the above systems to acquire knowledge aimed at the regeneration and protection of the landscape, the environment and products of the food chain and biological waste disposal system that generates energy and, therefore, excludes the pollution that comes from the combustion of other types of plants. (Figg. 2-5)

The anaerobic bio-digester is also an opportunity to redesign the relationship between the City and surrounding territory up to assuming a wider project involving the integrated coexistence of cultural, social and economic functions in a unitary model of sustainable development**.**

(Figg. 6-9)

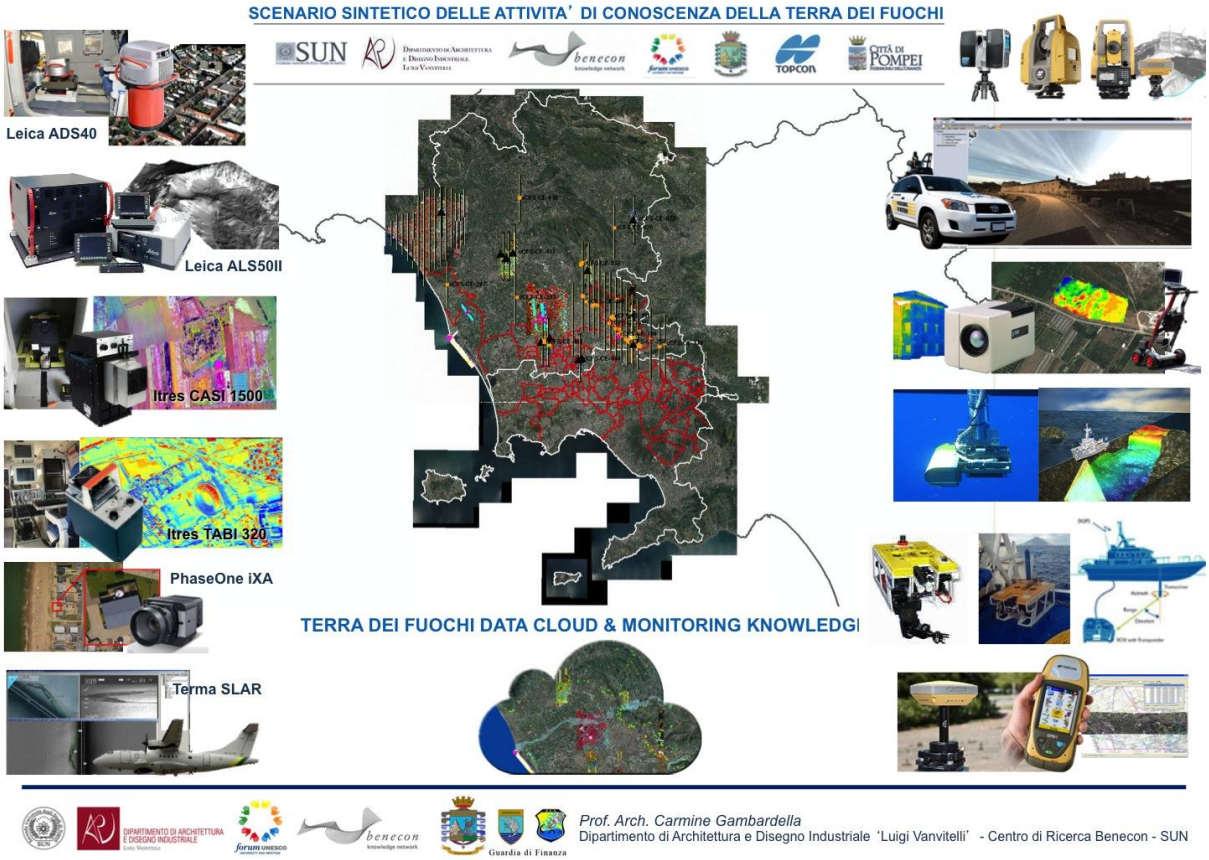


Fig. 2: Terra dei Fuochi. Land Data Cloud and Monitoring Knowledge

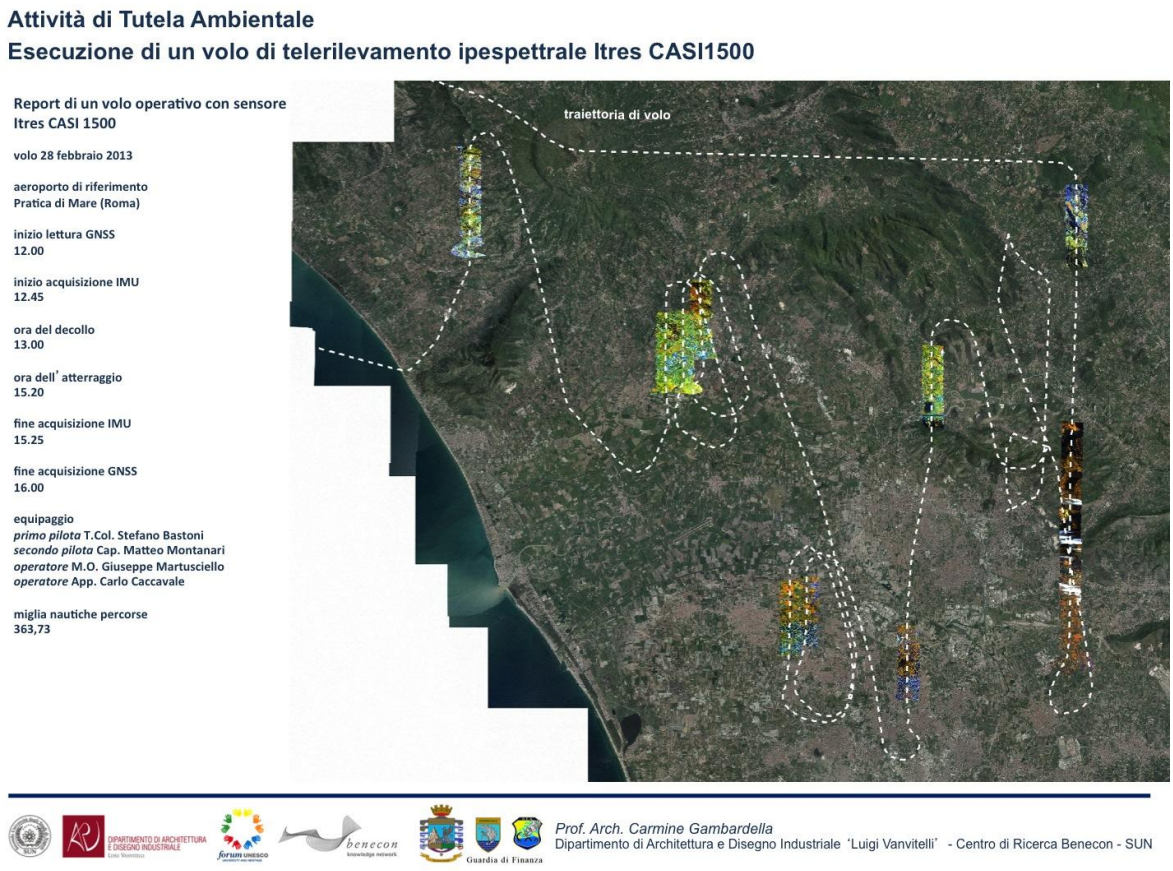


Fig. 3: Terra dei Fuochi: Hyperspectral remote sensing survey with ITRES CASI 1500 Sensor

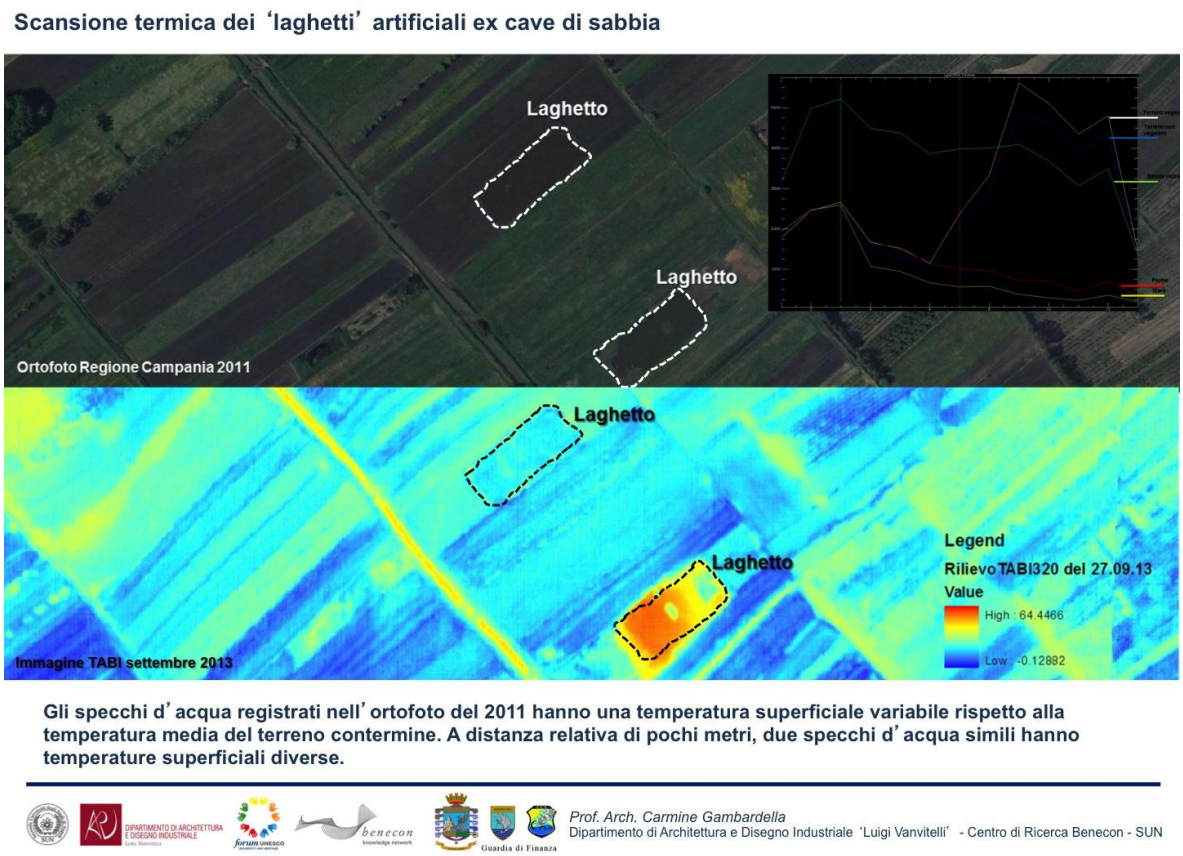


Fig. 4: Terra dei Fuochi. Thermal map of a sand quarry.

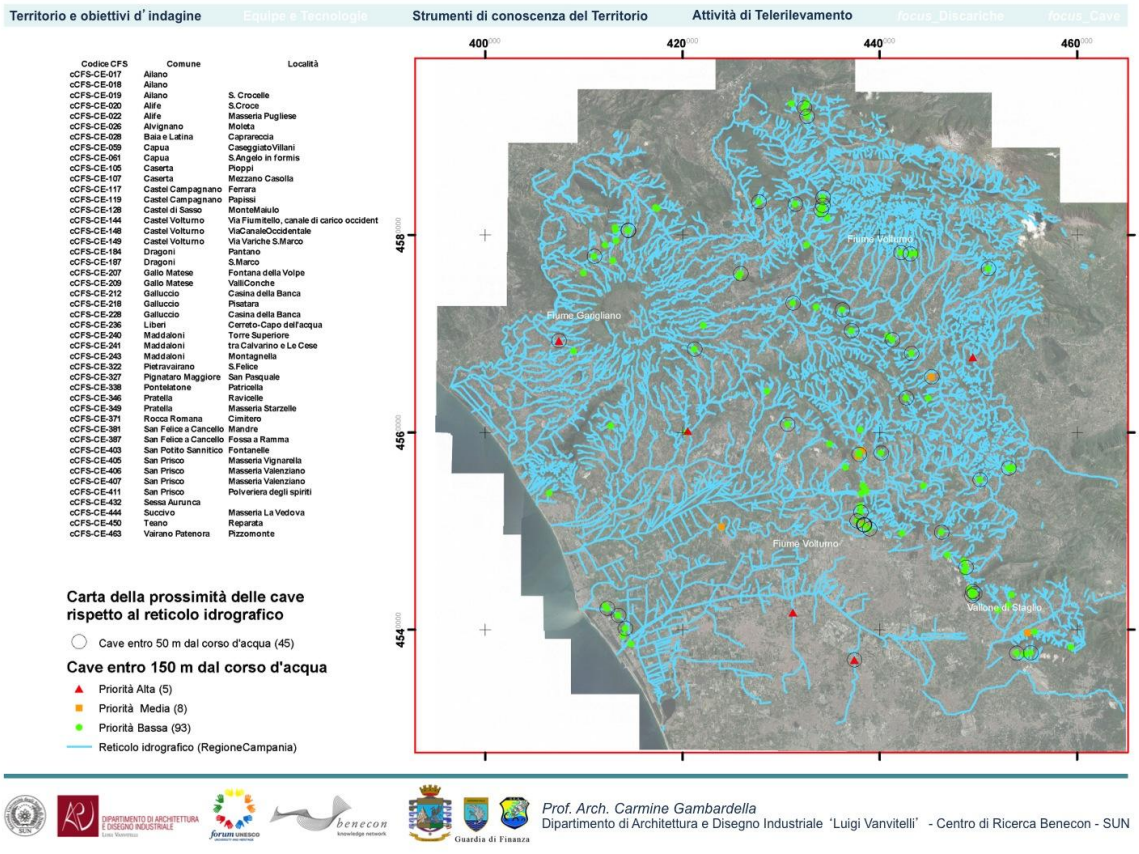


Fig. 5: Terra dei Fuochi. Geographic Information System. Waterways and quarries layers

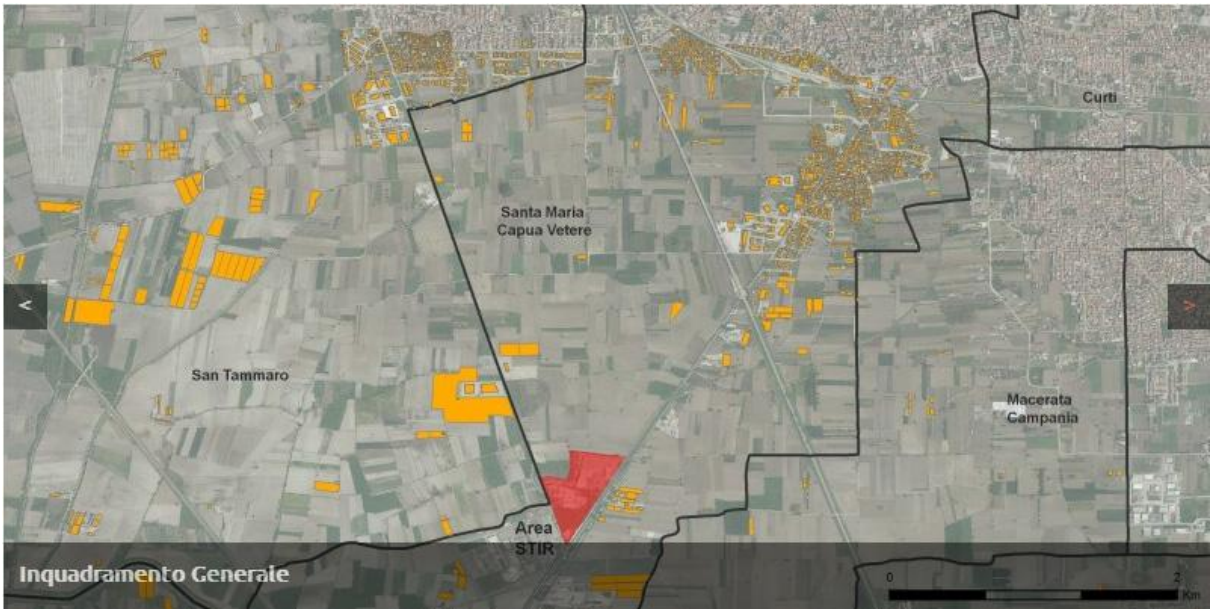


Fig. 6: Plant Anaerobic Digestion in Santa Maria Capua Vetere. Land overview.



Fig. 7: Plant Anaerobic Digestion in Santa Maria Capua Vetere. Period of construction of buildings.

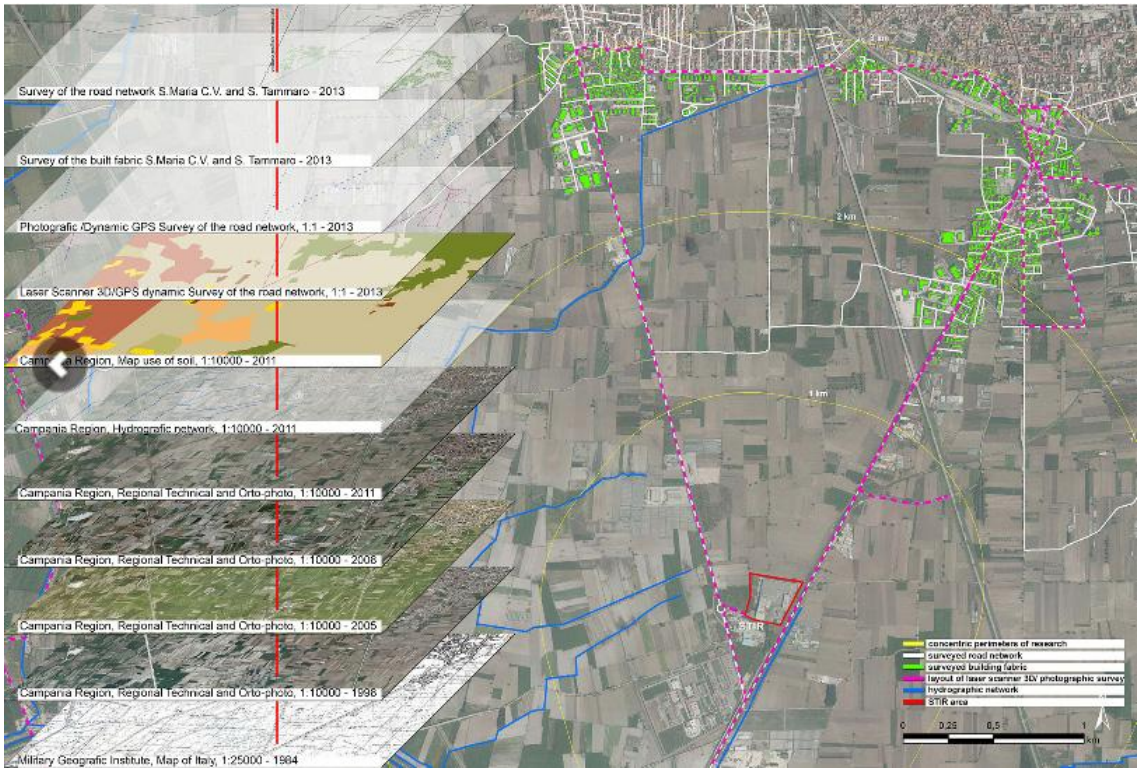


Fig. 8: Plant Anaerobic Digestion in Santa Maria Capua Vetere. Knowledge layers.

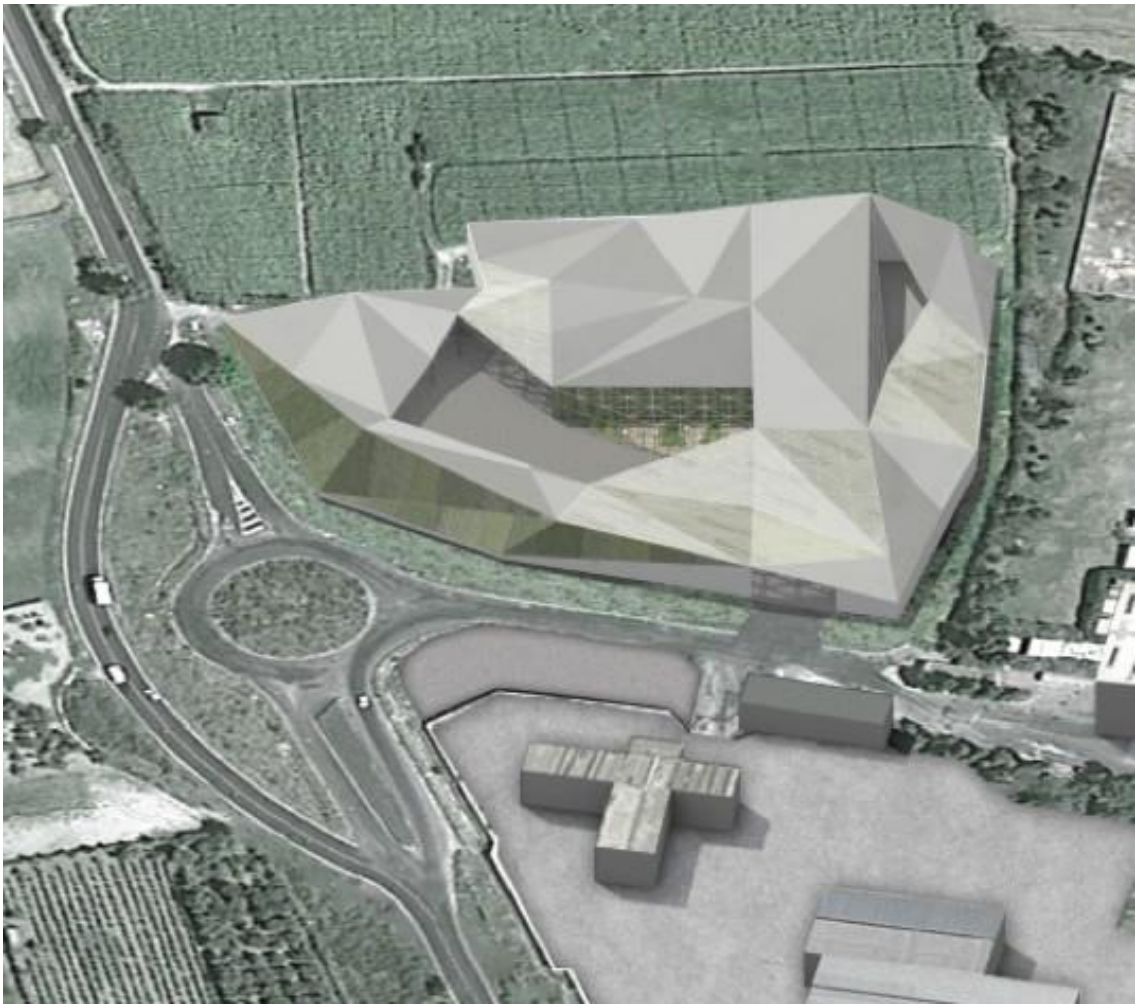


Fig. 9: Plant Anaerobic Digestion in Santa Maria Capua Vetere. Project.

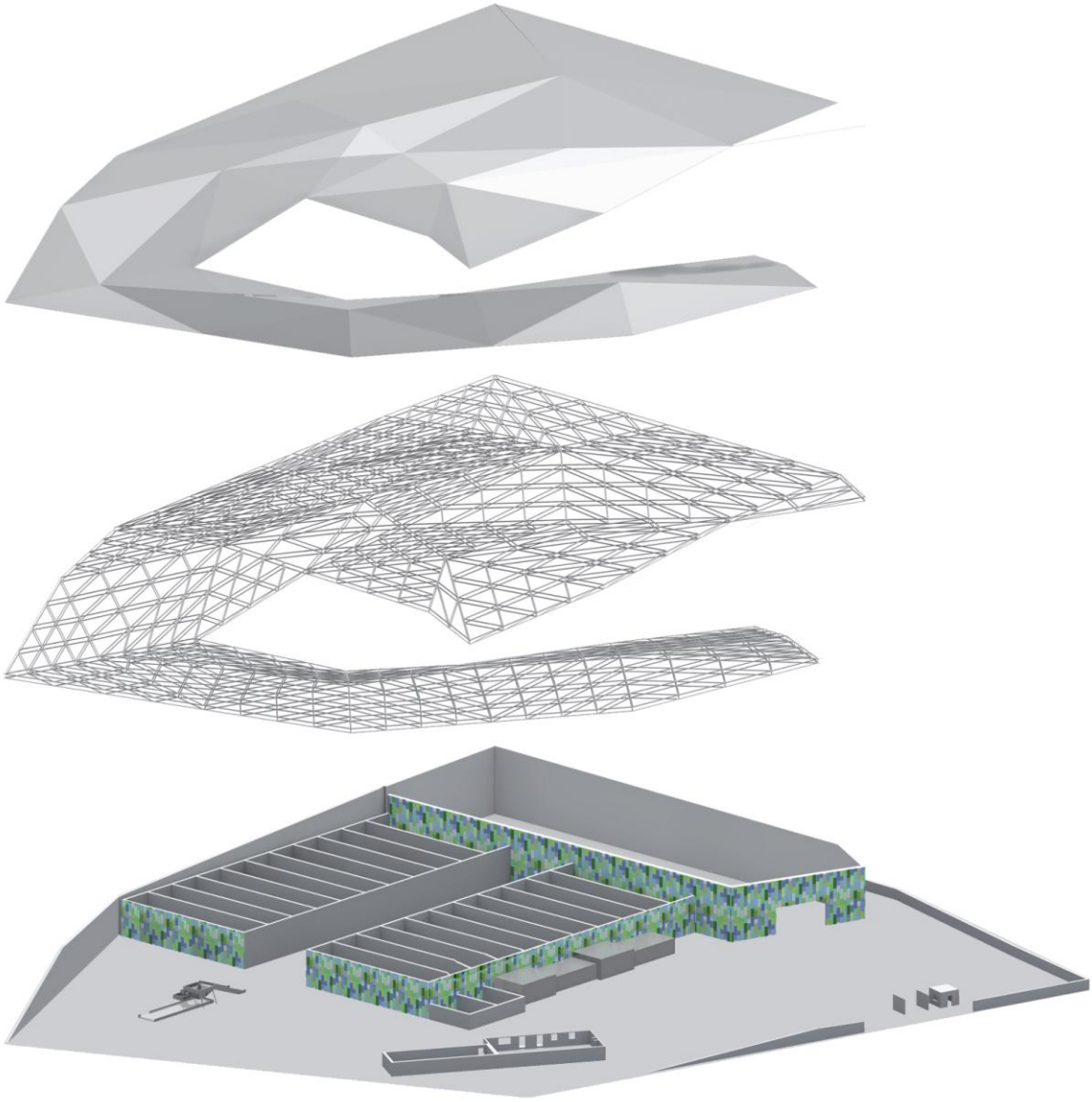
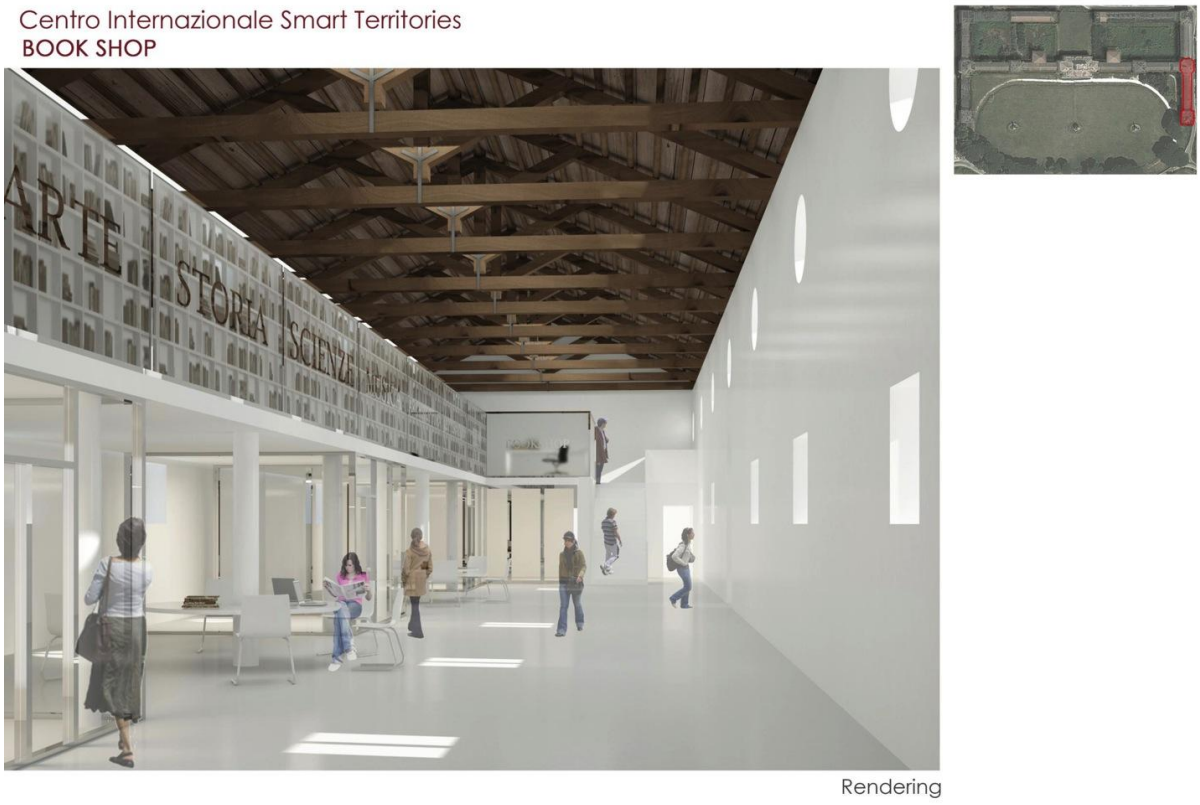


Fig. 10: Plant Anaerobic Digestion in Santa Maria Capua Vetere. Project.

In addition, on a monumental scale, with the Royal Palace of Carditello , we assumed not only the restoration of the architectural complex itself but also the regeneration of the foundational functions of the Factory, endorsing the current needs of the community, the functions promoted by the Bourbon project to create innovation and development in agriculture.
(Figg. 11-14)



Figg. 11-12: Carditello Royal Palace: rehabilitation project.





Figg. 13-14: Carditello Royal Palace: rehabilitation project.

In conclusion, taking the initial assumption on the primacy of thought, it is worth highlighting that technology allows thought to enter the body of Architecture and the Territory, to control the phenomena of change in progress, to capitalize integrated diachronic and synchronic information and data to provide a material that is not addressed by a reductive broad vision, full, but that allows to analyze the mind of Man from the building blocks that make up the matter in both its generative factors as well as the processes of change that are realized over time.
Therefore, I am convinced that by engaging in a process aimed at increasing the scientific welding between humanism and technology, we will achieve the expected results for a “best practice in HERITAGE” and good governance for the protection and preservation of the heritage inherited.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Fourth Right – a possible new way to conserve Chinese urban villages

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Abstract

Despite their reputation for narrow alleys and messy streets, urban villages in China are crucial to the stability of many big cities such as Beijing and Shanghai. Urban villages not only provide affordable living spaces for an enormous floating population that illegally moves to China's big cities, but they also provide a safe and comfortable social setting for them. The urban villages, however, are under constant threat due to continued government pressure as China's major cities become even larger and more modernized, resulting in the replacement of low- and mid-rise buildings with high-rise buildings. On the other hand, as more and more of China's floating population move to urban villages, the government cannot ignore the danger of unrest or even potential riots if the urban villages were torn down too quickly. Recognizing the importance of conserving China's urban villages, this paper looks into the power structure of the existing system and at the principal players involved such as developers, government officials, and the villages themselves, and then proceeds to analyze the factors that could influence the distribution of power within this structure. In conclusion, this paper suggests a new way of conserving China's urban villages – by increasing illegal construction inside the urban villages, thus increasing the compensation costs of tearing them down. This strategy is called the Fourth Right, or silkworm nibbling, and is differentiated from the existing three legal property rights.

Keywords: Urban village, floating population, illegal construction, Fourth Right, silkworm nibbling

Section

Urban villages appear both on the outskirts of and within major cities, including Beijing, Shenzhen and Guangzhou, among many others. The villages normally are surrounded by skyscrapers, transportation infrastructure, and other modern urban construction. Urban villages are characterized by dense, mid- to low-rise buildings, ambiguous private-public space, and shared community facilities such as public bath houses and public toilets. Often they are enclosed by walls with doorways to separate them from the surrounding areas. In 2008, there were more than 500 urban villages inside Beijing alone. With the expansion of city limits, more and more urban villages are forming.

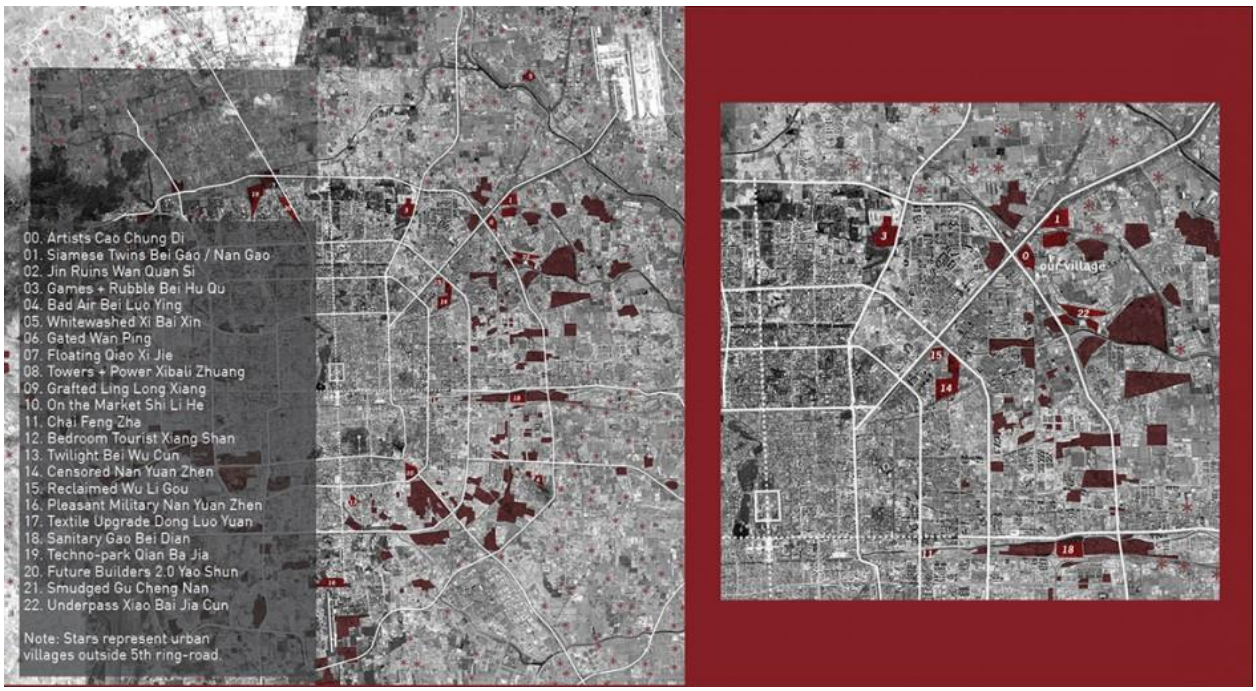

Fig. 1: Urban Villages in Beijing[1]



Fig. 2: Xian Village in Guangzhou[2]

Although there are multiple reasons for the existence of urban villages, the household registration system in China is considered one of the fundamental factors leading to the development of isolated urban villages. The household registration system basically prohibits people in China from moving their households from cities in which they are registered to other cities without undergoing a difficult and painful government authorization process. This has resulted in a large number of old villages that did not modernize or industrialize due to the lack of vibrant commercial activity and innovation. After the Chinese government opened its doors to the West in the early 1990s, this problem suddenly became more prominent. The growth of new industries and the demand for residential and commercial space required that city governments clean up and make available village farmlands for new usage. These farmlands and villages used to be located on the outskirts of cities; they were purchased compulsorily and turned into urban land by the government. Some of the old villages, however, were left alone due to the high social and economic costs of compensating for lost farmland and relocating

the original villagers. Further, the government had to arrange jobs in the city for the unskilled villagers, who mainly were farmers under communist policy.

Over time, the original farmlands in the urban villages underwent dramatic changes. With the rapidly increasing prosperity of areas that bordered or surrounded the urban villages, the villagers began to pursue higher economic value-added activities than farming such as renting apartments and opening restaurants and retail shops. The vast farmlands progressively were over built with illegal structures, i.e., structures built without legal permits. The situation was exacerbated as the villagers attempted to maximize their profits and returns by illegally extending their buildings up and out. Even without selling the land, the village landowners became rich landlords and became unwilling to move. With surrounding land values (or "land use" values because land is owned by the government; only land-use rights are granted to individuals) skyrocketing, the compensation costs for the government to tear down the villages also increased dramatically; this is because compensation values are normally set according to market values with a similar usage. In addition, the urban villages became an essential stabilizing force in major cities, even though they made urban planning by the central government difficult. The important role they played was to serve as a suitable and unique environment for the survival of what is called China's floating population.

The floating population arose due to unequal working opportunities and wages between rural areas and cities. In 2010, the urban-rural income gap was 3.23 according to Chinese official statements. A study by Professor Jinjun Xue, Nagoya University, Japan and associate professor Wenshu Gao, Chinese Academy of Social Science, shows that the official estimate may be too high; it may be 2.29 to 2.84, but either way, it indicates a significant income gap between rural areas and cities.[3] Moving to cities, however, has its challenges. For example, because of a household registration system in China, it is illegal to move to cities from rural areas. This did not stop people from migrating to the cities, however, thus creating illegal migrants, or a so-called floating population. Because they moved illegally, they are not eligible for many benefits while in the cities to which they streamed, including insurance coverage, education for their children, and public housing. As a result, the living standards of the illegal migrants actually may be worse than in the rural areas from which they came. It is hard to generalize a single reason for the illegal rural-urban migration. Some may be trying to fulfill their dreams to become rich or famous, and these individuals may intend to stay permanently in the cities. For many, however, the hope is simply to accumulate as much money as possible in a short period of time, then return home to their villages.

It is difficult to figure out the precise amount of floating population in each major Chinese city because it changes rapidly; however, according to an estimate from the National Bureau of Statistics of China, in 2010 Chinese cities had a combined floating population of about 220 million people, with another 243 million floating population expected by 2025. This would take China's urban population to nearly one billion people. A floating population by 2025 of about 460 million migrants would represent almost 40 percent of the total urban population. This floating population represents a major social and political cohort in urban China, and it requires each city to create an environment to accommodate the needs of these people.

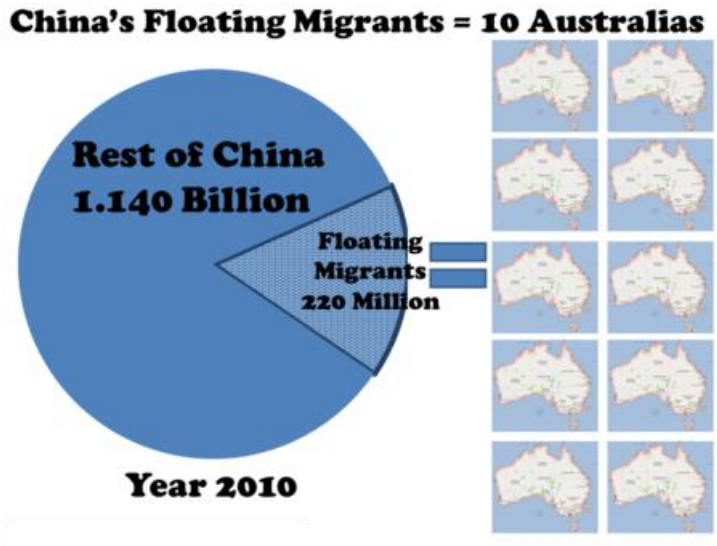

Fig. 2: Floating population in China[4]

The environment for most members of the floating population is fundamentally different from newly built, high-rise urban spaces. Those in the floating population are not interested in comfort or luxury; they are focused only on economics such as their rent. To accumulate as much income as fast as possible, the floating population seeks the most economical way to survive while in the cities. This has created unique urban environments such as the Ant and Mouse tribes. The Ant tribe is people who subdivide their rental space in high-rises into the smallest possible spaces which they then sub-let to the floating population. The Mouse tribe is people living in underground bunkers below the high-rises. According to a study done by the Chinese Bureau from data that was based on 1,675 entries over the past 18 months from 163 different contributors, the average high-rise resident has 700 square feet of living space with a monthly rent of around 5,000 Yuan, while urban village residents pay 500 Yuan for 200 square feet of living space. Because it is illegal to rent out bunkers as dwellings, there are no official figures for those living in such an environment. According to my visit in June 2012 to more than 10 sites and nearly 50 residents, however, the average Mouse tribe resident pays around 70 Yuan for about 45 square feet of living space. From my interviews, most Mouse tribe residents consider their dwelling to be temporary and will consider moving to an urban village after their income improves. Considering such dangerous and inhumane conditions, urban villages seem to be the only feasible solution for the floating population.

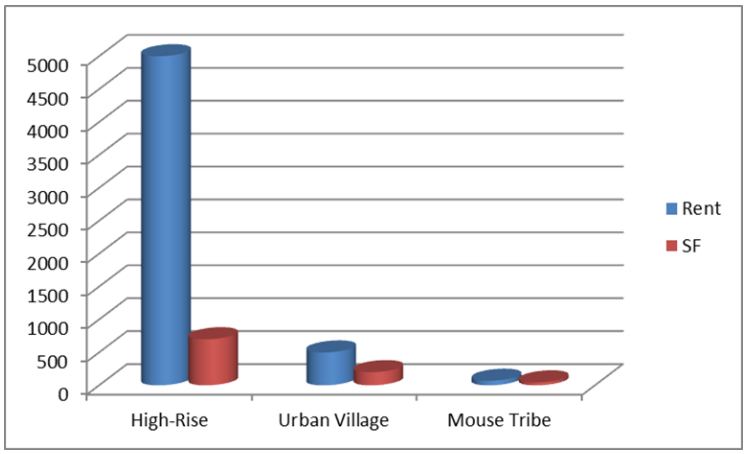

Fig. 3: Rent price and square foot comparison



Fig. 4: Mouse tribe living

The living conditions in urban villages, while better than for the Ant and Mouse tribes, are still different from other parts of the city. To make more money, landlords (the legal land-use owners) in the villages usually not only illegally expand their buildings, but they also sub-divide their rental properties into the smallest possible units. This puts enormous pressure on tenants to utilize smartly their available space.

One of the most common ways for tenants or the floating population to expand their available space is by invading public space for private activities such as cooking, washing, and even for small businesses. These invaded public spaces are among the liveliest areas in some cities and are notable for providing economic and leisure opportunities for newcomers to the city.



Fig. 4: Invading public space in urban village

The growing floating population also supports many other businesses such as small restaurants, traditional markets, barbershops, etc. These small businesses price their products or services according to the purchasing power of the floating population, which normally represents a sizable discount compared with prices outside the village. Urban villages are like small independent towns within cities with their own ecological system. To some extent, it is necessary to conserve the urban villages, not only for the benefit of the millions among the floating population, but also for the stability of China itself.

With pressure to increase the density of cities to accommodate growing populations and business activities, the Chinese central government is eager to replace the low-rise villages with high-rise buildings. This is evident by comparing a Google map of Beijing over different time periods. The main forces that prevent the government from moving forward as quickly as it might like with its plans to demolish villages is the huge compensation that would have to be paid for land-use rights to the landlords and the concern of precipitating unrest or even riots among the floating population due to the loss of affordable accommodations.

In 2007, a property law was passed in China. Chapter 5 of the law defines three property types within the People's Republic of China -- state, collective and private. Chapter 4, Article 40, of the law divides property rights into three types: ownership rights, use rights, and security rights. The law does not change the system of land tenure by which the state owns all land, but in formalizing existing practice, individuals can possess a land-use right, defined in Chapter 10 of the law.

Ownership rights or land ownership rights belong either to the central government or the local collective (the local government). Although urban villages are located within an urban area, land ownership rights are still regulated under the rural land system. In this system, land has not been privatized. Ownership remains “collective”, with local officials, typically at the village level, exercising a major influence over the allocation of land and the way households can use the land.

Land-use rights, however, are granted by local governments or the central government for different periods of time and for different usages. For example, the longest duration for a land-use right is 70 years for residential use. This land-use right can be traded like a commodity in the marketplace.

The compensation issue with the urban villages that prevents the government from tearing down the villages at will is for this right.

The land-use right, however, is influenced also by another unofficial right. Here I give it a name – the Fourth Right. The Fourth Right is the right to use public space through time, not law. The Fourth Right is considered a norm in China. People illegally occupying a public area through time tend to claim the right to use the area. Although it is not legal, the government tends to recognize it in fear of conflict or due to the lack of precise survey data and funds to demolish the illegally built structures. Although each city has its own way to reinforce its right to demolish illegally built structures, most of them include some form of compensation. For example, in Guiyang in 2013, the government provided compensation for illegal construction of up to 240 square meters. According to a report from the China Times, these types of practices and cheap construction costs have led to a huge increase in illegal construction over a short period of time.[5]

There is a special name for the act of illegal construction invading public space gradually through time; it is called “Jiang Shi”, which means “a silkworm that is nibbling”. For “Jiang Shi” to occur requires mainly two conditions – duration and boundaries. To declare a right to compensation for such space, villagers need to demonstrate how long he or she has used the space and how large the area is. This can be done with photos or witnesses.

Caochangdi, an urban village in Beijing, is a good example to demonstrate how the Fourth Right and its conditions could be used, especially by changing traffic patterns in the area, to encourage “Jiang Shi”. With increasing “Jiang Shi” behavior, the villagers’ Fourth Right could be strengthened, thus conserving an urban village.



Fig. 5: Google image Caochangdi 2002



Fig. 6: Google image Caochangdi 2008



Fig. 6: Google image Caochangdi 2012

Caochangdi is one of nearly 500 urban villages in Beijing, located near the Fifth Ring Road. Its estimated population is about 1.5 million people. In addition to an enormous floating population that characterizes all urban villages, Caochangdi also has a unique feature that is different from other villages; there are large numbers of local and internationally known artists who have established studios in the area, including the famous dissident, Ai Weiwei. This occurred because local officials have an open attitude toward art and culture.

From Google aerial maps of Caochangdi over different periods of time, we can see illegal construction take place over time, especially near empty public spaces. The pace at which this occurs, however, is different due to traffic patterns; if a road has a lot of vehicular traffic, the pace at which public space is invaded is dramatically slower. With fast and heavy traffic, the two essential conditions of “Jiang Shi” – duration and boundaries – are difficult to establish. Most villagers do not own vehicles, so the fast and heavy traffic in the area is mostly flow-through traffic or those taking short cuts to go elsewhere in the city. To slow down the traffic or even turn the vehicular traffic into bicycles or pedestrian walkways, which are the means of transportation use by most villagers in the area, art pieces could be donated by different artists and placed in strategic positions. Strategically displaying street art through partnerships with the local and international artists in the community would slow down and even change the nature of the traffic in the area, potentially even turning the targeted area into a pedestrian-only zone. This would enable and encourage the residents to exercise their Fourth Right, thus aiding in conserving the special character of the Caochangdi area.



Fig. 7: Art sculptures in Beijing 798 art district

This strategy was utilized in the nearby Beijing 798 art district, although the principal driver for this at the time was to clearly establish the identity of the area as a haven for artists and their art. The effect of this, however, also led to a dramatic change in traffic flows and conditions, resulting in dramatically less and slower traffic and the progressive establishment of illegal construction that invaded public spaces.

To roughly monetize this strategy in the case of Caochangdi, we can use the biggest plaza in the village, the Central Plaza, as an example. The total site encompasses 1,040 square meters. With an average compensation price near the area of 50,000 Yuan per square meter, 900 square meters of "Jiang Shi" construction would increase compensation costs by 45 million Yuan; 450 square meters would increase compensation costs by about 20 million Yuan. When we consider that multiple levels could be built, the effect of a substantial increase in compensation costs on government plans to demolish the area cannot be overlooked.

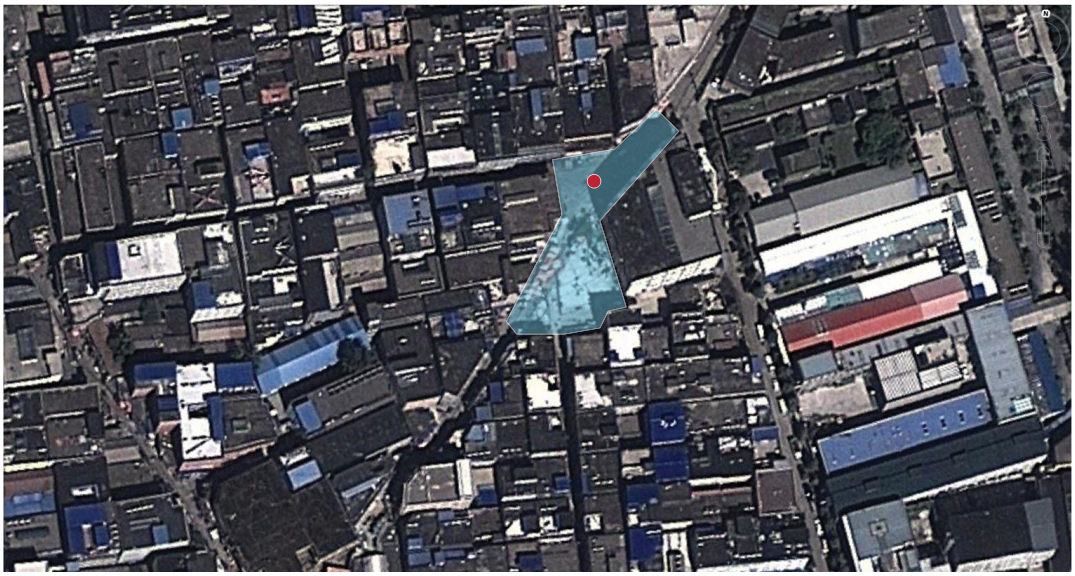

Fig. 8: Caochangdi Central Plaza

Bibliographical References

[1] http://www.studioweissman.com/portfolio/beijing-urban-village/

[2] http://xianvillage.wordpress.com/page/2/

[3] Xue, Jinjun & Gao, Wenshu. How Large is the Urban-Rual Income Gap in China? Seattle: University of Washington, 2012.

[4] Maheshwari, Andy. China: 220 Million Floating Population and International Security. China: Examiner, 2012.

[5] http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20131104000015&cid=1103

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Turin observe the time Gian Giacomo Plantery

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Abstract
Turin observe the time Gian Giacomo Plantery, Architect (1680 Turin 1756), uncle and teacher of B. Vittone.
He created his works, between Baroque and Neoclassicism, during urban renewal and the construction of Turin, we are inside the quadrilateral in the Roman port director to plum on the way to France in the axis of enlargement traced by Juvarra current square where the Savoy roads are expanded from 6 meters to 11 meters.
At the time he was commissioned aristocratic palaces with spectacular interiors and sometimes fanciful, such planteriane (Saluzzo Paesana, 1715-18; Cavour, 1729, etc..) And homes for rent. The survey does compare the artifacts of the eighteenth-century city today the charm of time researching and comparing the values found along roads projects iconography and what has been achieved and the charm was that period.

Keywords: Turin, Gian Giacomo Plantery

The analysis carried out to observe Turin at the time Gian Giacomo Plantery, Architect (1680 Turin 1756), uncle and teacher of B. Vittone. He created his works, between Baroque and Neoclassicism, during urban renewal and the construction of Turin, we are inside the quadrilateral in the Roman port director to plum on the way to France in the axis of enlargement traced by Juvarra current square where the Savoy roads are expanded from 6 meters to 11 meters. At the time he was commissioned aristocratic palaces with spectacular interiors and sometimes fanciful, such planteriane (Saluzzo Paesana, 1715-18; Cavour, 1729, etc..) And homes for rent. The survey does compare the artifacts of the eighteenth-century city today the charm of time researching and comparing the values found along roads projects iconography and what has been achieved and the charm was that period.

Among the customers of Plantery are represented, with its very special characteristics typical, the whole range of social categories richest who moved the capital of Piedmont, in the historical context of the whole was favored by skilled and initiatives concerned the royal house. This migration was interested in the new King of Sardinia, the ancient nobility of the province to the capital by transferring their residence wore a result of the great wealth of the agricultural property must give the tone to the baroque splendor of a court.

These palaces wanted to appear palaces, but in reality had to be instruments of income, as they are today our multi-family homes. The large building in Via della Consolata n. l, occupying 5000 square meters purchased in 1715 by Senator Count Baldassare di Saluzzo Paesana, a

descendant of an ancient race, Knight of the SS. Annunziata, the palace presented as a counterpoint to the palace, had two entrances with doorways through which they passed lavish parades where festivities were held fabulous, actually included many rental housing, adapted by the inspiration of a skilled artist to impress with spectacular precautions. The author himself became a tenant of the bourgeois noble client. Even the building in Via Cavour n. 8 has this character of utility Cavour The palace was built fourteen years after the palace of Saluzzo Paesana, in a stylistic period in which the rococo triumphed in Piedmont at that time we have events in neoclassical style in reaction to the Baroque therefore an important document of an attitude crisis of aesthetics denounced by the difficulty of coexistence of heterogeneous structural and decorative elements. The structures, thanks to the cultural evolution of the architect go from a severe majesty to a simple elegant and graceful, the stucco decorations are affected by the phenomena of elegant taste of the label.

Gian Giacomo Plantery is a characterization investigating some aspects, first drawings of the facades, with which emerges while maintaining a decorative style, a simple background with a pattern almost repeated that identifies today. While the most characteristic feature, is the architect designer of sometimes quite typical for structures and for ornamental purposes defined by the name of planteriane times, these times were to characterize the hallways of the buildings in a unique way, almost to want to make it unique in its appearance interior. Rearranging the times of Plantery chronologically, from the times of the atria and the vestibules of the houses and Novarina Cigliano, sometimes the hallways and lobbies of the buildings and houses and Cavour Paesana Capris and Fontana Cravanzana, spread a single issue that mature formal style true even today.

Checking the drawings he submitted to the Board of ornate, we can see how they were carried out according to the will of the architect, and not tampered with in time, which would need a lot of maintenance but overall the aesthetic simplicity to favorite, their conservation.

The district with the most eye-General, and urban design maintains a balance in the past, today enhanced, by the transformation of the streets in pedestrian areas. As a whole, the redevelopment of the time it remained a cultural resource as a result will be presented drawings preserved in the historical archives of the city of Turin and sample a taste of the photo made by me.

Archival collections
ASCTo: Archivio Storico del Comune di Torino,
AF. ASCTO: Archivio Fotografico dell'Archivio Storico del Comune di Torino
AF FTM: Archivio Fotografico della Fondazione Torino Musei Fondo Gabinio: Fondo Gabinio in Archivio Fotografico della Fondazione Torino Musei
AST: Archivio di Stato di Torino
Archival collections
ASCTo: Archivio Storico del Comune di Torino,
AF. ASCTO: Archivio Fotografico dell'Archivio Storico del Comune di Torino
AF FTM: Archivio Fotografico della Fondazione Torino Musei Fondo Gabinio: Fondo Gabinio in Archivio Fotografico della Fondazione Torino Musei
AST: Archivio di Stato di Torino



Fig. 1 In 1796 the architect Amedeo Grossi draw up the paper plant in Turin demo with numbers indicating all the owners of the houses, the churches with letters of the alphabet and description of the districts, squares and main





Fig.2 images of 2014



Fig. 3: **Palazzo Saluzzo Paesana** original project archive photos contemporary image



Plantery build the palace in 1729, spectacular sequence of spaces leading on from the atrium, which is split up into two ambiences with vaults which lunettes and stucco decorations.



Fig. 4 **Palazzo Cavour**

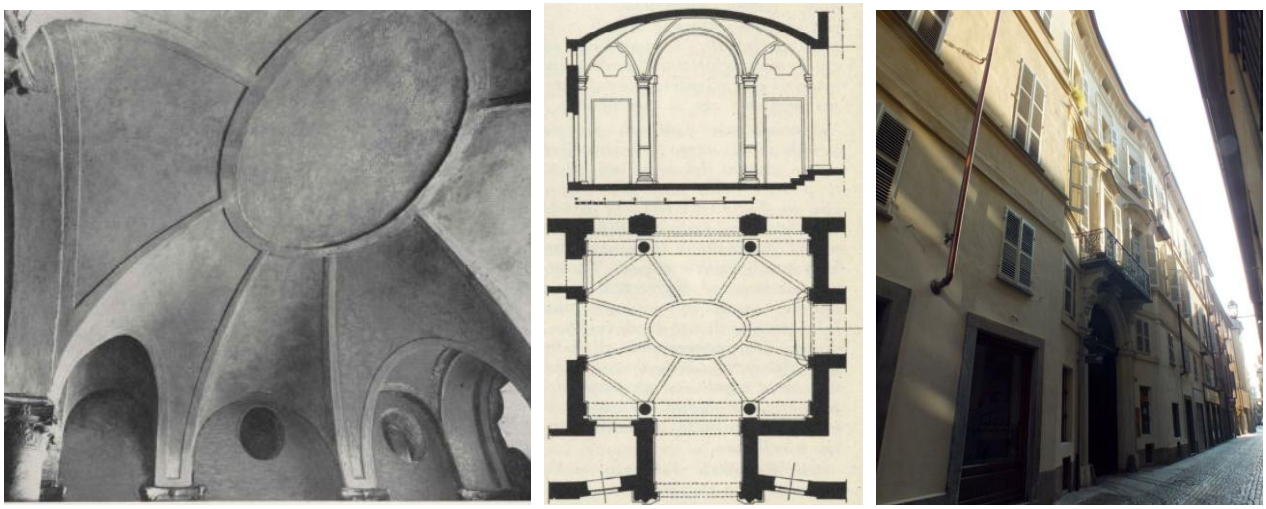
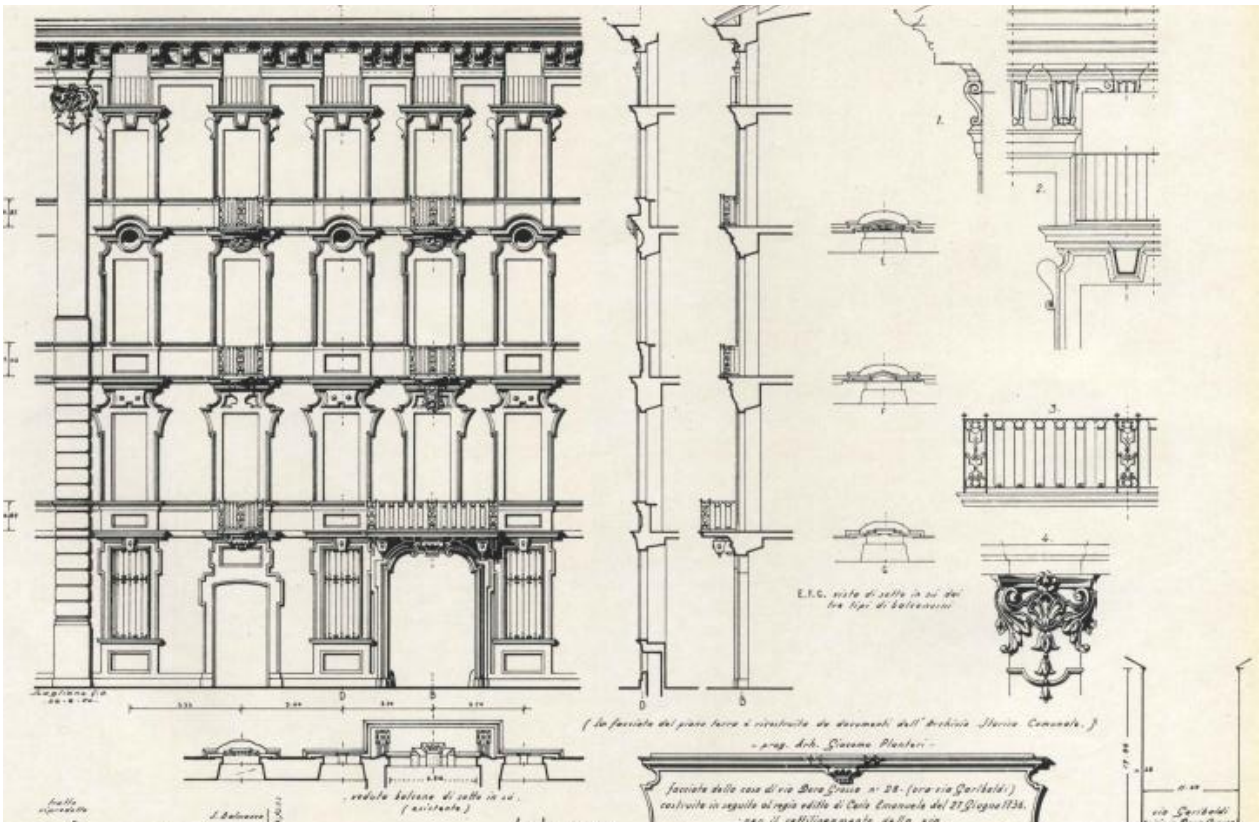


Fig.5: **Palazzo Cigliano via Barbaroux**



The Marquis of Fontana rebuilding of Dora Grossa now via garibaldi , the project was intended to change the romans medieval cityscape radically.

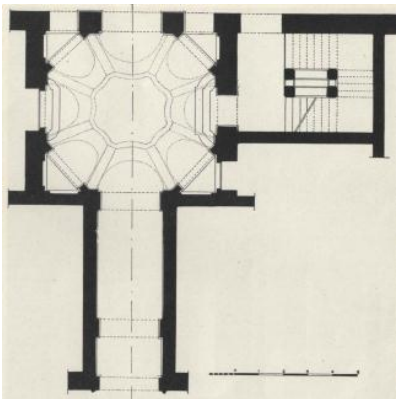










Fig.6 **Via Garibaldi** Designs Plantery, atrium Palace Fountain Street Dora big 1753

Bibliographical References

[1] CAVALLARI Murat, Augusto, Gian Giacomo Plantery, architetto barocco : nella ricorrenza del bicentenario della morte, Estr. da: Atti e rassegna tecnica della Società degli ingegneri e degli architetti in Torino 1957.

[1] CAVALLARI Murat, Augusto, Gian Giacomo Plantery, architetto barocco : nella ricorrenza del bicentenario della morte, Estr. da: Atti e rassegna tecnica della Società degli ingegneri e degli architetti in Torino 1957.

[2] CAVALLARI Murat, Augusto,Forma urbana ed architettura nella Torino barocca: dalle premesse classiche alle conclusioni neoclassiche, UTET, Torino1968.

[3] COMOLI MANDRACCI Vera, La proiezione del potere nella costruzione del territorio, in GRISERI Andreina, ROMANO Giovanni. (a cura di), Filippo Juvarra a Torino, Nuovi progetti per la città, Torino, Cassa di Risparmio di Torino, 1989

[4] COMOLI MANDRACCI Vera, La citta-capitale e l architettura , in COMOLO MANDRACCI Vera, Itinerari Juvarriani, Torino, Celid, 1995 pp. 9-26

[5] COMOLI MANDRACCI Vera, La dimensione urbanistica di Juvarra per l idea delle città-capitali , in COMOLI MANDRACCI Vera, GRISERI Andreina (a cura di), Filippo Juvarra, Architetto delle capitali da Torino a Madrid. 1714-1736, Torino, Ed. Fabbri, 1995

[6] COMOLI MANDRACCI Vera, GRISERI Andreina (a cura di), Filippo Juvarra, Architetto delle capitali da Torino a Madrid. 1714-1736, Torino, Ed. Fabbri, 1995

[7] COMOLI MANDRACCI Vera, Una nuova Versailles incompiuta in COMOLI MANDRACCI Vera e ROCCIA Rosanna (a cura di) Progettare la citta. L'urbanistica di Torino tra storia e scelte alternative, Archivio Storico della citta di Torino, Torino, 2001 pp.107-109

[8] CORNETTE Joël, Absolutisme et Lumières 1652-1783, Paris, Hachette Supérieur. CUNEO Cristina, La Basilica di Superga , in COMOLO MANDRACCI Vera, Itinerari Juvarriani, Torino, Celid, 1995, pp. 101-109

[9] DARDANELLO Giuseppe, Il Piemonte sabaudo in CURCIO Giovanni, KIEVEN Elisabeth, Storia dell architettura italiana. Il Settecento, Milano, Electa, 2000, Vol.1 pp 380 – 421

[10] DEFABIANI Vittorio, La palazzina di Caccia di Stupinigi , in COMOLI MANDRACCI Vera, Itinerari Juvarriani, Torino, Celid, 1995, pp 135-143

[11] Derossi, Onorato, Nuova guida per la città di Torino, Torino, 1781.

[12] GABETTI Roberto, GRISERI Andreina (a cura di) , Stupinigi, luogo d'Europa, Torino, U. Allemandi, 1996

[13] GRISERI Andreina, Le metamorfosi del barocco, Torino, G. Einaudi , 1967

[14] GRISERI Andreina, La Palazzina di Stupinigi, Novara, Istituto Geografico De Agostini, 1982 GRISERI Andreina, Ambienti del Settecento, Novara, Istituto geografico De Agostini.

[15] GRISERI Andreina, Juvarra regista di una rivoluzione del gusto , in GRISERI Andreina,

[16] GRISERI, Angela, Il palazzo Saluzzo Paesana, U. Allemand & C., Torino, 1995. [IT\ICCU\BCT\0008909]

[17] MAFFEI Scipione, Elogio del signor abate D. Filippo Juvara Architetto, 1738 in BRINCKMANN Albert Erich, ROVERE Lorenzo, VIALE Vittorio, Filippo Juvarra, Milano, Oberdan Zucchi, 1937, pp.18-21

[18] MONCASSOLI TIBONE Maria Luisa, Ritratti per un re : Vittorio Amedeo II dalla storia all'immagine, Torino, Regione Piemonte, ANISA (Associazione nazionale insegnanti di storia dell'arte), 1991.

[19] Olivero, Eugenio, Il palazzo Cavour in Torino, Stamperia Artistica Nazionale, Torino1932 .

[20] CITTÀ di TORINO, Inventario degli Alti dell'archivio comunale dal 1111 al 1848, stamperie diverse, Torino.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The"*illusory space*"from wall frescos to "*quadraturismo*", to cyclorama.
Planar and solid representation techniques and restitution of imaginary space.

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Abstract (ID nº 003)
At the advent of descriptive Geometry (*Poncelet 1822*) the representation of illusory space framed by painted and/or solid architecture had reached a satisfactory technique: Donatello ("*stiacciato*") Borromini (*forced perspective*) Pozzo ("*quadratura*"-"*anamorfosi*").
With the discovery of the wall roman paintings of Pompeii, the evolution process of the illusion technique is completed that, from the Hellenic theatrical scenography, with the degradation of measurements ("*double ratio*"), the introduction of vanishing points ("*operation of projection and sectioning*") gets to the illusion of building in a virtual space.
In the presence of whichever *trompe l'œil* Pompeii cannot not be thought of/*revisited*: *From the world to Pompeii*.
The transfer of the preparatory drawing (*chequered* in advanced) on the surface to paint forces to enlarge it to adapt it to the geometry of the painting plane: it consists of projective problems that found verification in the practical execution of the transfer of the drawing on the surface of the vault.
This paper deals with the geometrical/projective problems relative to the realisation of the wall paintings and presents a confrontation in the restitution of the preparatory cardboard of the space represented in one of the partitions of the barrel vault of the nave of St. John in Valletta painted by Mattia Preti.
Two examples of restitution of the illusory space are presented with the analysis of the vanishing points and the architectural structure that creates the illusion of the *Panorama Mesdag*.

Keywords: Projective geometry ; quadraturismo ; Mattia Preti ; Trompe-l'œil .

1. Scope and Methodology.

In the wall paintings the perspective set-up that frames and/or acts as background to the scene has a fundamental importance to guarantee the illusory effect of an "imagined" space.
The geometrical exercise of the plani-volumetric restitution of the entities painted on the various surfaces reveals the capability of the artists to represent spaces anyway well defined, making use of the visual experience and of some empirical methods without the support of a specific geometrical theory.

2. Projections on planes and primitive surfaces.

The central projection of architectures on the wall limits of (architectural) spaces, has the aim to make the observer believe he is "admiring" or "finds himself in" a real space.
On the vertical surfaces, once having chosen the sight position, the illusory representation is assured by the degradation of the heights/altitudes and in general by the spatial relationships of the parts of the composition.
The composition will be made up of plane curves resulting from the plane section of the visual cone, and in all its area these figures have a bijection function with those "imagined".
When the support becomes cylindrical of spherical, the curves will be skew and it is useful to overlay a reference grid (*quadratura*) on the perspective view of the desired space, thought of as enlarged and placed on the level of the impost of the vault surface. (Fig.1)
To graphically obtain the successive projection on the cylindrical vault of the initial perspective in true form (preparatory sketch) it is sufficient to note that the lines of the quadratura parallel to the generatrix of the

cylindrical vault will have their projections coinciding with the generatrix of the same vault, whilst the lines on planes parallel to the directirx, will turn out to be curved like all the others in generic positions. (Fig. 2)
On the auxiliary plane belonging to the directrix of the cylindrical surface, the generatrix projection of the line to which the point that has to be projected belongs, is located.
Having overturned on the mentioned auxiliary plane the projective ray, the distance of the projected point (on the cylinder) from the same auxiliary plane (where the directrix / edge of the cylindrical section of the vault lies) is located.
But not all the field of the initial perspective, once projected on the cylindrical surface, will be included in its space, or better, in the initial perspective the projection of the edges of the vault must be inserted and hence some projections "will fall" on the vertical walls with a considerable deformation (*anamorphosis*). (Fig. 3)

2.1 …"way of doing the *graticola* (quadratura) in vaults"...

The idea to project the shadow of the grid of ropes, tensioned at the level of the impost, with a lantern placed at the location of the sight position, even if having merit, must have found difficulties due to the obstruction of the scaffoldings and the distance of the vault from the lantern that would have projected shadows that were not distinct enough.
Pozzo finds a solution using a rope that, tied to the point of observation, is pulled/projected up to the surface of the vault always remaining tangent to the lines of the grid / quadratura.
Another problem is the drawing of the projections of the vertical edges of the imaginary architectural features that, apart from being skew, must appear to be converging at the vanishing point.
The sight position and a rope in tension from the projection of the foot of the imaginary edge to the vanishing point, form a vertical plane that intersecting the vault creates the projection of the vertical edge.
Being placed at the point of observation and pointing the view tangent to the mentioned rope vertical edges can be marked on the vault.
Alternatively, if another rope is considered hung to the vanishing point and left to hang, looking at it so that it coincides with the previous one, it is possible to draw a curve that in its extension will end in the vanishing point. (Fig. 4) [1] [2]

3. The vault of the St. John Co-cathedral in Valletta painted by Mattia Preti.

In the plane development of the first partition (entering), of the cylindrical vault the views oriented the most perpendicularly to the surface can be composed.
Preti invents an architectural frame that, dividing a "common" background sky in three illustrations relative to the life of the Saint, makes the observer believe he can see, in sequence, the development of the story.
Even if the scenes have three different vanishing points, or better, are three central perspectives, the architectural features and the objects, thought of with a side parallel to the frame/picture, have a common vanishing direction coinciding with the generatrix of the vault.
There are few imaginary curves that when projected undergo deformations and the vertical edges are minimal, so much so that Preti prefers to use the "atlantes" instead of columns that, even if adjacent to the edge, would have created problems. (Fig. 5)

3.1 Geometrical model of the represented space.

Having traced the projections of the edges of the architectural features of the first scene (entering to the left), it is noted that they coincide in three different vanishing points aligned on the axis of the composition.
From a geometrical point of view the construction is wrong but, in practice, the observer is forced to raise his view to view the scene completely.
Hence different projection frames "are created" that give rise to a "vanishing axis".
Majestically, Preti creates a first space at the impost of the vault where he places the figures with the same size of the real oval windows.
These figures are placed on a basement on which rest, on a middle level, the bases of the atlantes and they themselves sit on a raised pedestal whose edges concur to the first vanishing point.
The main scene happens at the level of the middle level and is frames by an entablature with corbels supported by the atlantes.

The base of this frame will be observed before the same scene, therefore Preti provides another vanishing point and in the end the vanishing point for the main elements of the composition, of the background and the higher part of the frame.
From the tracings of the edges the geometrical construction of the perspective that allows to construct the geometrical model of the “illusory” space can be hypothesised and, having chosen an appropriate position for this, the quite reliable reconstruction of the “preparatory sketch” can be made, projecting on the surface. (Fig. 6) (Fig. 7)
The central scene is framed, with view form “the bottom to the top”, by a circular balcony being part of the main architectural frame whose model, reconstructed and projected on the surface, must be enlarged to coincide, as much as possible, with the real painting.
In this scene an impossible doric temple is represented that rests too close to the edge of the balcony and does not “continue” in the oculus of the scene to the right. (Fig. 8)

4. The space represented by Giotto.

Previously Giotto had deduced the usefulness of the different vanishing points relative to successive views of approaching the scene or else to a collective view composed with one directed to details.
In the representation of the "Benedizione di Innocenzo III" the views are majestically composed in a way that, whichever the choice for the plane on which the observer is places (plane of the Basilica or base of the illustration), the model of restitution of the represented space shows us an environment physically adequate to host the actors of the scene. (Fig. 9) (Fig. 10)

5. Forced perspective.

In the panels that decorated the pedestal of the altar in the Basilica di Sant’Antonio da Padova, Donatello represents spaces of a certain depth with architectural features that, in the case of the panel of the “Miracolo del fliglio pentito”, appear, thanks to the technique of the low relief (“stiacciato”), placed from the proscenium up to the backdrop (six levels) where a construction is placed axially with the scene and additionally rotated with respect to the view.
The first building on the right, with a different vanishing point on the line of the horizon, can be considered rotated in plan or else moved to show completely the stairs otherwise hidden by the characters of the scene.
In this case the exercise of planimetric reconstruction of the represented space can be incremented by the definition of a model of the levels of the low relief. (Fig. 11)

6. Cyclorama.

A panoramic view painted on a cylindrical surface and observed by a platform at the centre of the circular hall ensures the illusory effect of a realistic view enhanced by an adequate illumination, by the movement of certain elements, etc.
A first geometrical / projective problem is that to create the painting on canvas in adequate dimensions starting from a preparatory drawing of reduced dimensions.
In the “Panorama Mesdag” (The Hague), the drawing made on a glass cylinder positioned with the axis coinciding with that of the circular hall, is projected, from the centre of the cylinder, on the canvas, traced and hence completed.
In a panoramic view, in general, the alignment of the horizon is evident, or else can be deduced, whilst the lower limit has an irregular flow.
To delimit this lower part of the painting, that represent the part of the scenery closest to the observer, Mesdag builds a real beach from the platform to the canvas modelling the edge so that when seen from the sigh positions it overlaps to with the lower edge of the painting.
This second problem is solved, geometrically, intersecting the ruled surface, constructed by the circle located by the various positions of the observer at the lower edge of the painting, with a concentric cylinder to the one of the canvas and at an adequate distance from it. (Fig. 12)

Bibliographical References

Referring Web Pages Web:

[1] http://fondosdigitales.us.es/fondos/libros/1777/318/perspectivae-pictorum-atque-architectorum-i-pars-qua-facillima-ac-expeditissima-methodus-omne-id-quod-ad-architecturam-attinet-optica-ratione-delineandi-exhibetur/

[2] http://www.ilproprietario.it/Mondovi/Articles/arteestoria/Andrea_Pozzo_e_la_cultura_matematica

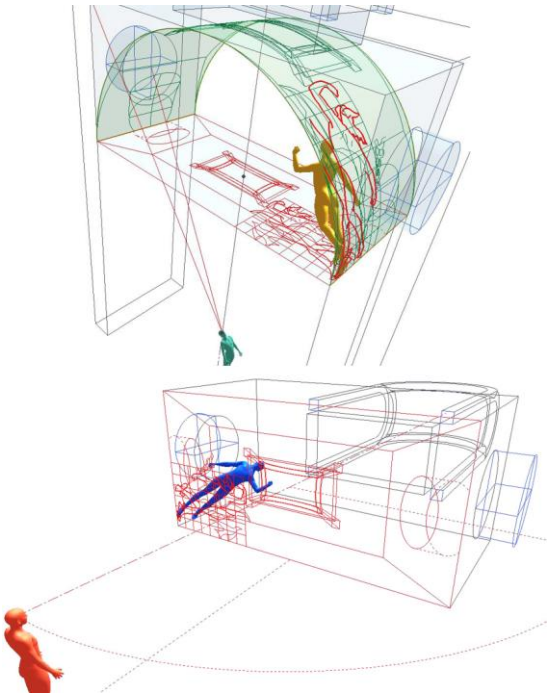

Fig. 1: Perspective of the imaginary space.

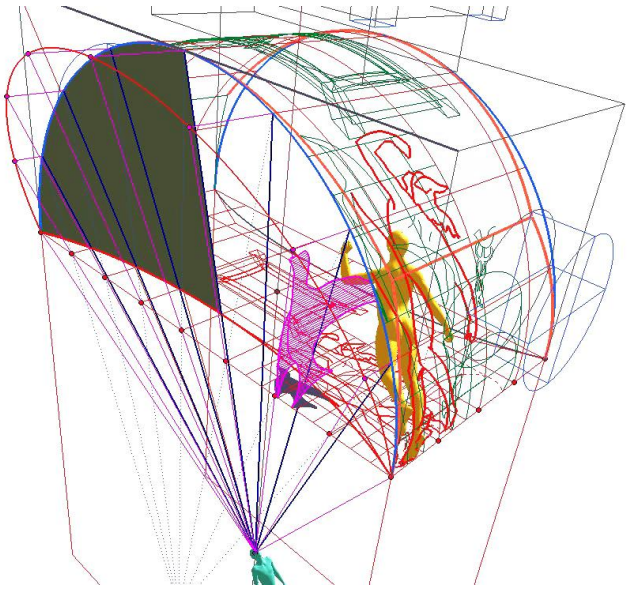

Fig. 2: Position of the initial perspective and its projection on the vault.

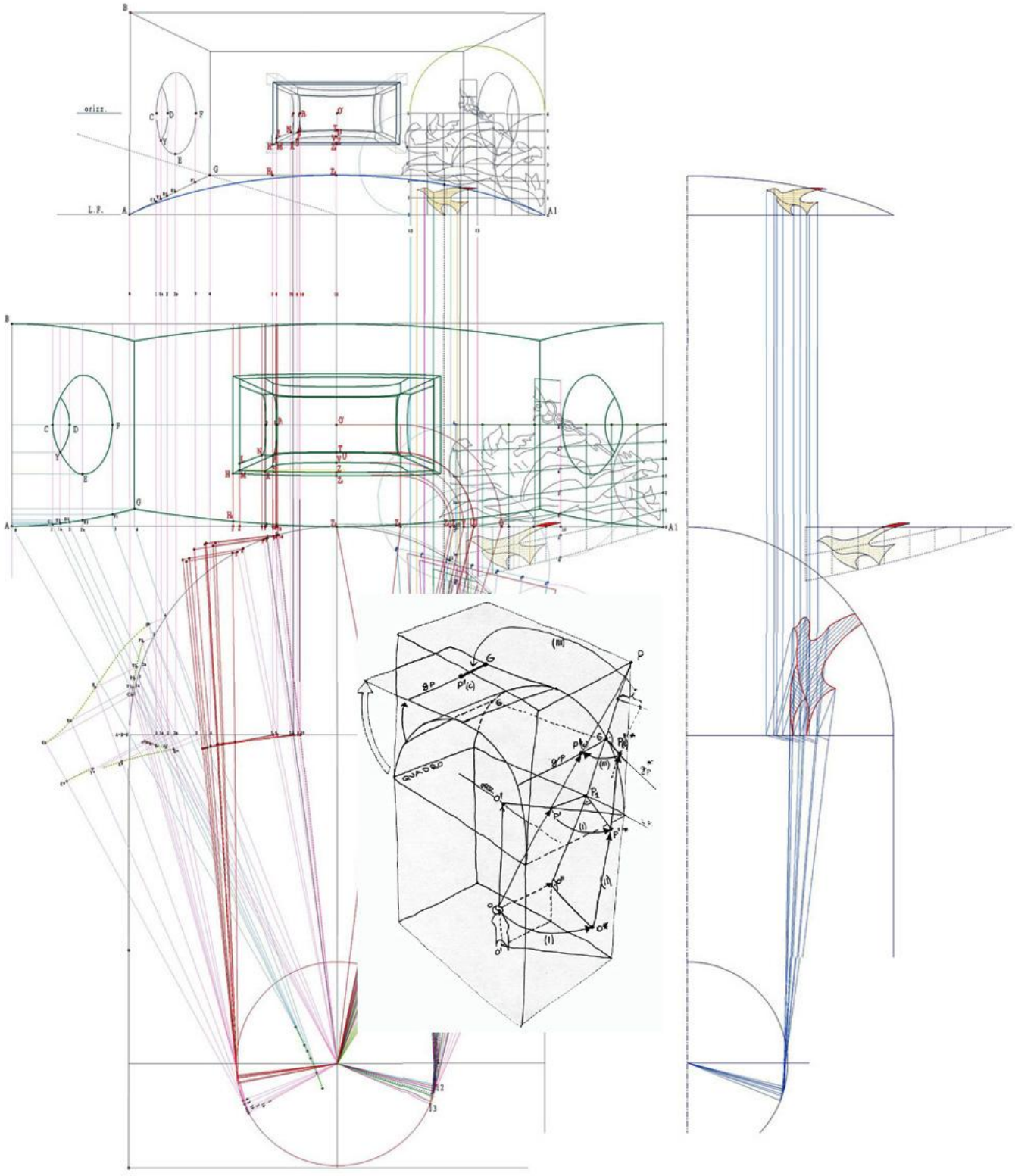

Fig. 3: Construction of the preparatory sketch.

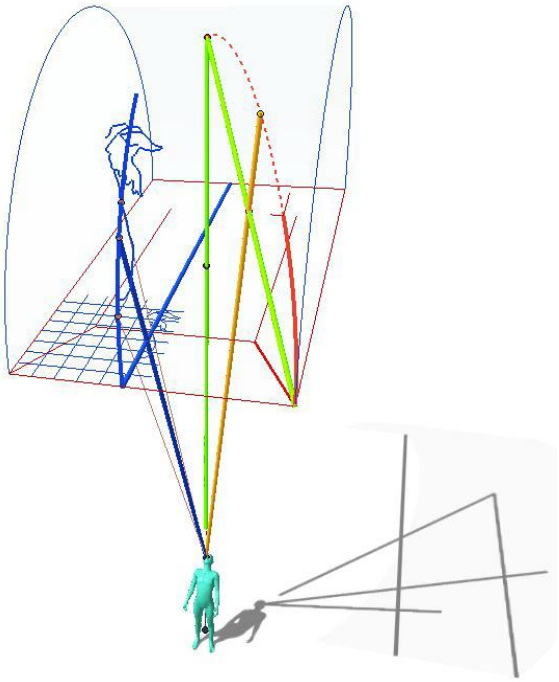

Fig. 4: Practical methods of transfer of the drawing on the vault.

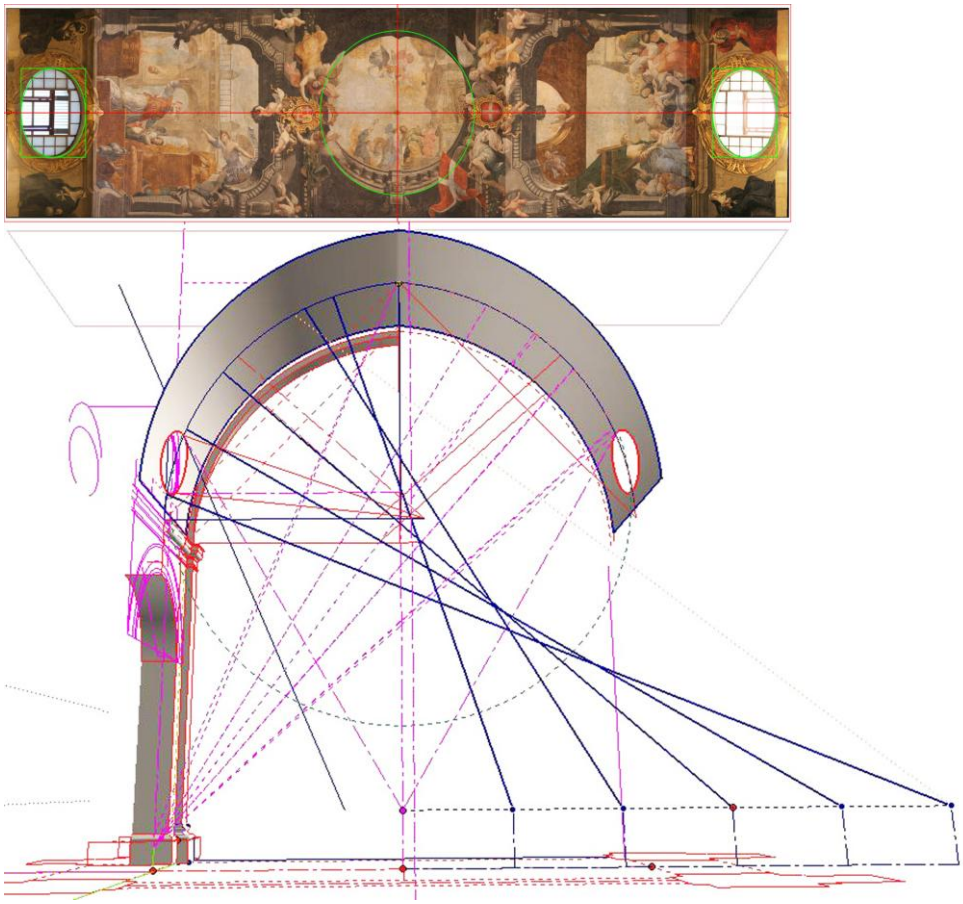

Fig. 5: Real shape of the painted surface.

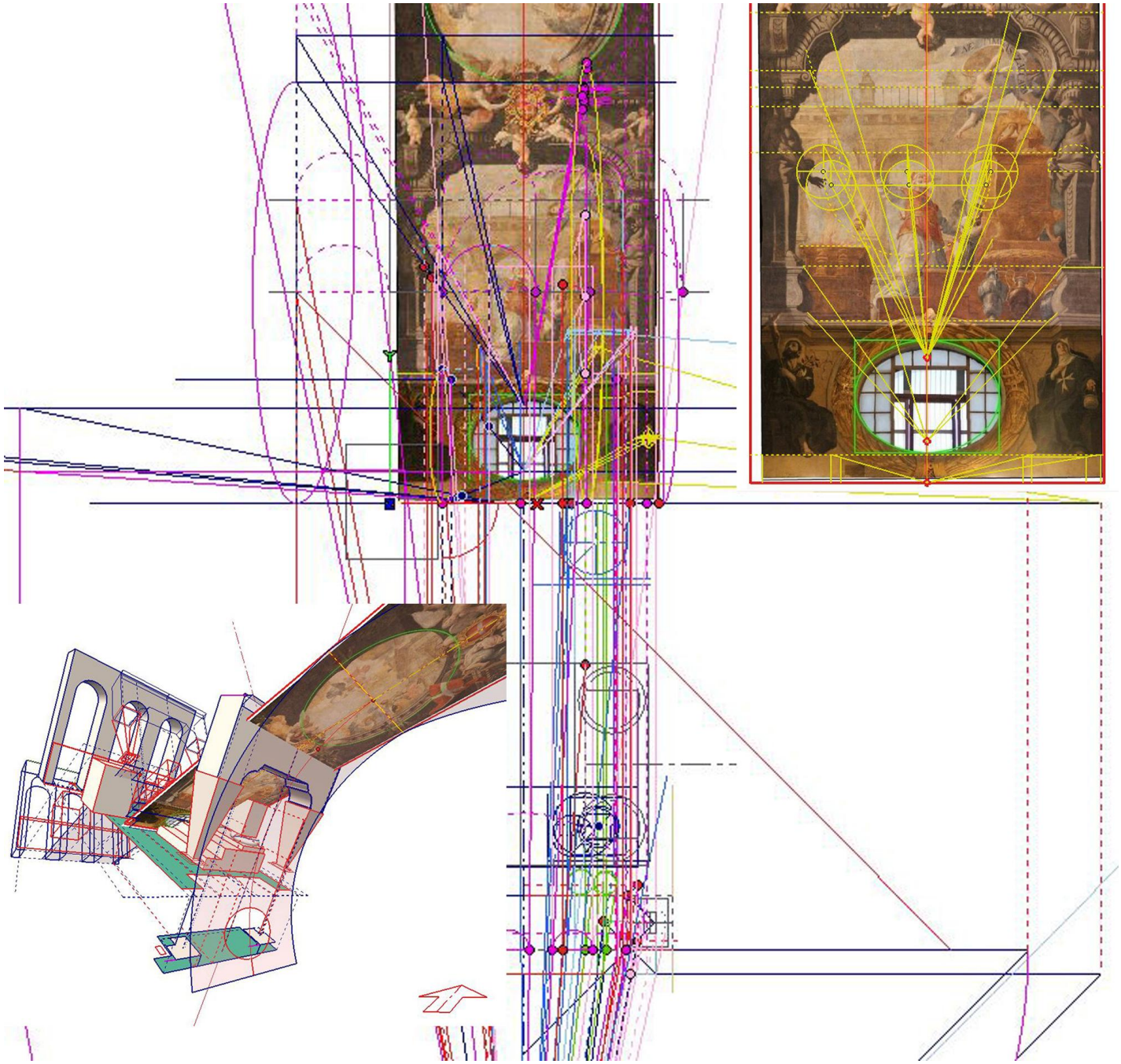

Fig. 6: Graphical traces and definition of the geometrical model.

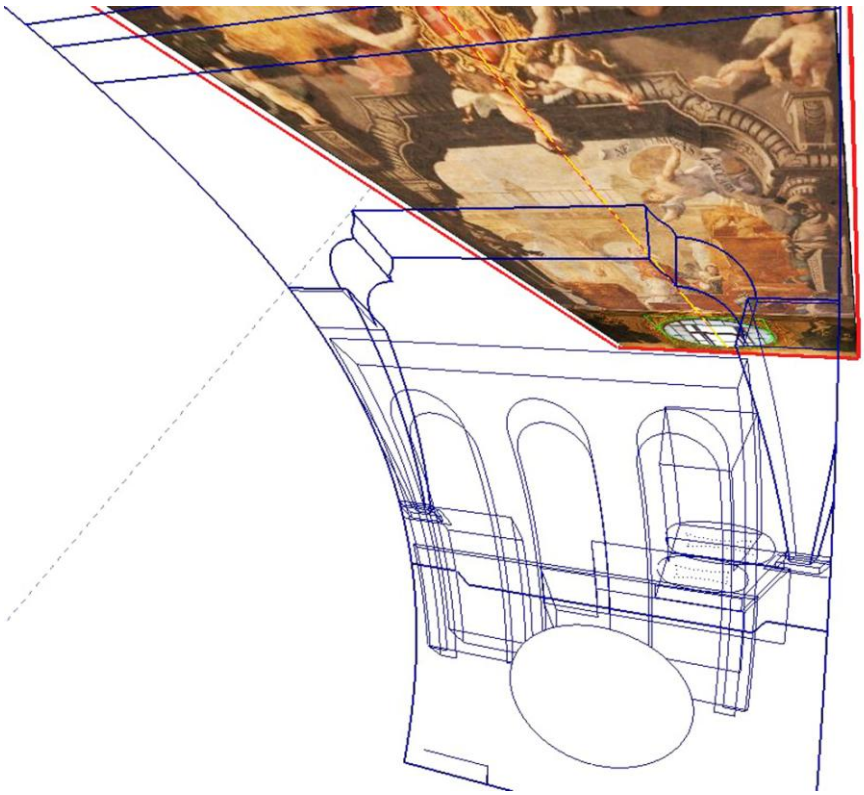

Fig. 7: Verification: projection of the geometrical model on the support surface.



Fig. 8: Common projections at different views: dimensional adaptations of the geometrical model.

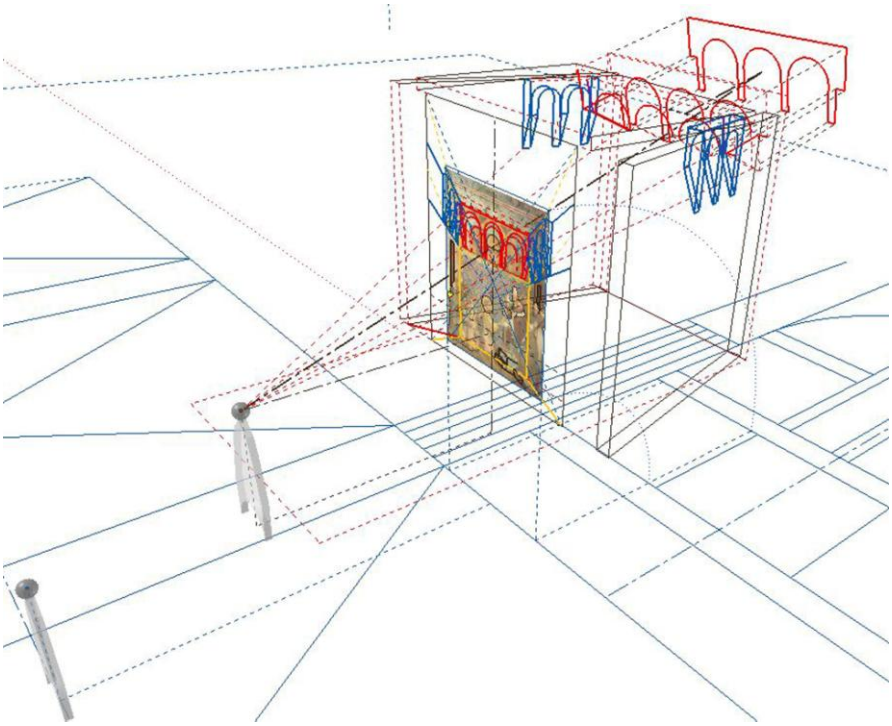

Fig. 9: Giotto: central views and definition of the geometrical model.

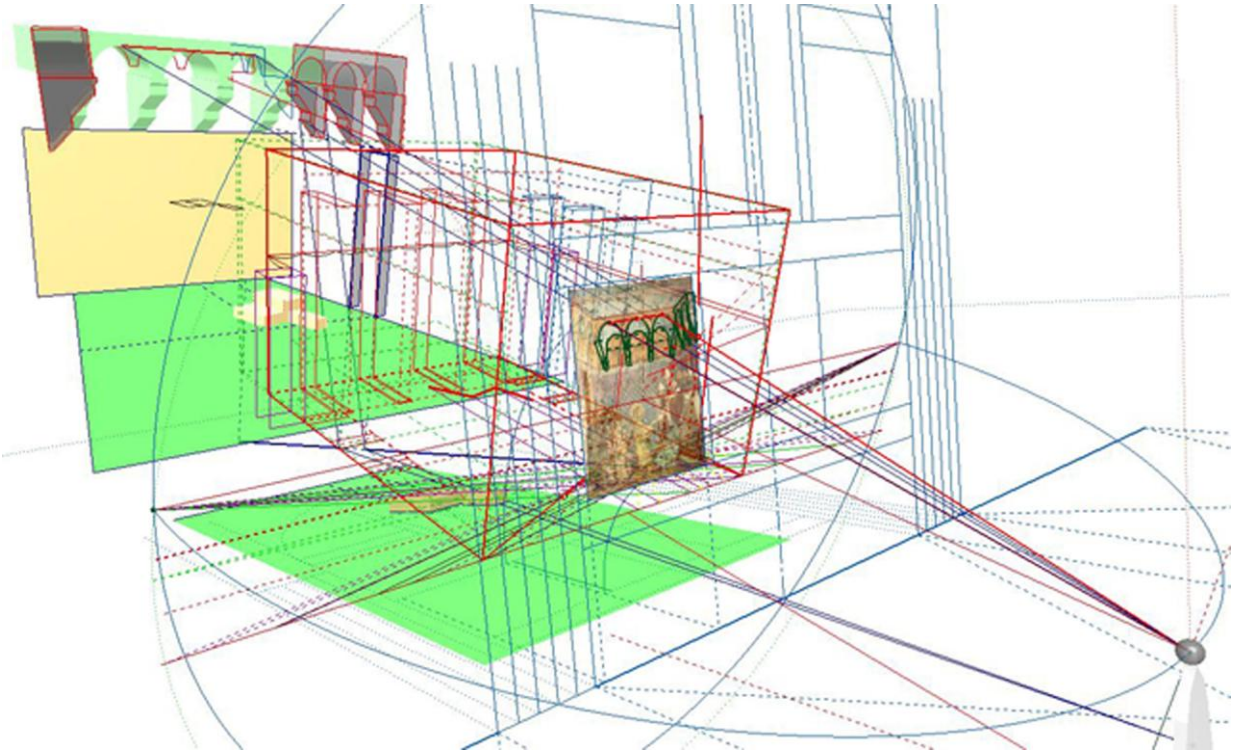

Fig. 10: Giotto: accidental view and definition of the geometrical model.

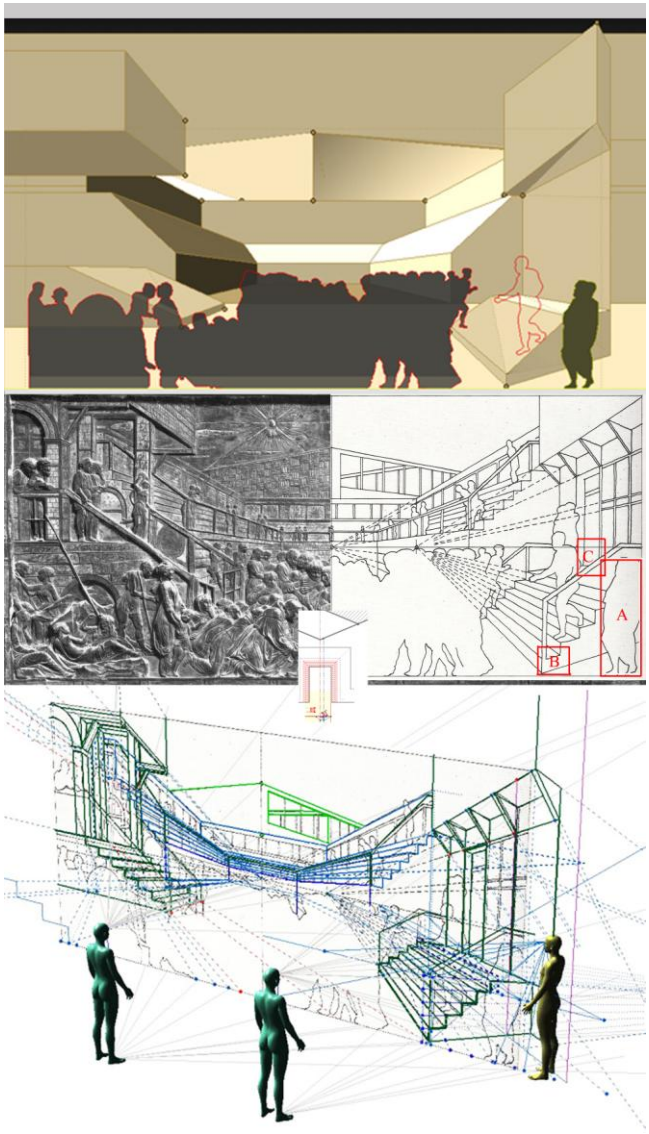

Fig. 11: Donatello : Forced perspective.

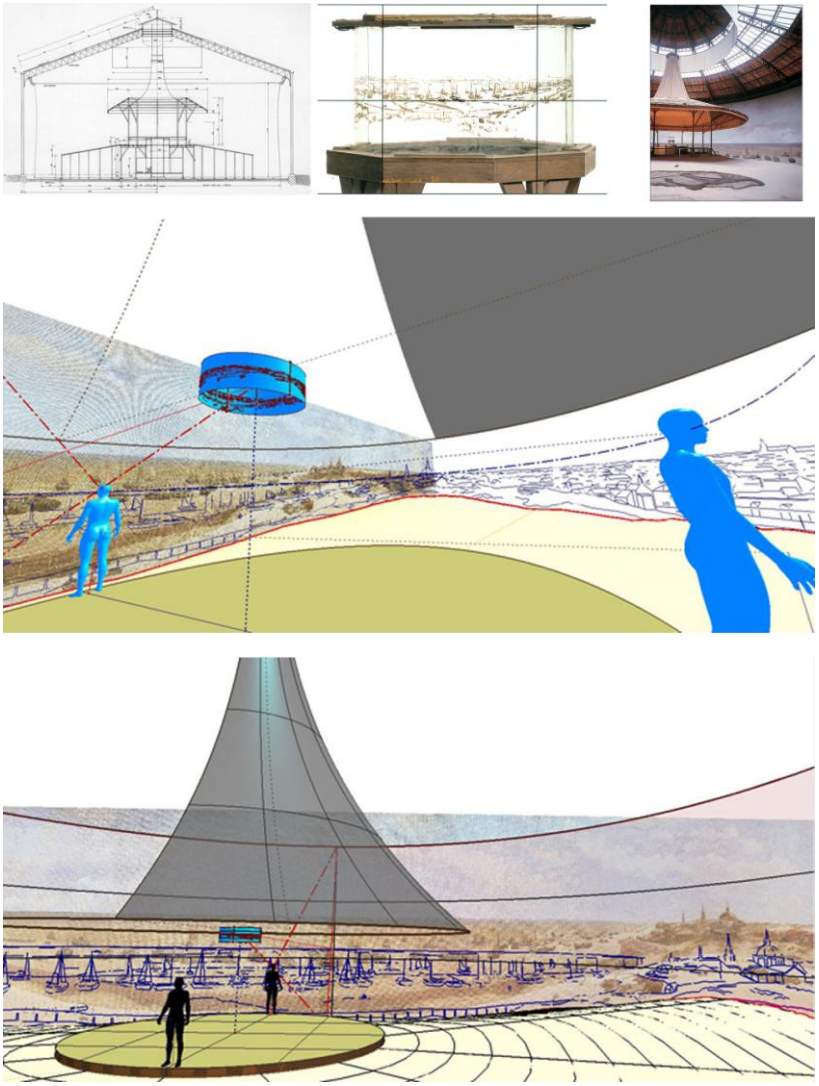

Fig. 12: Panorama Mesdag.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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SmartEcoPhone, between research and enterprise. Enhancing the natural and cultural heritage of Rome

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Abstract
Historical parks and gardens are important stepping-stones for the conservation of the cultural and natural heritage in cities, and as such, they deserve a careful management. This can be achieved also through the support of citizens as well as tourists, who have to be proactively involved, so as to increase the collective identity. The involvement, in turn, can be facilitated when the information about cultural and natural heritage is easily and user-friendly accessible, and the communication with the managing institutions is straightforward. To this purpose, an application in English and Italian for smart phones and tablets (both iOS and Android systems) dedicated to the historical parks and gardens of Rome has been developed through a joint venture between public institutions and private enterprises within the framework of an EU-funded project. Through its geo-location system and an interactive discovery tool, the application allows the user to retrieve the information on historical monuments as well as to identify the components (flora and fauna) of the natural heritage, with a total of over 400 entries with iconographical material. In addition, the application can be used to report updated information concerning problems and the possible degradation of the site to the managing institutions. The extension of this system to a national scale, and its potential to improve the economic sustainability of the management of the historical parks and gardens, is also addressed.

Keywords: botanical identification key, citizen science, cultural heritage awareness, historical parks, smart phones-tablets applications.

1. Introduction
Historical parks and gardens are important stepping-stones for the conservation of the cultural and natural heritage in cities, and we know too well how much they require a careful management. This can also be achieved with the support of proactive citizens as well as tourists, so as to increase the collective identity. Involvement can be facilitated when the information on the cultural and natural heritage is easily and user-friendly accessible and the communication with the managing institutions is straightforward.
This process is now attainable also through the use of a system of multimedia guides compatible with smart phones and tablets by cross-platform applications. Today, the widespread opportunity to access the web, coupled with the possibility to use mapping software based on Global Position System (GPS), make this kind of instruments able to give detailed information on any geographical element,

enriched by specific information on several themes: a very useful and important instrument that can be used for increasing the citizens awareness of the importance of the conservation of natural and cultural heritage, in a virtuous circle among fruition, knowledge and conservation.
Moreover, such interactive multimedia technologies are changing - especially among the younger generations - the methods of learning and the way we process knowledge. Through the interaction with program, a visitor can explore the site according to different themes and her/his specific interests, to become a protagonist in the achievement of the information.
According to market analyses carried out by the major telephone companies, smart phone devices are used in Europe today by about 65% of the population. Italian data are slightly lower, but in line with the general trend toward the replacement of old mobile phones with the new ones that offer a wide range of services through Internet access.
With this figures in mind, in Rome, with about eleven million of tourists visiting the city each year, and about three million residents, the present *app* has the possibility to reach and proactively involve a very large public.
In particular, Rome represents a unique and complex case study due to its particular richness of public green open spaces where natural and cultural heritage coexist and have evolved in the course of centuries [1]. Presently, public parks range from true archaeological parks to the magnificent XVIth-XVIIIth-century aristocratic villa gardens to those designed in the twentieth century. The locations of these spaces, and their dimensions are also very varied: we have little belvederes over the city and gigantic parks of 180 hectares [2]. Because most of these parks have an aristocratic origin, they are true open-air museums that ought to have responsible use and management.

2. SmartEcoPhone Project

The EU-funded SmartEcoPhone (SEP) project was aimed at developing a single cross-platform *app* for smart phones and tablets to guide the visits of 25 historical parks and gardens of Rome and its Botanical Garden interactively.
The 26 sites have been selected to give an exhaustive historical as well as socio-geographical panorama of Rome, considering not only the most famous or central parks, such as Villa Borghese, Villa Doria Pamphilj or Villa Ada Savoia, but also less known or “peripheral” ones, such as Villa Bonelli, Villa Lazzaroni, Villa Chigi, or Villa Carpegna, aiming at developing the collective identity. The project has included archaeological parks, such as Oppio Hill – an integral part of the extraordinary complex formed by the Coliseum, the Imperial Fora, and the Roman Forum -, as well as XXth-century bourgeois villas and public neighbourhood parks, such as the Villa Lais, Villa Glori, and Nemorense Park [3]. Many of the selected sites offer striking views over the old and the new city (Orange Trees Garden, Villa Balestra, St. Alexis Park, Villa Aldobrandini), while others, with their extension, offer the possibility of an escape into a sort of countryside, such as the Villa Doria Pamphilj on the south-west and the Villa Ada Savoia on the north-east. Most of these areas were lavish early modern villa gardens, and they still offer - despite great losses - an astonishing rich cultural heritage (statues, fountains, buildings, layout or even age-old trees).
The *app*, available in two languages, Italian and English, was developed for both Android and iOS systems and can be downloaded on the device from the respective *app* markets. The *app* has also a cache memory in order to download background maps so as to reduce significantly the need and related cost of Internet access.

Parks and gardens name	Cultural heritage	Tree species	Animals
Castel Sant'Angelo	10	5	9
Museo Orto Botanico	6	71	16
Pincio	11	31	10
Villa Alberoni Paganini	5	25	9
Villa Fiorelli	1	19	7
Giardino Sant'Alessio	4	7	9
Parco Nemorense	1	25	11
Villa Aldobrandini	3	26	8
Villa Borghese	23	57	23
Villa Carpegna	3	25	10
Villa Flora	2	23	8
Villa Lazzaroni	4	32	13
Villa Torlonia	15	34	14
Colle Oppio	10	36	9
Parco degli Scipioni	6	13	6
Parco Savello	4	6	9
Villa Ada Savoia	13	41	25
Villa Balestra	2	14	6
Villa Bonelli	4	22	7
Villa Celimontana	10	35	11
Villa Chigi	2	9	8
Villa Glori	8	13	8
Villa Lais	5	34	9
Villa Leopardi Dittajuti	3	22	8
Villa Doria Pamphili	14	74	31
Villa Sciarra	13	49	18

Fig. 1: List of the historical parks and gardens, which are at present available in the SEP application, with the number of related entries on plants, monuments, and animals.

3. General structure and contents

Once activated, the *app* displays a main menu organised into three categories:
1 - Info: this section consists of a presentation of the *app,* its contents and main functionalities. Credits and contacts are also available here.
2 - Map: This is one of the two functions that allow the user to plan the visit. Using the GPS, the visitor can locate his position with respect to the location of the parks and gardens on the background map. By selecting a park, it is possible to access the detailed information of the site.
3 – Scroll list: This is the other function that allows the user to plan the visit. The complete list of the sites can be visualised together with a picture and a general description of the garden and its history, focusing on its main transformation.
Once a site has been selected with function 2 or 3, the visitor can visualise general info, such as opening hours, public transport, services, and contacts, as well the general description of the park, with the history of the site and other curiosities. She/He can then discover the site's botanical characteristics through a list of the most significant tree species, as well the site's cultural heritage by means of a list of present historical, artistic and archaeological monuments. In the category of fauna, in addition to the list of native wildlife species recorded in the area, the *app* also offers the possibility of listening an audio reproduction of animal calls, in order to facilitate their identification.

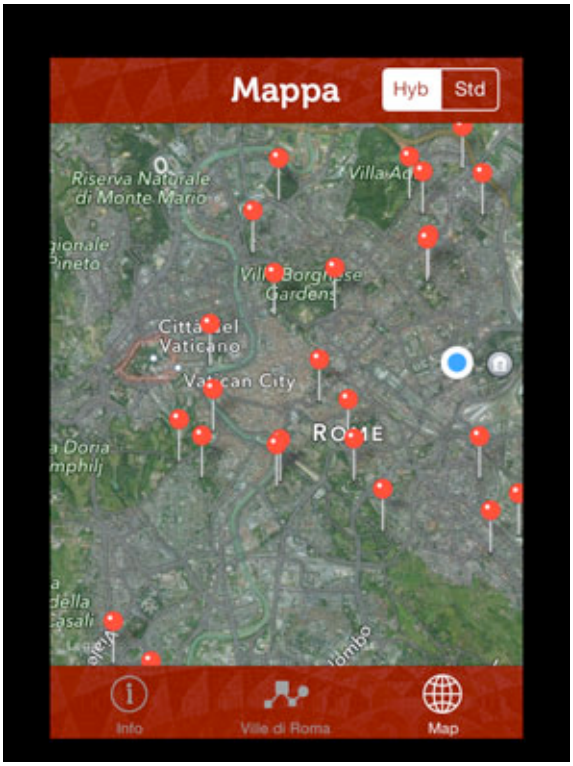
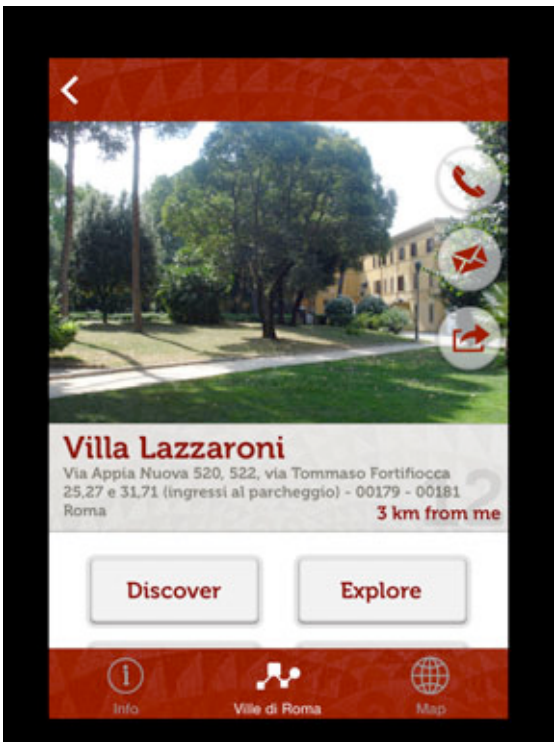




Fig. 2: The Map is one of the two functions that allow the user to plan the visit. Using the GPS, the visitor can locate his position with respect to the location of the parks and gardens on the background map.

Fig. 3: The Scroll list is the other function that allows the user to plan the visit. The complete list of the sites can be visualised together with a picture and a general description of the garden.



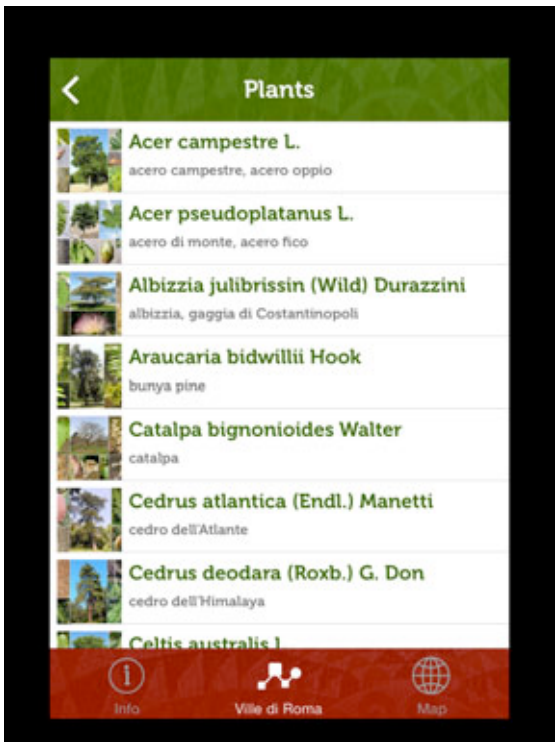
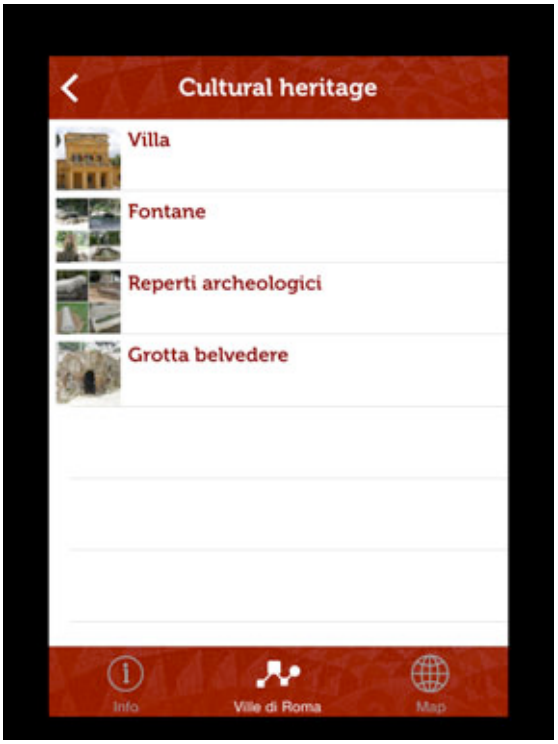


Fig. 4: Once a site has been selected with function 2 or 3, the visitor can visualise general info (opening hours, public transport, services, and contacts) and the general description of the garden.

Fig. 5: The visitor can then discover the site's botanical characteristics through a list of the most significant tree species.



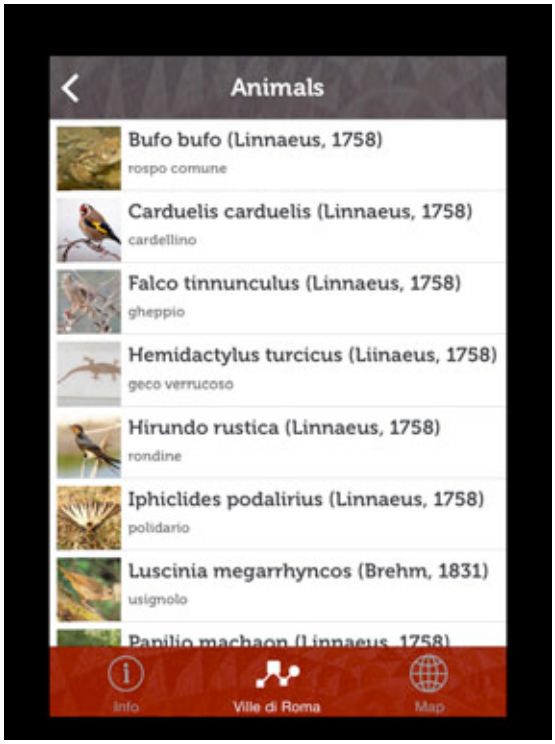


Fig. 6: The visitor can moreover discover the site's cultural heritage by means of a list of present historical, artistic and archaeological monuments.

Fig. 7: In the category of fauna, in addition to the list of native wildlife species recorded in the area, the *app* also offers the possibility of listening an audio reproduction of animal calls, in order to facilitate their identification.

For each selected object (plant, monument, or animal) a description and one or more pictures are available. Currently SEP offers about 400 entries, together with over 1,000 pictures.
Each selected object can be also displayed on the background map to guide the visit. At any moment, through the GPS system built in into the device, the user is able to identify her/his own position on the map by a blue point. This way of consulting the guide is the simplest as well the most interactive one: by clicking on the different icons nearest to her/his own position, the visitor can receive information about what she/he see during a walk, whether plants or cultural heritage objects.
Moreover, the *app* contains also a tool that allows even non-specialised users the possibility of identifying the 169 ornamental tree species recorded for the parks and gardens of Rome [4] using morphological and anatomical characters. This tool has been developed within the framework of the Dryades Project, which has been implemented by the University of Trieste in order to develop identification keys for plants and animal species [5]. The tool is set up on a choice-based identification key: at every step the user is asked to choose between two options, described textually and by means of pictures and drawings, in order to progressively arrive at identifying the tree species. A botanical glossary is also available to support the identification. When selecting the remaining species, the description of its main morpho-anatomical characters (trunk, leaves, flowers, fruits) and the corresponding pictures allow the user to verify the correctness of the identification process.
A simplified version of the identification key, specifically developed for children, is available for the Botanical Garden. This tool allows a “Botanical Treasure Hunt”, so that by playing with new technologies, basic scientific notions as well as the importance of the conservation of biodiversity can be taught.

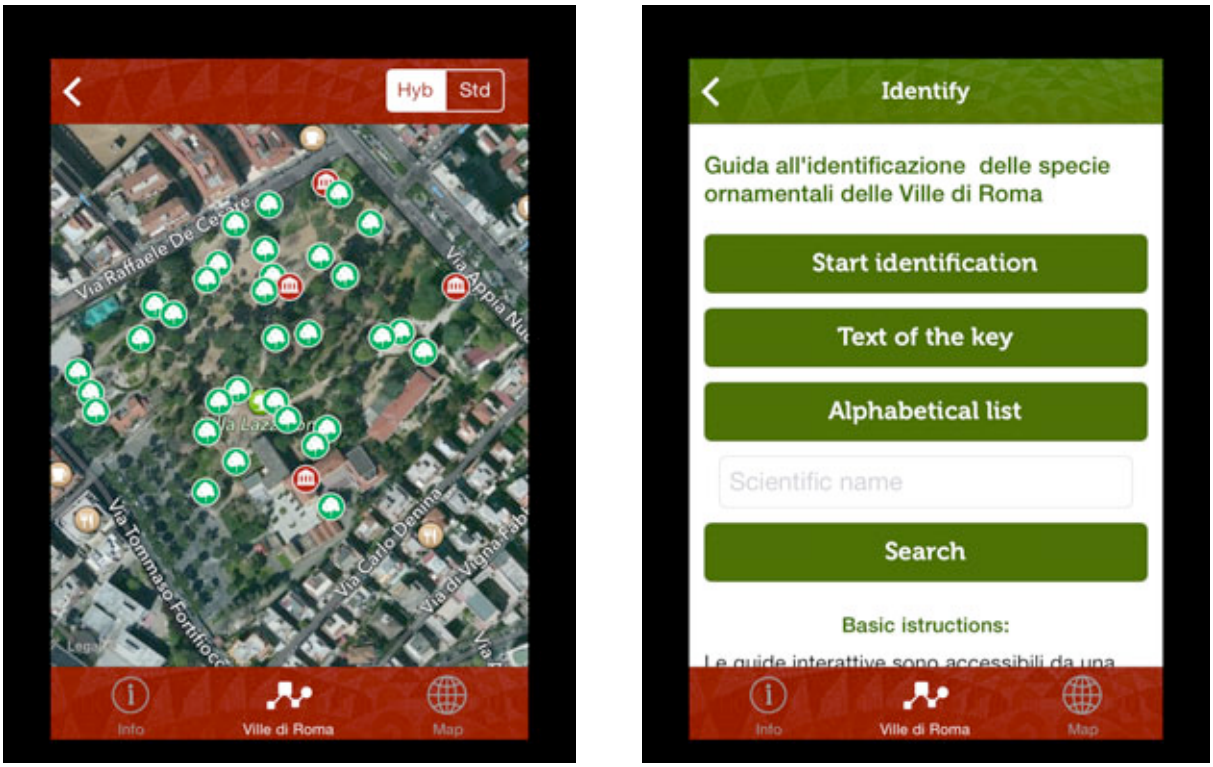


Fig. 8: Each selected object can be displayed on the background map to guide the visit. At any moment the user is able to identify her/his own position, and by clicking on the different icons she/he can receive information about what she/he see, whether plants or cultural heritage objects.

Fig. 9: The *app* contains also a tool that allows non-specialised users the possibility of identifying the 169 ornamental tree species recorded for the parks and gardens of Rome using morphological and anatomical characters. The tool is set up on a choice-based identification key: at every step the user is asked to choose between two options, described textually and by means of pictures and drawings, in order to progressively arrive at the identification of the tree species.

4. Conclusions

The SEP application was officially launched in March 2014, with the official sponsorship of Unesco Italian National Commission.
The application can already achieve several important goals:

- Facilitate tourism of natural and cultural heritage of the historical parks and gardens of Rome.
- Spread the awareness among the population of its importance and the need of a careful conservation.
- Provide the responsible institutions of a tool for receiving information on problems and critical issues.
- Support the general process of “Citizen Science” by involving of non-specialists in scientific activities by means of new technologies [6].

Based on the success such *app* has enjoyed since the first days, the extension of the system at a national scale, and its potential use to improve the economic sustainability of the management of the historical parks and gardens, are the long-term goal of the project.
It would so be advisable to start a discussion on a coordination process involving relevant institutions, cultural and environmental associations and universities, in order to develop a coherent platform to make accessible the enormous natural and cultural heritage hosted by historical parks and botanical gardens of Italy.

Bibliographical References

[1] ATTORRE, Fabio, FRANCESCONI, Fabio, PEPPONI, L, PROVATINI, R, BRUNO, Franco. Spatio-temporal analyses of parks and gardens of Rome. In *Studies in the History of Gardens & Designed Landscapes: An International Quarterly*, 2003, 23, 3, p. 293-306.

[2] CAMPITELLI, Alberta, CREMONA, Alessandro (eds.). *Atlante storico delle ville e dei giardini di Roma*. Milano: Jaca Book, 2012.

[3] GAWLIK, Ulrike. Raffaele de Vico und die Grüngestaltung Roms im 20. Jahrhundert. In *Die Gartenkunst*, 2012, 24, 2, p. 260-284.

[4] ATTORRE, Fabio, FRANCESCONI, Fabio, PROVATINI, R, SPICAGLIA, L, BRUNO, Franco. Il Sistema Informativo Geografico delle Ville e Giardini storici di Roma. In *Quaderni di Botanica Ambientale e Applicata*, 1999, 10, p. 131-142.

[5] NIMIS PL, LEBBE RV. (eds.). *Tools for identifying biodiversity: progress and problems*. Trieste: Edizioni Università di Trieste, 2010.

[6] BONNEY, R, COOPER, CB, DICKINSON, J, KELLING, S, PHILLIPS, T, ROSEMBERG, KV, SHIRK, J. Citizen Science: A Developing Tool for Expanding Science Knowledge and Scientific Literacy. In *BioScience*, 2009, 59, 11, p. 977.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Conservation and Structural Safety Rehabilitation: a Renewed Approach Needed

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Abstract
The paper aims to underlines open issues, by proposing even an example, concerning the actual general mode approaching the problems regarding the conservation of the Architectural historic patrimony. Since last decades great amount of studies are available in term of historic documentation, advance technique for geometrical relief and in-situ or laboratory tests on material composition. But the last ring of the chain, the structural rehabilitation designer, generally was not active part of the initial diagnostic phase. As consequence, he has been mostly a "spectator" in drawing Guide Lines, Provisions, that became user manuals, adopted by the authorities, with rigid "prescriptions", even not clearly scientifically justified, on and how to use/not use materials and techniques for the static safety rehabilitation. However, due mostly to seismic events, the structural safety became a priority; coupling this with the priority of at best saving original texture or even documented modifications, researches to improve the mechanical performance of traditional material are recommended, and still needed, in order to enhance, preserving as much as possible, the original structural response and satisfy the safety requirements. The paper aims to underline, by briefly recalling significant steps, how the need and urgency to save the architectural patrimony still request not only more specific tests on traditional-modified-compatible material, in order to properly enhance the static capacity of the monument, but even reliable/affordable analytical models able to produce a strengthening design, with safety coefficients scientifically proved. Moreover, the aim is of not only saving original material texture and structural system but, not least, proposing affordable total cost of the rehabilitation executive project.

Keywords: Conservation, structural safety, material compatibility

1. The state of the art on structural-restoration approach: brief historic recall and consideration
It is today accepted that strengthening, conservation and restoration works are strictly linked, essentially because they follow the basic principles, of either satisfying the same needs either sharing the common responsibility to give to the future the essential of the manufacture [1].
However since few years ago, and for some decades, the agreement on the above recalled common principles and responsibility was not fully accepted. Different arguing issues and point of view have been underlined as of prior requirements leading the conservation of the monuments. Because of negative strengthening cases, generally due to lack of technical solutions in the details, for years long the "Carta di Atene" (1931) as well as the "Carta di Venezia" (1964) have been recalled and cited as rigid Guide Lines against the use of masonry new components, different from the traditional, with particular reference to the mortar. Even if, however, in the "Carta di Atene" is approved "the wise use of modern technique, and specifically of reinforced concrete". As a major consequence of some misleading examples, studies and researches and proposals concerning the conservation of historic heritage have mostly developed two antagonist philosophies, unfortunately often producing hidden strengthening interventions not easily deliverable and readable. Therefore, sometime not in accordance with the Conservation School, but even not well suited to the overall static demand of the building, it has been proceeded, in some cases, with an insufficient safety capacity or, on the contrary,

with too redundant interventions. In addition, a not secondary consequence of an “a priori” ostracism for some materials, the knowledge on performances concerning new generations of cement based mortar have been generally neglected.
May be dated at the beginning of the ‘80 years a different brave approach, open to a wise, intelligent “curiosity” for the properties and use of performant limestone mortars or Portland based materials, with or without fibers as strengthening material, for saving the historic architectural heritage [2].
The more recent seismic events, starting from the Friuli earthquake till the last one in Emilia, have revealed, if it was necessary, the extreme fragility to the seismic loads of our masonry buildings, even of those recently strengthened, some with reinforced concrete elements and some with the so called “performant masonry”. Thanks to a progressive knowledge and analysis models on the behavior of bearing masonry in seismic area [3], the awareness that the aspects of historic-architectonic conservation and structural capacity are strictly linked is opening today new approaches. Anyway, due to the lack of the structural point of view in the broad debate on conservation in the recent past, more research and communication, deeply and sharply oriented, are needed, and, among other, we can underline the following:

a) confidence and capacity of proposing and using advance, but feasible and broadly proved, numerical modelling able to estimate the structural behavior of either the single different element either as wool, with consistent safety design coefficient, is still needed and evident. The urgent requests of change of the NTC are just one of the proof;
b) a detailed classification of different comprehensive typology of masonry structures finalized to prove, for each of them, and suggest different strengthening material and technique, based on tests results, by best suited examples;
c) the study and use of additional, but traditional, materials, compatible with the old masonry and able to enhance the physical and mechanical characteristic of the old one and showing a real capacity of collaborate with it.

In particular, it is the opinion of the authors and it is here chosen, as significant example, the typology of plastered masonry is still requiring particular knowledge on the mutual properties between plaster and internal type of masonry; in many cases the plaster may be not only a finished material, but, due to its components and thickness, may assure a consistent mechanical capacity to the masonry wall.
These are some cases encountered, for example, in historic buildings heavily wounded by the earthquake of L’Aquila (Fig. 1), and not only there peculiar. The thickness of the plaster, from 5 to 8 centimeter, on both side of the wall, may be considered as a very efficient structural strengthening contribution, provided some requirements, like as the compatibility and adherence with the inner masonry, are satisfied, or may be improved, at which instance and stage. The answers to each question are still open for research, because of very few available focused and updated contributions.
In the following, the paper, after consideration based and coming from recent instruction and recommendation, and for the purpose here underlined, will presents recent experimental test and interesting results concerning the c) area of research, above mentioned.



Fig. 1: Typical “Apparecchio Aquilano” masonry wall covered with plaster.

1.2 The role of the recent recommendation and harmonization calling new researches

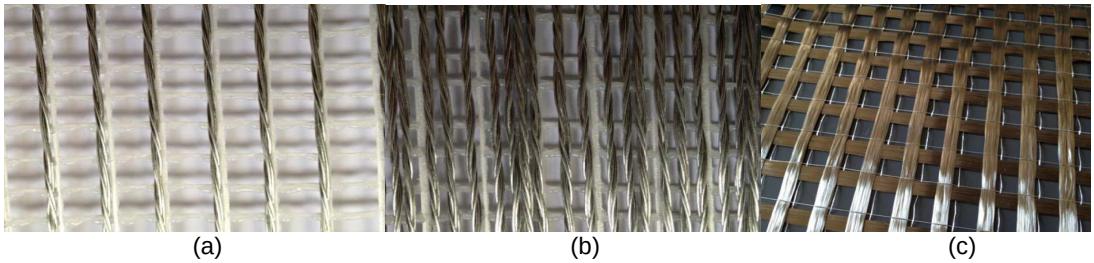
As already mentioned in the first part of the paper, the strengthening procedures have been proposed and used mostly without considering the history of the building; on the other hand, the problems of conservation of historic heritage have been studied to privilege the ornamental components.
May be dated at the beginning of '80, the concept the two aspects are strictly linked, producing lively debates, for decades ,in Italy, and not only; an interesting overview of such progressive mutual understanding and for finding to be in line with, even in term of the recommendation is given in [4].
As result, it is possible to see, around a common table the two souls, even if the deep understanding of different suggestion need more refined works.
The recent seismic Italian codes NTC 2008 are suggesting, as it is known, the two different approach of way of strengthening an Historic law protected building, structural safety increase or structural adequacy for a given earthquake, which have been introduced and proposed in the Italian recommendation since many years ago [5]. This different mode, of approaching the complex methodology for saving the Historic patrimony, brought, readable nowadays in the code, results from long debating research, more and more now speaking common languages. This is a good point, but the long time divergent goals, brought deep different knowledge, still now not easy to find common agreements. Examples are the huge quantity of researches regarding the use of FRP strips on old masonry, not strictly in accordance with the principle of using compatible, also with the tradition, material; and, on the contrary, very few advance knowledge and practical proved results about the area of mechanical improving of traditional material, or even the advance knowledge on efficacy of structural modelling, responsible to give structural safety coefficients, either numeric either as percentage. Anyway it is today present a grade of harmonization between the two research areas, with open mind to proposals, some years ago, not conceivable.

2. A significant example

The authors want here, in the second part of the paper, to focus on one of these gaps, encountered when they have faced to study the possible rehabilitation design for an historic palace in L'Aquila.
The masonry walls, with typical "Apparecchio Aquilano" [6], made of the so called double leaf masonry, are mostly covered by a thick plaster, as shown in Fig. 1. Enhancing the mechanical properties of the walls, either for vertical and horizontal loads, without changing the thick of the wall, leads to proceed on two parallel techniques: to enhance by injection the core of masonry [7, 8] and to perform a strictly collaboration between the core masonry, and the two lay of the mechanical enhancing plaster. In particular, because of the damages, the plaster may be removed and a new one, more performant, it is worthwhile for the purpose to be studied. To the knowledge of the authors no data were available, and still now the data and results of tests here presented are original, even they need more research and understanding.
The idea was to make a new performant plaster with higher mechanical properties, not only in term of resistance but even of ductility and of adherence capacity. A mix-design was prepared with a low grade of pozzolanic mortar, some mix with stainless steel fiber additives (see Fig. 2), some with mesh steel fiber and one with a mesh basalt fibers, both commercially available (Fig. 3); detailed description of this phase of the research can be found in [9].

Fiber shape	Sinusoidal	Hook (90°)	Hook (180°)	T
Diameter [mm]	0,65	0,65	0,65	0,65
Length [mm]	20	20	20	20
Overall length [mm]	28	32	38	44
Energy [kJ/m^2]	4255,30	1954,55	4122,82	5995,40

Fig. 2: Shape and characteristics of the considered stainless steel fibers.



(a) (b) (c)

Fig. 3: Steel fiber mesh (a, b) and basalt fiber mesh (c).

Some prior pull-out test and three bending point test on the behavior of the single fiber and of samples have been done at the Politecnico di Milano and S&R i-lab of Italcementi Group; the detailed description of the aim, the different tests and results are reported in [9, 10]. In the Figure 2 the geometric characteristic of different fibers tested are shown, while in Figure 3 the two kind of steel mesh and the basalt mesh are shown; Fig. 4 shows the sample, the test apparatus and the final configuration of the pull-out test and the three point bending test. Even the best performance has been shown by the T-fiber, as shown in the graph of Figure 5, the sinusoidal fibers have been chosen, because of their affordable cost and showing easier features during the preparation of mix design of the plaster, and, anyway, a positive dissipation capacity [10], as shown in the figure.
Here the focus is pointed on some unexpected positive results, that need already to proceed with more research program, because, as it will be shown, may be highly promising in term of mechanical strengthening enhancement of masonry wall, under vertical and horizontal loads.



Fig. 4: Three point bending test (left and middle), fiber in concrete cube for pull-out test of a single fiber (right).

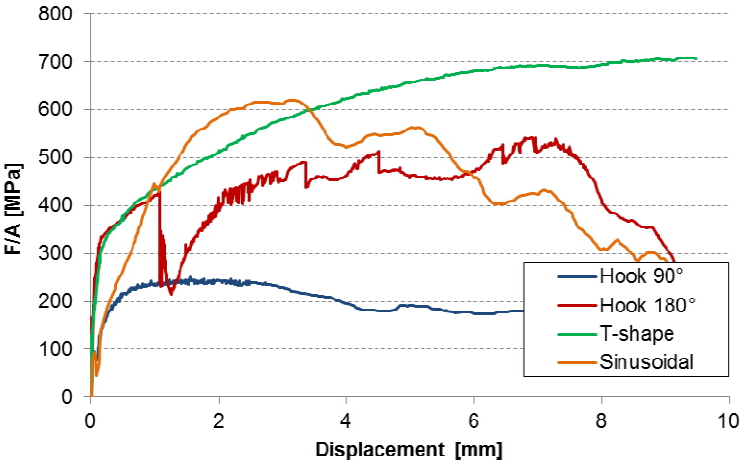


Fig. 5: Stress vs. pull-out displacement diagram.



Fig. 6: Reconstructed wall masonry specimens.

As the second step of the experimental research, wall samples have been prepared, as shown in Fig. 6, with typical texture and material of L'Aquila masonry.
After the due hardening time, the walls, but one for sake of comparison, have been injected with pozzolanic mortar, and after, the reinforced plaster, with different kind of reinforcement, as described above, has been poured surrounding the walls (see Figure 7).
The walls have been tested under a shear-vertical compression combination of loads, according with the UNI EN 1052-3 [11], at the Aquila University Lab, as it is shown in Figure 8; more for curiosity than comparison, even a wall left with the original masonry has been tested, whose behavior does not reserve here to be reported.
The diversified steps, results and comments on the complete tests program have been presented and will be presented in different international congresses [10, 12], and have been submitted for publication to international journals and workshops. In the following of the present paper, the major goal is to show and underline the necessity of knowing and quantitatively giving the grade of mechanical enhancement of an ancient masonry plastered wall provided with the two jointly techniques, i.e. using both performant mortar injection and performant new plaster, without change the original geometry and external appearance.



Fig. 7: Wall specimen: before casting of the reinforced plaster (left) and after curing (right).

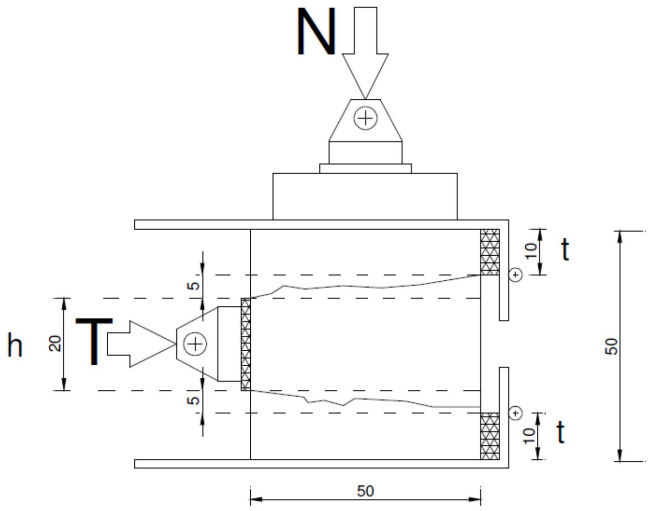




Fig. 8: Testing apparatus: layout (left) and during test (right).

2.1 Promising results

The results are, at this first step of the research, of interest from many points of view. Just a recall of the main focus of the paper: after many years of lack of attention by the scholars in the field of searching and proposing compatible more performant mortar to enhance the structural seismic capacity of historic buildings, it is today evident, either due to the recent failure of important monument, either due to progress in the new available based mortar material, a renewed necessity of the more traditional material studies, how to define new rehabilitation technique, and more suitable and reliable analyzing model for Masonry structures. All these three points, different but each other

related, are clearly pointed out by the LINEE GUIDA 2011 [13] and outlined in the reviewing version of the NTC [14].
Here just some consideration on results achieved from the test performed for proposing new rehabilitation material, i.e. the first point above recalled. The graph of Fig. 9 shows the results of all the walls tested with the shear-compression combined loads; the different typologies of strengthening technique, as it is readable on the figure, where all treated with mix fiber additives mortar injection, and 4 walls with steel mesh laying in the plaster, 2 with basalt mesh and 3 just with the fiber reinforced SCC plaster.
But the walls treated with just injection, the initial elastic behavior is similar for all the walls, with an higher pick value for those with SCC fiber reinforced plaster; even the ductility remaining capacity is very similar for all the samples.

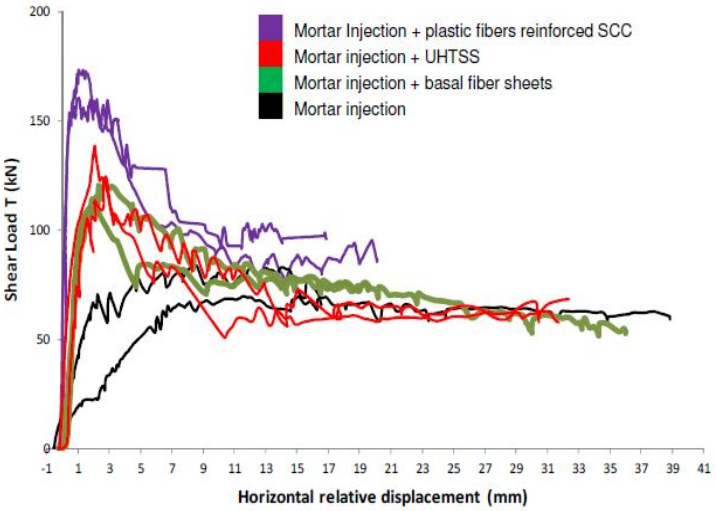


Fig. 9: Shear load vs. horizontal displacement of all the wall specimens under shear-compression test.

It is also noteworthy to focus the attention on the behavior shown by the samples without plaster, just injected (Fig. 10): the first elastic behavior is similar, the average value of elastic pick is 70 KN; while the test on sample T1 has been interrupted because of technical problem of the testing machine, T2 and T3 samples show, anyway, a good range of ductility; even for T1 sample it is possible to guess a good ductility capacity.

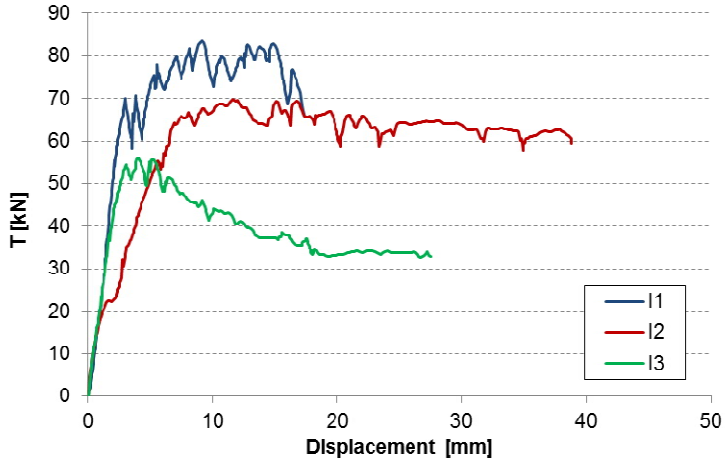


Fig. 10: Shear-compression test results for the injected wall specimens.

A not secondary behavior of this first set of tests regards the capability of adherence between the old masonry and the new reinforcing plaster; as it is shown by the photograph below. The plaster with net incorporated (either basalt, or steel) has shown progressively detach from the masonry during the test, with a complete spalling of the entire side of the plaster at the end of the test (Fig. 11); this behavior may be also responsible of the lower pick values of the shear load T (Fig. 9, red and green curves). A

very interesting and promising result is due to the samples with reinforcing skin made of fiber reinforced SCC: the skin did not detached from the masonry, resisting in a unique ensemble with the internal wall specimens till the end of the tests (Fig. 12 and Fig. 13).
The graph of Fig. 13, showing not complete test for F2 sample, for technical reason of the testing apparatus, is shown a good agreement of F1 and F3, in term of maximum shear versus displacement, with the results reported in Fig. 9.



Fig. 11: Detachment of the plaster in wall specimens reinforced with mesh.



Fig. 12: Typical shear crack pattern on the external reinforcing SCC (left) and view of the specimen after test, with the fiber reinforced SCC plaster not debonded from the internal masonry core (right).

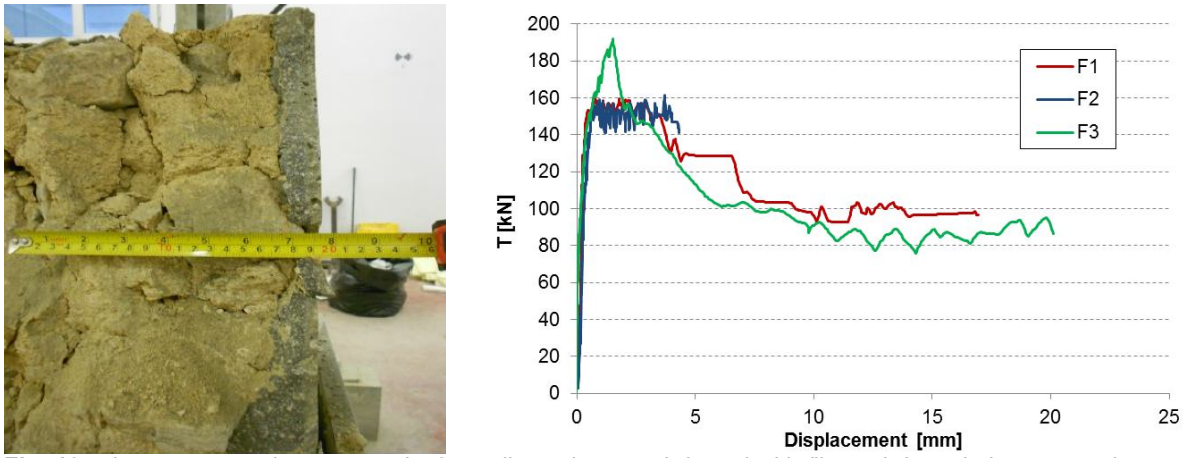


Fig. 13: Shear-compression test results for wall specimens reinforced with fiber reinforced plaster: specimen and thickness of the plaster layer (left) and shear vs. displacement graph (right).

3. Conclusions

The paper underline, by briefly recalling some significant step, how the awareness that the responsibility of saving the historic patrimony may be at the best achieved with common agreement between the two main point of view, structural safety ad historical conservation, both able to give his

knowledge as service to the other requests. With this awareness, the today debate is now reopening studies and researches that have been, in some way, forgotten, for years. The renewed attention to the use of the possibility, how and when, to increment the resistance capacity of masonry elements, mostly with traditional more performant materials, need to be better pursued.
The times of misleading debate on negative use of cement based mortar, as well as on the inutility, or even wrong use, of analysis model on the first range of possible elastic behavior of a masonry wall, provided in parallel experimental test, are today responsible on a diffuse range of proposals very far from conservation criterions, sometime not well justified, overestimated from the safety point of view and, not least, unnecessary expensive rehabilitation costs.

Bibliographical References

[1] TORSELLO, B. P. *Cosa è il Restauro? Nove studiosi a confronto.* Venezia, Marsilio, 2005. ISBN 978-88-317-8645-4.

[2] CARBONARA, G. *Il Cemento Nel Restauro Dei Monumenti.* L'Industria Italiana del Cemento, Vol. 11, 1980.

[3] GIUFFRE', A. *La Sicurezza e Conservazione nei Centri Storici, il caso di Ortigia.* Bari, Laterza, 1993.

[4] GALLI, C., CONSERVA, F. *Scienza e Intuizione: Per un Uso Consapevole delle Tecniche nel Progetto di Restauro.* DISEGNARE CON (numero speciale), Bologna, 2012.

[5] D.M. 24-01-1986. *Norme Tecniche per le Costruzioni in Zona Sismica*.

[6] MORETTI, M., DANDER, M. *Architettura civile aquilana dal XIV al XIX secolo.* L'Aquila, L. U. Japrade, 1974.

[7] VINTZILEOU, E., MILTIADOU-FEZANS, A. *Mechanical properties of three-leaf stone masonry grouted with ternary or hydraulic lime based grouts.* Engineering Structures, 01/2008, 30(8), 2265-2276.

[8] BINDA, L., PINA-HENRIQUES, J., ANZANI, A., FONTANA, A., LAURENCO, P. B. *A contribution for the understanding of load-transfer mechanisms in multi-leaf masonry walls: Testing and modelling.* Engineering Structures, 01/2006, 28(8), 1132-1148.

[9] FRANCHI, A., SILVESTRO, G., RONCA, P., CRESPI, P., BORGARELLO, E., BORSA, M., YAGLI, B., SGOBBA, S., TORTELLI, S. *Malte rinforzate con fibre in acciaio inox ad elevata duttilità per il rinforzo di murature storiche: prove di pull-out della singola fibra.* CTG Italcementi CIS-E (Internal Report), 2012.

[10] CRESPI, P., GREGORI, A., PIZZAMIGLIO, F. *Lo sviluppo di nuove malte duttili per il rinforzo Strutturale in Zona Sismica.* Proceedings of XI CIAS International Workshop, Creta, 18-26 May 2013, 15-34.

[11] UNI EN 1052-3. *Metodi di prova per muratura – Parte 3: Determinazione della resistenza iniziale a taglio*, 2007.

[12] FRANCHI, A., CRESPI, P., GALEOTA, D., GREGORI, A., RONCA, P. *Laboratory tests on unreinforced and reinforced historical masonry wall specimen in L'Aquila (Italy)*. Proceedings of 9th International Masonry Conference, Guimaraes, 2014.

[13] DPCM2011. *Valutazione e riduzione del rischio sismico del Patrimonio Culturale*. Direttiva del Presidente del Consiglio dei Ministri del 9 febbraio 2011.

[14] NTC08. *Norme tecniche per le costruzioni*. D.M. 14-01-2008.

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METHODS AND APPROACHES OF ESTIMATION OF NEGATIVE IMPACT OF PHYSICAL FACTORS IN CONDITIONS OF URBAN TERRITORIES

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Abstract
Physical factors (noise, vibration, electromagnetic fields, ionized radiation etc.) may cause significant negative influence both to environment and to the health of population. It is shown that combined impact of different physical factors may cause different effect of impact to the man's organism and to environment. Damaging impact may be summated, attenuated or amplified. Thus, during of estimation of impact of different physical factors to the health of population it is necessary to take into consideration the impact of different physical factors.
Methods and approaches of estimation of physical factors combined impact to the health of population and to environment are described. Analysis and examples of approaches to estimation of physical pollutions influence to the human's health in Samara Region of Russian Federation are considered.
New methods of estimation of combined impact of physical factors to the functional state of man are suggested. Results of research of combined impact of physical factors are allowing to make the following general conclusions: complex impact of physical factors to the man's health and to environment in conditions of urban territories may significantly amplify the negative effect.

Keywords: Physical factors, urban territory, estimation, impact

1. Introduction

In conditions of urban territories the impact of negative factors to environment and to population is constantly increasing. Among of these factors are physical pollutions: electromagnetic fields, ionization, radon, noise, vibration, infrasound etc.
Electromagnetic fields may cause significant negative influence to the human's health [4-7]. The negative effect of impact of electromagnetic radiation to the humans depends upon the power and the frequency of the radiation. For low-frequency radiation (radio waves to visible light) the best-understood effects are those due to radiation power alone, acting through the effect of simple heating when the radiation is absorbed by the cell. For these thermal effects, the frequency of the radiation is important only as it affects radiation penetration into the organism (for example microwaves penetrate better than infrared). Initially, it was believed that low frequency fields that were too weak to cause significant heating could not possibly have any biological effect.
Ionization may cause significant negative impact and cancer illness. Impact of ionization radiation may cause not only damage if life activity of separate organs and systems, but also of human organism in total.
Noise level is increasing together with the cities growth. More than 60% of population of large cities is living in exceeding noise conditions [1-3, 7-9]. Damaging influence of intensive noise to the human's health is not restricted only by impact to ears. It is known, that noise is affecting to the human's central and vegetative nervous systems, influencing to the human's psychological condition etc. The most serious problems are caused by low frequency acoustic affection.

Vibration may cause impact to the different urban areas (environmental, industrial, domestic) [1]. It is difficult to find in modern town the place where vibration is completely absent. Vibration in urban areas may cause serious negative problems up to the buildings and construction breakdown and inhabitants decease. Vibration and structural noise may cause decrease the operational characteristic, durability, reliability of different kind of power plant and industrial equipment. Among of the negative sequences are destruction of parts and units of machines and equipment, pipelines, junctions of aggregates etc. Industrial vibration leads to workers disease, fatigue breakdown of pipeline and apparatus junction, disturbance of sealing airproof, decreasing of machine operating characteristics, etc.
These and many other examples are proving that physical factors may cause significant negative influence to the health of population and to environment.
To be able to take the required measures for physical pollutions reduction it is necessary to develop approaches and methods of estimation of physical pollutions impact [6, 7].
This paper is devoted to study and to development of methods and approaches of estimation of physical factors negative impact to the health of population and to environment in conditions of urban territories.

2. Essence and main principles of ecological monitoring

Objects of ecological monitoring usually are natural, anthropogenic or natural- anthropogenic systems. Ecological monitoring is not only passive statement of facts, but also modeling and forecasting of the processes.
Main purposes of ecological monitoring are:
- Current accounting of variations of environment and preventing of deterioration of quality of environment;
- Forecasting of variations of environment and connected with it ecological sequences.
Ecological monitoring must include different levels:
- Global (biosphere) monitoring on the basis of international collaboration;
- National monitoring arranging in frameworks of one state;
- Regional monitoring arranging in frameworks of different regions of one state;
- Local monitoring in towns, districts or exactly in enterprises.
Among of the main principles of ecological monitoring of physical pollutions it is possible to emphasize the following:
- Identification of sources of physical pollutions of urban territories and of degree of it potential ecological danger;
- The most dangerous zones of urban territories from the point of impact of physical pollutions;
- Measurements of physical pollutions in conditions of urban territories;
- Processing of experimental data, issue of conclusions;
- Mathematic and calculative modeling of propagation and estimation of physical pollutions in conditions of urban territories;
- Development of physical pollutions mapping in conditions of urban territories;
- Development of measures of reduction of physical pollutions in the most dangerous zones of urban territories.

3. Principles of estimation of combined impact of physical factors to the health of population

During estimation of impact of different physical factors to the health of population it is necessary to take into consideration the impact of different physical factors in combination with chemical factors. Such kind of impact is considered as combined.
Existing and usual method of estimation of the impact of different physical factors do not consider the mutual influence of different physical factors.
In the real conditions different damaging environmental factors are impacting to the biological objects. Impact of complex of different factors to the organism is interdependent and in significant degree is complicating the reaction of organism.
For the adequate estimation of the effects of negative impact of damaging factors of environment it is necessary to carry out analysis and account of different situations of impact of different combinations of factors.
Depending to the quantitative estimation of effects during the impact of several factors it is possible to determine (Fig. 1):
- **additive** impact, when the effect of exposure is determined by the sum of effects of isolated factors influencing to the organism;
- **synergetic** (potential) impact, when the effect of impact of different factors is more than additive effect (disproportional amplification of impact is observed);
- **antagonistic** impact, if the effect of impact of combination of different factors is less than additive impact (attenuation of effects is observed).

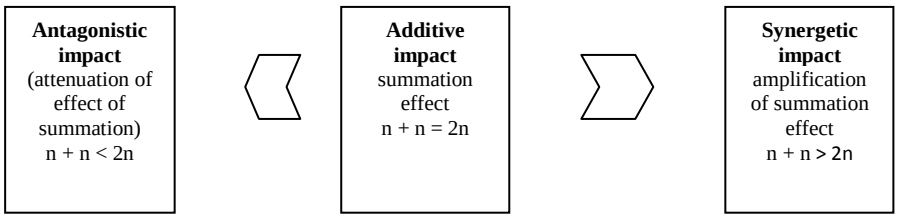

Figure 1. Peculiarities of different effects during the impact to the organism of several factors of various nature

Thus, combined impact of different factors may cause different effect of impact to the man's organism. Damaging impact may be summated, attenuated or amplified (Fig. 1), as well as may cause variation of character of influence (e.g., display of carcinogenic effects) [6, 7, 9].
Organism's reaction to the impact of complex of factors depends to it combination and the level. During single impact the additive effect is observed for the substances of narcotic action, irritating gases etc.
One of the reasons of synergism is inhibition by one substance of the processes of biotransformation or metabolism of the other substance. For example, amplification of negative impact has been observed during combined impact of some pairs of phosphorus organic products.
Antagonism may occur during mutual impact of similar damaging substances to the mechanism of impact.
For the practical purposes it is the most important the determination of damaging effect of complex of factors causing synergetic impact exceeding of the sum of efficiency of impact of separate components. It is necessary to consider during estimation of ecological risks connected with impact of different combinations of chemical and physical factors to the man and to environment.
During estimation of ecological risks it is necessary consider the effect of summation (addition of small quantities of different damaging substances). Such quantities of substances separately may do not cause any problems for health of for ecosystem, but in sum it becomes dangerous due to the mutual amplification of effects (synergetic impact).
It is important to note that summation principle it is possible also to use during calculation of complex impact of polluting substances to the man, penetrating in man's organism with air, water and food. For the practice purposes it is admitted to consider that the sum of reduced to MPC (maximum permissible concentration) of values of concentrations of polluting substances having summation of impact, should not exceed value "one", that is:

$$C_1 / MPC_1 + C_2 / MPC_2 + \ldots + C_n / MPC_n \leq 1, \quad (1)$$

where Ci, C_2 ... Cn - the values of actual concentrations of polluting substances; MPC_1, MPC_2 ... MPC_n – are corresponding values of MPC of it substances.

It should be noted that such effects may be a sequence of combined impact of chemical substances, physical factors, climate conditions, stress impact etc. For example, concentrations of nitrites harmless for rabbits are coming dangerous for increased but also admissible level of ionizing radiation.
Thus, for provision of ecological safety of population of towns it is occurs keen necessity of provision of complex estimation of impact of different factors of environment to the man and to ecosystems. Much importance should be attached to study of combined impact of factors of different nature – physical and chemical – to the man's organism [6].

4. Modern methods and approaches to monitoring of physical pollutions of urban territories

Existing methods and approaches to monitoring of physical pollutions of urban territories are having some disadvantages:
- Dependence of results of measurements from conditions of environment: meteorological conditions (wind, temperature, humidity, pressure), dislocation of buildings and barriers, reflection from soil and from the other surfaces etc.;
- Dependence of the distance of source of physical pollutions;
- Dependence of the final result of measurements from qualification of staff;
- Error effects of the other sources of physical pollutions;
- Significant workload of final processing of measurements results.

It is evident that long-term automated environmental monitoring allows to significantly increase precision of measurements and the quality of physical factors measurements results processing [2-5].

To achieve more detailed knowledge about physical factors it is necessary to collect more detailed data which is difficult to structuralize and to analyze by using of traditional methods and systems of monitoring. Due to GPRS (or ADSL) technologies and to Internet network presently it is possible to carry out automated collection, storage and publication of physical factors measurements data in network in a real time, and also to publish constantly updating maps of physical pollutions in correspondence with measured levels of physical pollutions.
It is suggested to provide automated clock registration of data of results of measurements of levels of physical pollutions and of the other corresponding parameters of environment and the possibility of measurements without the presence of staff. Measurement system includes:
- One or more stations of monitoring (devices for measurements of physical pollutions, systems of electro-feed etc.);
- Central module (processing, analysis and storage of data of measurements);
- Channel of transmission of data of measurements (GPRS/ADSL, Internet) etc.
All stations of monitoring are connected with central station in which processing, analysis and storage of data of measurements is carried out.
Suggested methods and system of automated environmental monitoring of physical factors are having a number of evident advantages.

5. Examples of monitoring of physical pollutions of urban territories

As examples of monitoring of physical pollutions of urban territories in Russia let us describe some results of monitoring of electromagnetic fields and of noise of the living area of Togliatti city of Samara region of Russia.
Measurements of electromagnetic fields were carried out for industrial frequency range (electrical part E, kV/m and magnetic part H, A/m of electromagnetic field strength) and for radio frequency range (electrical part E, kV/m; magnetic part H, A/m of electromagnetic field strength and density of flow of energy, mkW/sm^2). In total more than 250 measurements of electromagnetic fields were carried out.
Results of measurements of electromagnetic fields strength industrial frequency range in the territory of Komsomolsky district are showing that the most values of electromagnetic fields strength were near to electric power lines Exceeding of sanitary norms was determined for Esenin street situated near to the Zhigulevsky hydro power station. For Central and Avtozavodsky districts the main problem is impact of electromagnetic fields of radio frequency range near to the TV mast / towers. Exceeding of sanitary norms were fixed for Mira street (Central district) and Sverdlov street (Avtozavodsky district).
For noise monitoring as object of study living territory of the Avtozavodsky, Central and Komsomolsky districts of Togliatti city was selected near to the city streets with intensive transport movement. In total over 150 points have been investigated. Measurements of noise levels in places of living territory of Togliatti city adjoining to noise dangerous zones have been conducted in strict correspondence with above mentioned requirements. Near to the Central and Komsomolsky districts of Togliatti city it is situated a number of industrial enterprises united to so called "North Industrial Unit". Noise estimation and monitoring of North Industrial Unit enterprises for further determination of sanitary zone have been also carried out. Measurements have conducted in daytime in weekdays mainly in rush hours and during the lunch-time; and in night time (since 23.00 till 7.00). The most significant excess of standard equivalent noise levels have been observed for the following points. Komsomolsky district, night time: point K-07, Matrosova Str., 60, the value of exceeding of normative requirements of equivalent noise level is 8 dBA, maximal noise level - 6 dBA; point K-12, Yaroslavskaya Str., 11: the value of exceeding of normative requirements of equivalent noise level is 5 dBA, maximal level - 8 dBA; day time: point K-10, Chaykina Str., 67, the value of exceeding of normative requirements of maximal noise level is 9 dBA; point K-13, Yaroslavskaya Str., 61, the value of exceeding of normative requirements of maximal noise level is 9 dBA. Central district, night time: point C-18, Lenina Str., 98, the value of exceeding of normative requirements of equivalent noise level is 10 dBA, maximal noise level - 5 dBA; point C-23, Mira Str., 60, the value of exceeding of normative requirements of equivalent noise level is 12 dBA, maximal noise level - 12 dBA; day time: point C-24, Mira Str., 114, the value of exceeding of normative requirements of equivalent noise level is 4 dBA, maximal noise level - 3 dBA. Avtozavodsky district, night time: point A-32, Dzerzhinskogo Str., the value of exceeding of normative requirements of equivalent noise level is 8 dBA, maximal noise level - 3 dBA; day time: point A-04, Topolinaya Str., 21, the value of exceeding of normative requirements of maximal noise level - 19 dBA.
By using of developed program provision maps of electromagnetic fields and of noise of urban territory of Togliatti city were developed. Map of electromagnetic fields density of flow of energy of Avtozavodsky district is shown in fig. 2, map of noise levels of the territory of Shluzovoy district is shown in fig. 3. In green color values of equivalent sound level below 60 dBA, in yellow color – values of equivalent sound level between 61 and 65 dBA, in red color - values of equivalent sound level more than 65 dBA are shown.

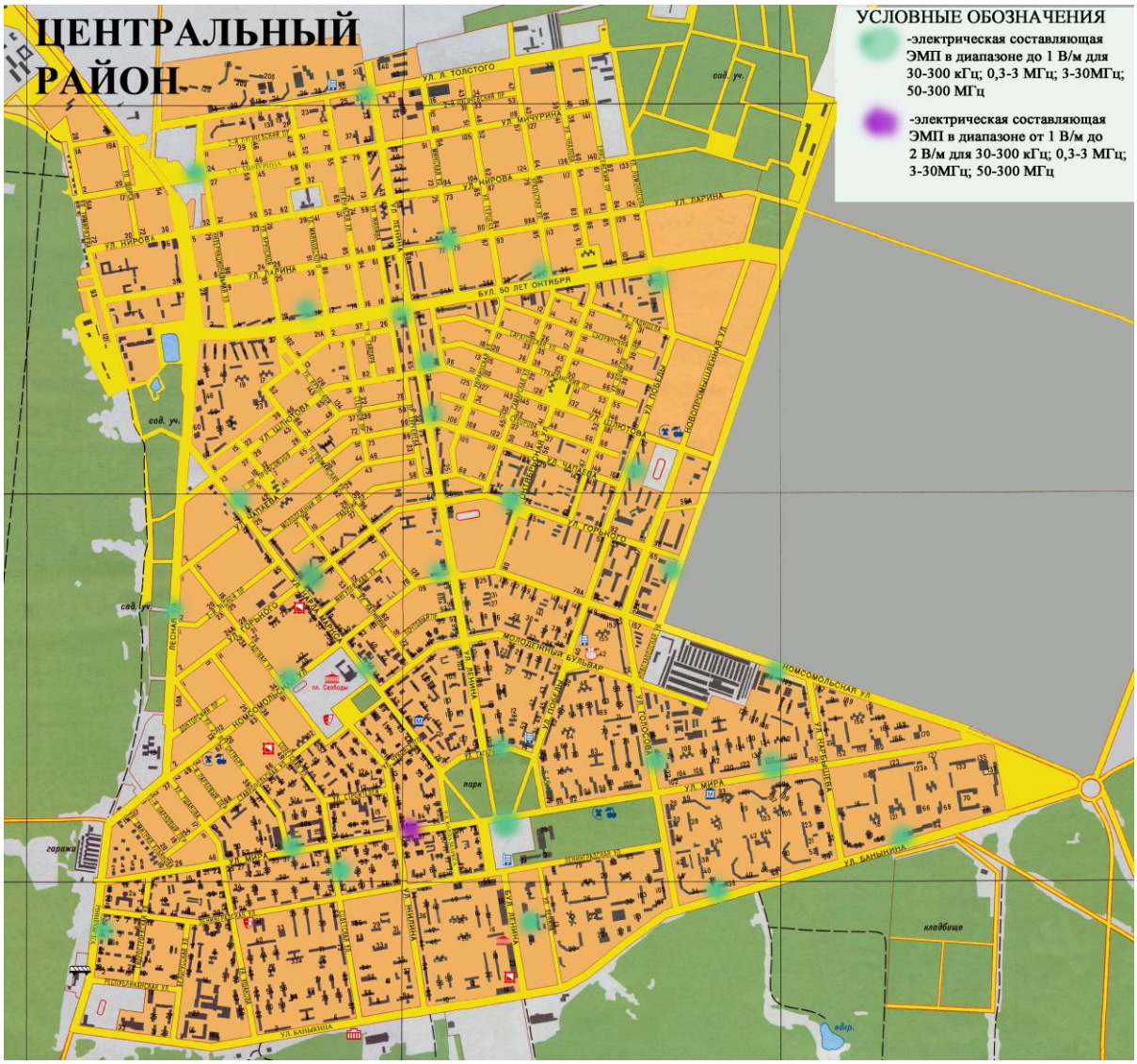

Figure 2. Map of electromagnetic fields density of flow of energy of Avtozavodsky district

6. Conclusions

Methods and approaches of estimation of physical factors negative impact to the health of population and to environment are described. It was shown that complex impact of physical factors may amplify or weaken the system response of organism. Method of continuous automated environmental monitoring of physical factors is suggested. Evident advantages of method are shown.

Some results of monitoring of physical pollutions of urban territories in Russia are described on the example of monitoring of electromagnetic fields and of noise of the living area of Togliatti city of Samara region of Russia. Analysis of measurement results are showing that there are dangerous zones of dwelling territory on electromagnetic fields and of noise negative impact.

In total, the results of work are allowing to forecast and to reduce negative impact of combination of physical factors to the human's health and to environment more efficiently.

Acknowledgement

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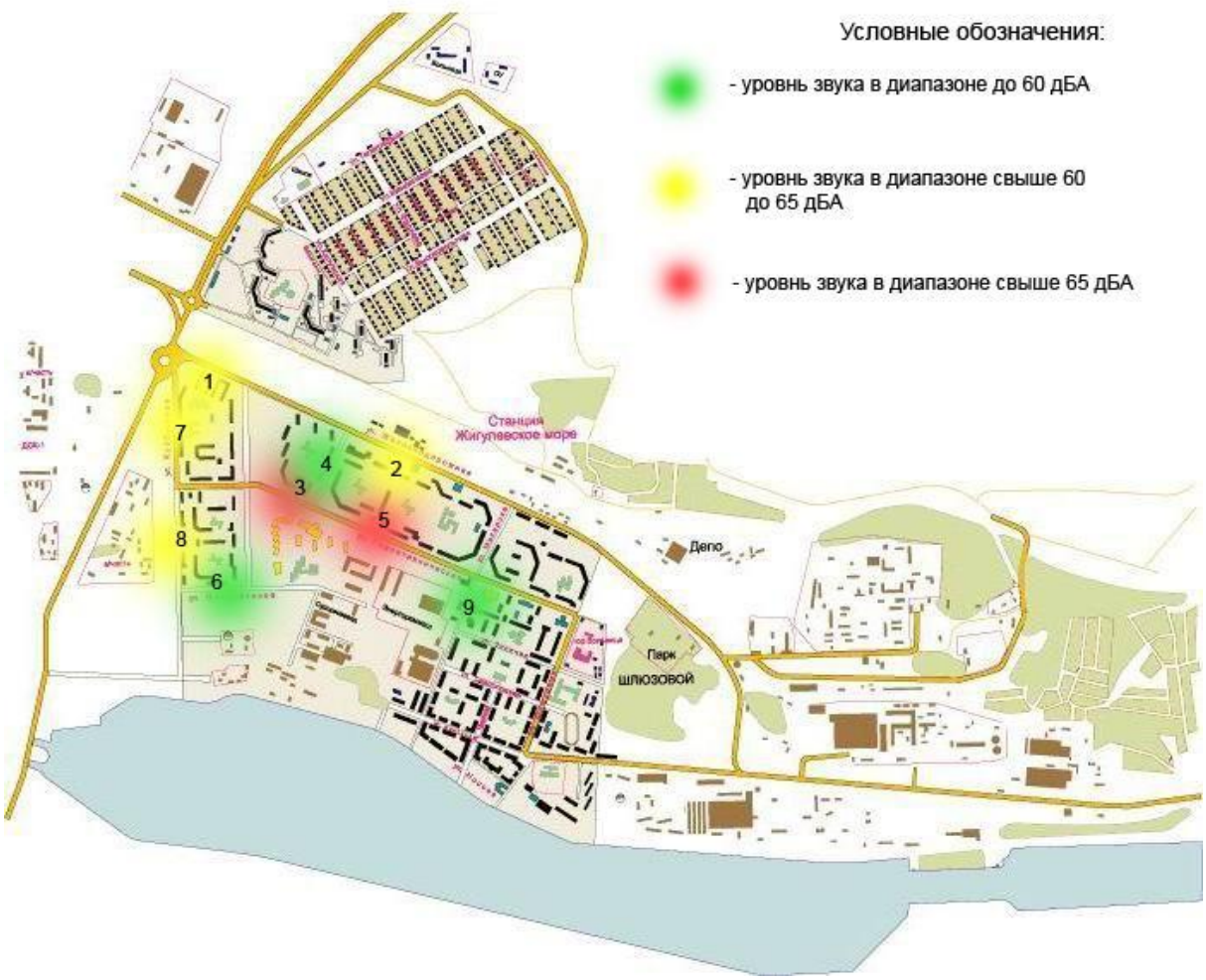

Figure 3. Map of noise levels of the territory of Shluzovoy district

Bibliographical References

[1] LUZZI, S., ALFINITO, L., VASILYEV, A. Action planning and technical solutions for urban vibrations monitoring and reduction. Proc.: *39th International Congress on Noise Control Engineering 2010*, INTER-NOISE 2010. C. 2508-2515.

[2] LUZZI, S., VASSILIEV, A.V. A comparison of noise mapping methods in Italian and Russian experiences. Proc.: *Forum Acusticum Budapest 2005: 4th European Congress on Acustic* 2005. pp. 1051-1056.

[3] LUZZI, S., VASILYEV, A.V. Noise mapping and action planning in the Italian and Russian experience. *8th European Conference on Noise Control 2009, EURONOISE 2009* – Proceedings of the Institute of Acoustics 2009.

[4] SHEVCHENKO, D.P., VASILYEV, A.V. Program Provision for Automated System of Environmental Monitoring of Physical Fields // *The Special Issue "ELPIT-2005" of the scientific edition "Proceedings of Samara Scientific Center of Russian Academy of Sciences",* Samara, 2005, volume 2, pp. 292-295.

[5] VASILYEV, A.V. Ecological Monitoring of Physical Pollutions on the Territory of Samara Region. Reduction of Impact of Sources of Physical Pollutions // Book. – *Edition of Samara Scientific Center of Russian Academy of Science*, Samara, Russia, 2009. 140 p., 36 ill. ISBN 978-5-93424-467-6.

[6] VASILYEV, A.V., BUKHONOV, V.O., VASILYEV V.A. Approaches to Environmental Impact Assessment of Physical Pollutions of Territories During Design and Construction of Industrial Objects

and it Realization in Samara Region of Russia. Proc. of the International Scientific Conference (XI International Forum) Heritage. Architecture. Landesign Focus on Conservation, Regeneration, Innovation "Le vie dei Mercanti", June 13th – 15th 2013, Aversa-Capri, Italy, Edition of La scuola di Pitagora, Naples, Italy. - pp.1183-1190. ISBN 978-88-6542-290-8

[7] VASILYEV, A.V., ZABOLOTSKIKH, V.V., BYNINA, O.V., TERESHCHENKO, J.P. Experience And Prospects Of Environmental Planning Of Towns Of Russia Taking To Account Noise Factor. Proc. of the international scientific conference (X International forum) Architecture. Design. Landscape "Le vie dei Mercanti", 30 May – 4 June 2012, Aversa-Capri, Italy, pp.1253-1260.

[8] VASSILIEV, A.V. Systematization of the principles of classification of active noise and vibration control methods. Proc.: *14th International Congress on Sound and Vibration 2007*, ICSV 2007. pp. 3250-3257.

[9] VASSILIEV, A.V. Recent approaches to environmental noise monitoring and estimation of its influence to the health of inhabitants. Proc.: *14th International Congress on Sound and Vibration 2007*, ICSV 2007. C. 3242-3249.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

NEW APPROACHES TO ESTIMATION OF ECOLOGICAL RISKS OF URBAN TERRITORIES

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Abstract
Human activity is connected with negative impact to environment. Maximal number of sources of negative impact is located in industrial regions. Factors and existing methods of estimation of ecological risks of urban territories are discussed. The main steps of complex estimation of ecological risks are pointed out.
New approaches to estimation of ecological risks of urban territories are suggested allowing to consider joint impact of physical and chemical pollutions and to determine the most problematic zones of urban territories. Program provision have been developed allowing not only to store and systemize the information about ecological risks but also to carry out correlation analysis of different data, to modeling and to estimate ecological risks, to forecast pollutions of environment and to ecological ranging of urban territories.
Results of approbation of new approaches to estimation of ecological risks on the example of the territory of Togliatti city of Russia have been described.

Keywords: Ecological risk, urban territory, estimation, impact

1. Introduction
Human activity is connected with negative impact to environment. It is possible to point out many factors as potential negative sources of environmental pollution. Maximal number of anthropogenic sources of risks is situated in industrial regions including collection of industrial, domestic and agriculture zones [1-3, 5, 8, 9].
Ecological risk may be considered as variation from generally admitted principles and norms of relations of man, business subjects, society and state to surrounding environment and from the norms of social relations between them.
For efficient reduction of ecological risk and for decision about possibility of reduction of negative impact of different factors up to the certain limits it is necessary to carry out forecasting and estimation of ecological risks.
Estimation of ecological risks – identification and estimation of probability of occurrence of events having negative sequences for environmental state, health of population, activity of business subject and caused by environmental pollution, disturbance of ecological requirements, emergency situations of natural and anthropogenic reasons.
It is evident that man may be impacted by the negative influence not of one but of the several pollutants, so it is necessary to develop approaches and program provision for estimation on ecological risks.

This paper is devoted to study and to development of new methods and approaches and program provision for estimation on ecological risks in conditions of urban territories.

2. New approaches to estimation of ecological risks of urban territories

For the analysis of multi-factor researches it is important to select adequate mathematic-statistical method of analysis and of generalization of experimental data. Traditional approach with using of multi-factor dispersion analysis and of F-criterion of Fisher for estimation of importance of separate factors and of their combination do not allows to decide the task of forecasting of functional state of man (FSM) by using of values of parameters of external medium and of other factors, participating in it forming. In this case researcher is having the necessity of using of a number of regressive models, describing the interrelation of separate indicator of functional state of man with linear or non-linear combination of factors of external environment (FEE):

$$y_i = f(x_1, x_2, \ldots\ldots x_n), \quad (1)$$

where y_i - i-form of values of estimation of FSM, and $x_1, x_2, \ldots\ldots x_n$ – of FEE.

A number of such equations (in dependence of the number of used indicators of FSM) may be rather high, and this makes difficult it practical usage. Moreover, in this case it is observed setting of multidimensional (for totality of FSM) task of quantitative estimation of system response of man's organism in negative conditions to several one-dimensional tasks. Such approach is not completely adequate. The most logical is study of multidimensional system by multidimensional mathematical methods.

During the study of functional state of man the main are statistical models of qualitative estimation of system response of organism of man to factors of life activity.

It is necessary to use the methodology of decision of system tasks with consideration of the main peculiarities of medical-biological information, which is an adequate mean of generalization and structuring of medical information in applied medical-biological researches.

Statistical concept, including successive application of methods of factor, canonical, correlation, cluster and component analysis is allowing to synthesize criteria and algorithms of making of decisions during estimation of functional state of man in applied medical-biological researches. Criteria and algorithms of estimation of functional state of man are allowing to carry out the estimation the degree of effort of mechanisms of adaptation of organism to the factors of vital activity.

New approach of determination of integral indicator of functional state of man (FSM) in coincidence with integral indicator of physical factor of environment (PFE) may be carried out on the basis of interrelation of one-dimensional multi-parametric characteristic of system response of organism (L_{sost}) and one-dimensional multi-parametric characteristic of external environment (L_{sr}). In this case $L_{sost} = L_{sr}$. On the basis of application of canonical correlation analysis it is determined that there is exist close interrelation of totality of indicators of FSM with totality of parameters of external environment ($\rho = 0.82$; $p < 0,05$).

3. Development of program provision for estimation of ecological risks

New program provision for estimation of ecological risks have been developed by authors. It allows to carry out complex estimation of risks and to carry out joint impact of main chemical and physical factors to the human organism taking to account possible toxic effects. Program provision also allows to carry out automatic processing and estimation of results of measurements of different physical and chemical pollutions and to carry out calculations of integral values of impact of factors of different nature.

Program, provision "Integrated monitoring of physical and chemical pollutions" (IMCF) [10] consists of 3 main blocks integrated with other modules of automated working place «Complex City Test»:

1. Informational block including:

- databases of physical; factors and chemical pollutants of environment of urban territories (air, water, soil);
- informational-reference tables of values of maximal admissible concentrations and maximal admissible levels of main chemical pollutants and of physical factors;
- lists of the main chemical toxicants and of physical pollutions of town;
- - lists of the main sources and factors of chemical and physical impact to the population;
- informational databases of medical statistics, databases of ecologically caused illnesses of citizen.

2. Program-analytical block, containing:

- module of automated processing of measurements results of different chemical and physical impacts;
- module of ecological-toxicological estimation of measurements allowing to carry out estimation of correspondence of measurements results to the sanitary-hygienic requirements;

- module of integral estimation and analysis of combined impact of factors if different nature allowing to carry out integral estimation of joint impact of physical and chemical factors to the human health, calculation of ecological risks and integral values of physical and chemical pollutions of environment taking to account indexes of toxic effects of synergetic impacts exceeding effects of summation.

3. Block of mapping of territory (GIS-mapping) containing:

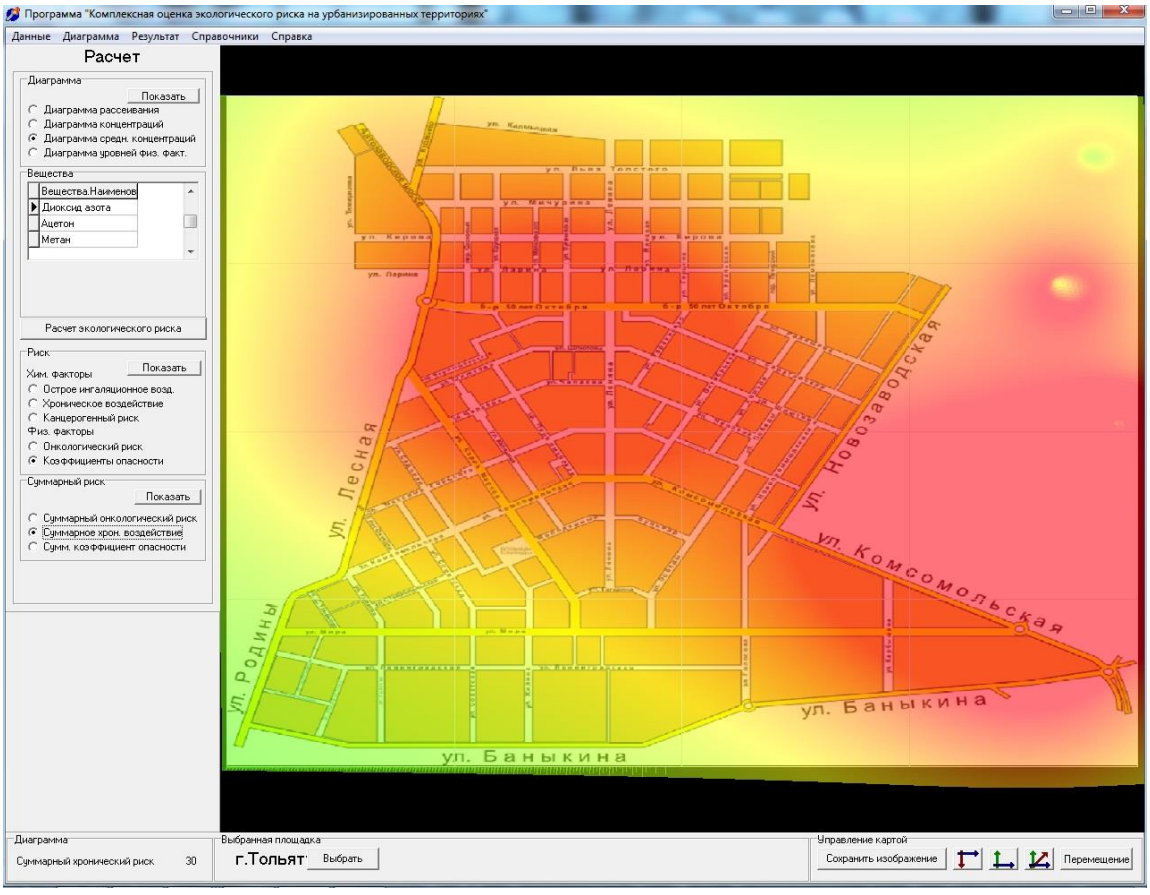
- module of mapping of territory of town for the different pollutants and factors of physical impact;
- module of dynamic mapping of physical fields and of chemical pollutions of town;
- module of mapping of integral impact of limiting factors allowing to create maps according to results of measurements and calculations of integral values of combined impact of factors of different nature, dynamic maps of physical and chemical pollutions (maps of ecological risks, maps of combined impact of factors).

Results of calculations in dependence of a number of values may be presented or as the table of measurements or as the separate field of results displaced below the table of measurements.

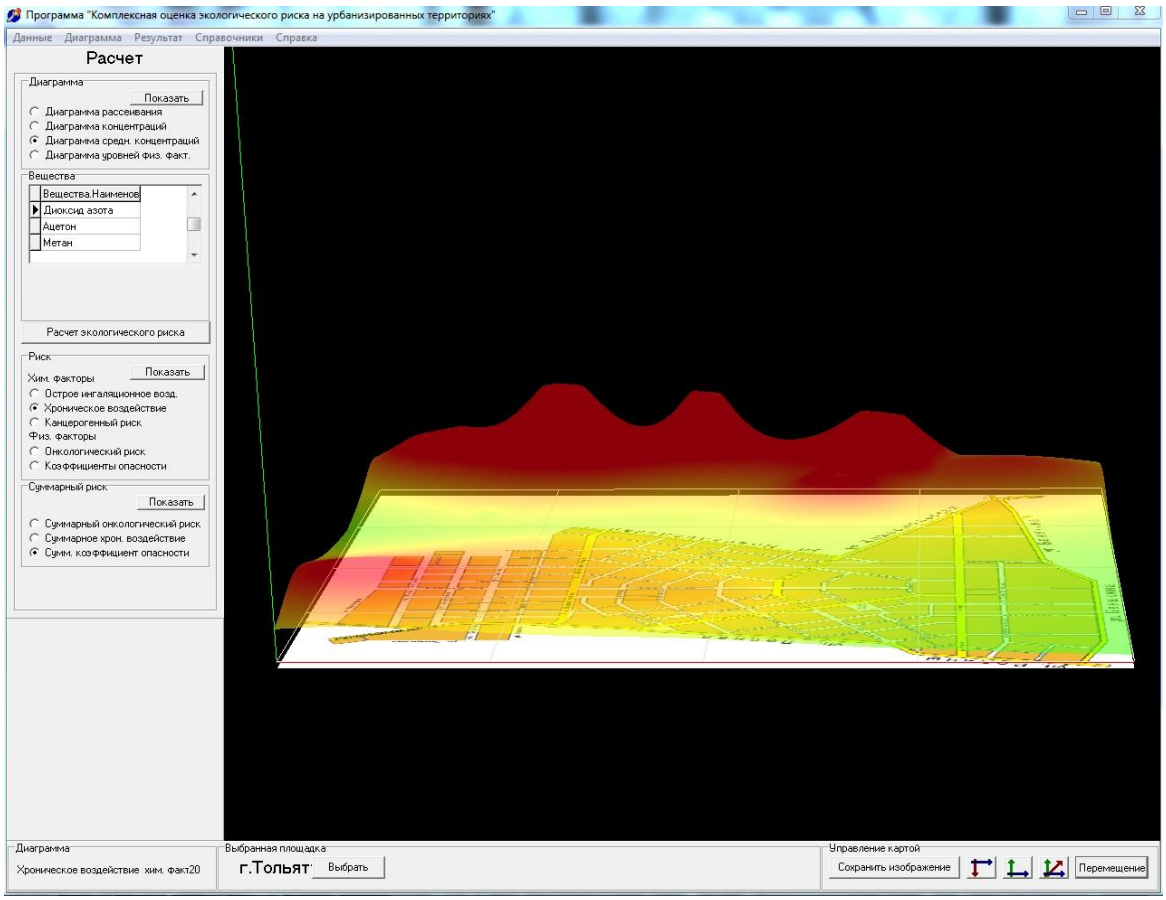
Program allows to input into the database results of measurements of the following impacts: noise (sound); infrasound; ultrasound; vibration; electromagnetic field, ionizing radiation; heat radiation; chemical pollutants; main toxicants.

Automated functions of developed program provision:

- account of measurements of concentrations of chemical components for inhalation input (atmosphere air);
- account of measurements of concentrations of chemical components for mouth input (water, food);
- account of measurements of levels of impact of physical factors;
- storage of data about maximal admissible concentrations of chemical substances and groups of summation;
- account of data of sources of pollutants emission into atmosphere;
- modeling of pollutants dispersion in atmosphere air;
- calculation of ecological risk on the basis of calculated data of ground level concentration of pollutants in atmosphere air during gas-air смеси exhaust from single source;
- calculation of ecological risk on the basis of measurements of concentrations of chemical pollutants;
- calculation of ecological risk on the basis of measurements of levels of impact of physical pollutions;
- complex estimation of ecological risk of impact of chemical and physical factors during combined impact;
- determination of probability of development of cancer illnesses.



a



b

Figure 1. Two-dimensional (a) and three-dimensional (b) representation of results of estimation of ecological risk by using of developed program provision.
Green color – normative value; yellow color – risk; red color – угроза

As the basis for mapping the graphical two-dimensional map of investigated territory is used.
Program provision allows to determine the most dangerous zones of urban territory from the point of probability of develiopment of chronic illnesses from complex influence of chemical and physical factors (figure 1).
Main modules of informational block of program provision "Main toxicants of environment and human health" are shown in figure 2.
Thus, for provision of ecological safety of population of towns it is occurs keen necessity of provision of complex estimation of impact of different factors of environment to the man and to ecosystems. Much importance should be attached to study of combined impact of factors of different nature – physical and chemical – to the man's organism [4-7, 9].

4. Approbation of new approaches and software for estimation of ecological risks in conditions of urban territories

Authors have approbated developed program provision for the complex research and estimation of ecological risk of Togliatti city. As main pollutants the following components were determined: formaldehyde, dioxide of nitrogen, dioxide of sulfur, oxide of carbon, methane, acetone, sterol, benzopyrene. Together with estimation of chemical pollution analysis of influence of following physical factors was carried out: noise, vibration, ionizing radiations, electromagnetic fields of industrial and radio frequency range, radon.
Using of automated system allowed to obtain the data of probabilistic development of different illnesses in dependence of factors of impact (figure 3 a – chemical factors; b – physical factors) and point out in a map of territory.

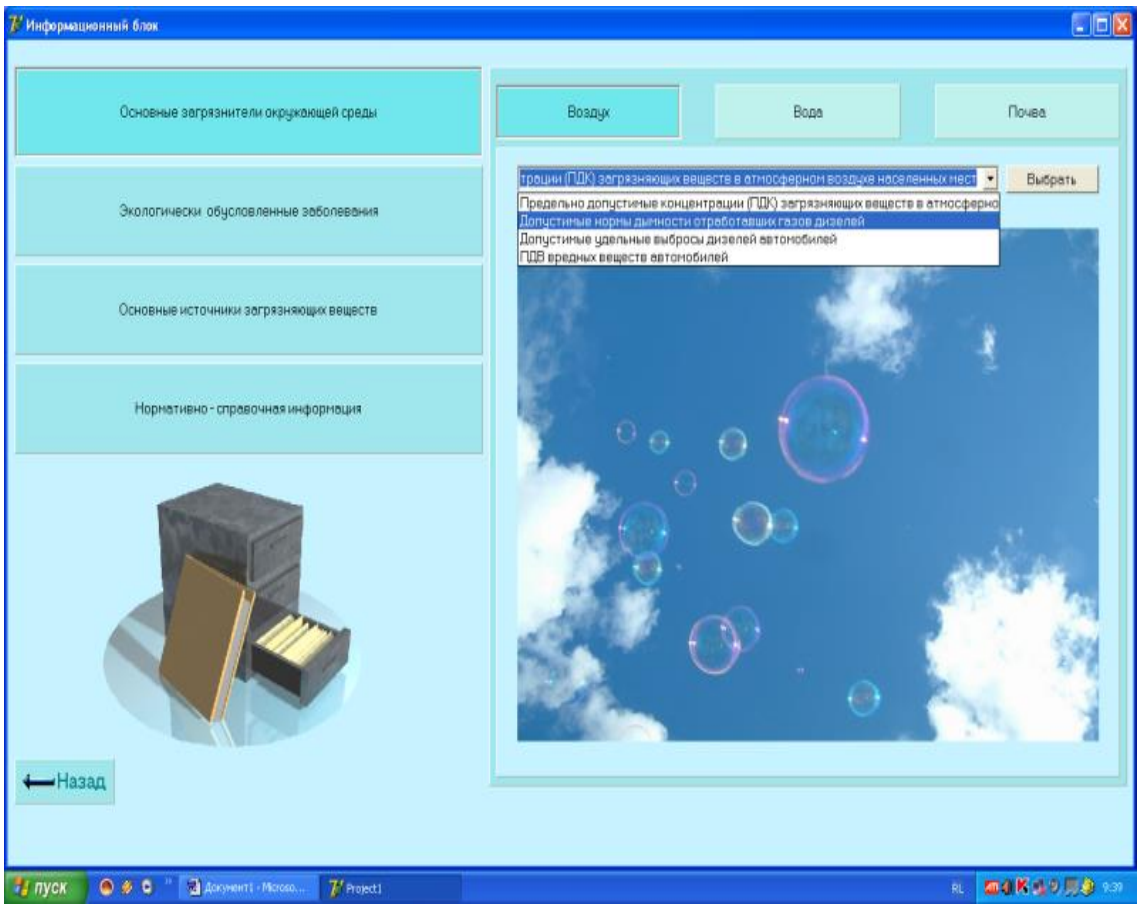
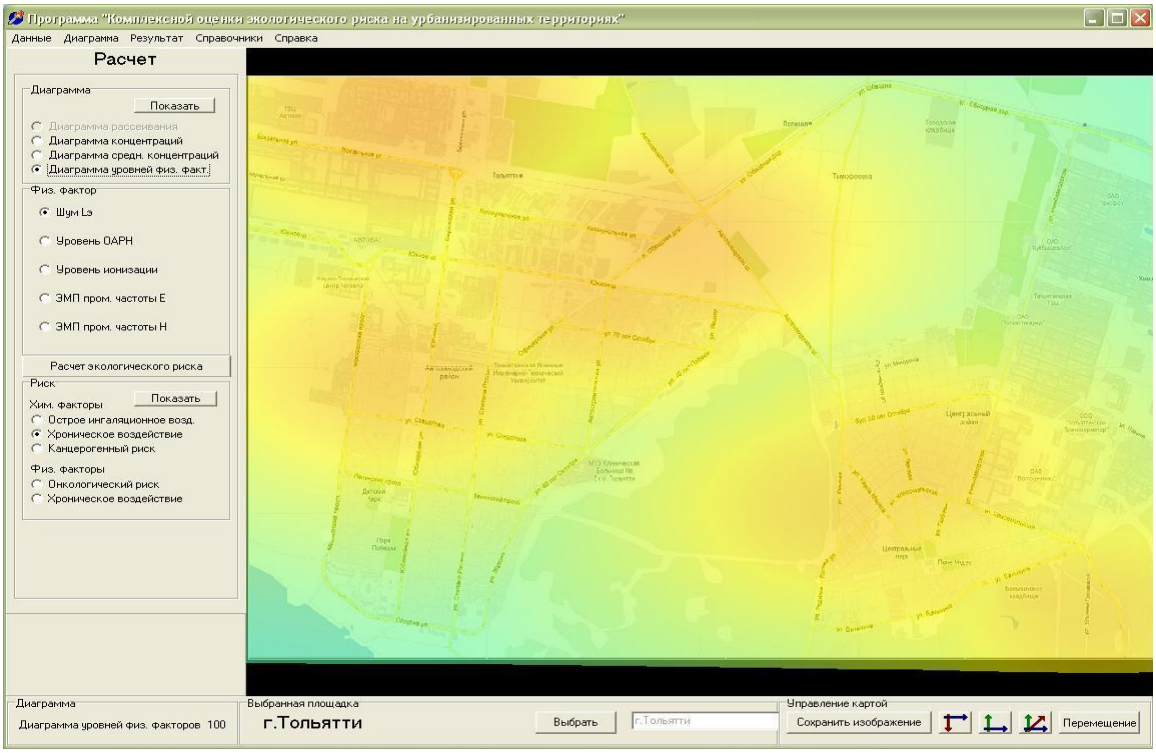


Figure 2. Main modules of informational block of program provision "Main toxicants of environment and human health"



a



b

Figure 3. Example of calculation probabilistic development of different illnesses in dependence of factors of impact

а – acute inhalation impact of chemical substances;
б – probability of development of chronic illnesses from noise impact

Developed program provision allowed to receive the data not only about probability of development of different illnesses from the main chemical and physical factors, but also to estimate it integral impact taking to account synergism effects.

5. Conclusions

The results of research are showing that complex estimation of risks is a prospect approach for efficient control of quality of environment and of estimation of ecological safety.

New approaches to estimation of ecological risks of urban territories are allowing to consider joint impact of physical and chemical pollutions and to determine the most problematic zones of urban territories.

Developed program provision is allowing to carry out not only separate, but also combined estimation of ecological risks of territories and to efficiently forecast risks of ecologically caused illnesses form complex impact of factors of different nature.

Results of approbation of new approaches to estimation of ecological risks and of program provision on the example of the territory of Togliatti city of Russia are showing high efficiency of estimation of ecological risks of urban territories.

Bibliographical References

[1] LUZZI, S., ALFINITO, L., VASILYEV, A. Action planning and technical solutions for urban vibrations monitoring and reduction. Proc.: *39th International Congress on Noise Control Engineering 2010*, INTER-NOISE 2010. C. 2508-2515.

[2] LUZZI, S., VASSILIEV, A.V. A comparison of noise mapping methods in Italian and Russian experiences. Proc.: *Forum Acusticum Budapest 2005: 4th European Congress on Acustic* 2005. pp. 1051-1056.

[3] LUZZI, S., VASILYEV, A.V. Noise mapping and action planning in the Italian and Russian experience. *8th European Conference on Noise Control 2009, EURONOISE 2009* – Proceedings of the Institute of Acoustics 2009.

[4] SHEVCHENKO, D.P., VASILYEV, A.V. Program Provision for Automated System of Environmental Monitoring of Physical Fields // *The Special Issue "ELPIT-2005" of the scientific edition "Proceedings of Samara Scientific Center of Russian Academy of Sciences",* Samara, 2005, volume 2, pp. 292-295.

[5] VASILYEV, A.V. Ecological Monitoring of Physical Pollutions on the Territory of Samara Region. Reduction of Impact of Sources of Physical Pollutions // Book. – *Edition of Samara Scientific Center of Russian Academy of Science*, Samara, Russia, 2009. 140 p., 36 ill. ISBN 978-5-93424-467-6.

[6] VASILYEV, A.V., BUKHONOV, V.O., VASILYEV V.A. Approaches to Environmental Impact Assessment of Physical Pollutions of Territories During Design and Construction of Industrial Objects and it Realization in Samara Region of Russia. Proc.: *The International Scientific Conference (XI International Forum) Heritage. Architecture. Landesign Focus on Conservation, Regeneration, Innovation "Le vie dei Mercanti",* June 13th – 15th 2013, Aversa-Capri, Italy, Edition of La scuola di Pitagora, Naples, Italy. - pp.1183-1190. ISBN 978-88-6542-290-8

[7] VASILYEV, A.V., ZABOLOTSKIKH, V.V., BYNINA, O.V., TERESHCHENKO, J.P. Experience And Prospects Of Environmental Planning Of Towns Of Russia Taking To Account Noise Factor. Proc.: *The international scientific conference (X International forum) Architecture. Design. Landscape "Le vie dei Mercanti"*, 30 May – 4 June 2012, Aversa-Capri, Italy, pp.1253-1260.

[8] VASSILIEV, A.V. Systematization of the principles of classification of active noise and vibration control methods. Proc.: *14th International Congress on Sound and Vibration 2007*, ICSV 2007. pp. 3250-3257.

[9] VASSILIEV, A.V. Recent approaches to environmental noise monitoring and estimation of its influence to the health of inhabitants. Proc.: *14th International Congress on Sound and Vibration 2007*, ICSV 2007. C. 3242-3249.

[`0] VASILYEV, A.V., ZABOLOTSKIKH, V.V., TERESHCHENKO, I.O., TERESHCHENKO, J.P. Program provision "Integrated monitoring of physical and chemical pollutions" (IMCF). *Certificate of State registration of computer program* f№ 2012661245, registered in Register of computer programs October 23 2012.

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IMPROVEMENT AND REALIZATION OF SYSTEM OF WASTE MANAGEMENT OF URBAN TERRITORIES

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Abstract
Problem of waste management is coming one of the most important problems in all industrial countries. Waste number is growing every year. Waste may cause complex negative impact to the landscapes of territories, to biosphere and to the human health. Examples of waste negative impact are considered. Methods and approaches of reduction of waste negative influence are analyzed.
Suggestion to improvement of existing waste management system in Russia are described. It is shown that to decide the task of reduction of waste negative impact to the population and to environment it is possible only by realization of complex approach including waste collection, transportation, disposal, treatment, utilization, education, information of population etc.
Results of complex organization of waste management system in Samara region of Russia in framework of cluster of secondary resources are considered.

Keywords: Waste management, urban territory, system, impact, reduction

1. Introduction
In conditions of modern urban territories it is possible to determine many factors causing negative impact to environment and to human's health [2]. One of the main factors is waste negative impact [1, 3-7].
Problem of waste management is coming one of the most important problems in all industrial countries. Waste number is growing every year. In Russian Federation annually more than 7 billion tons of different kind of waste is forming, and only 7 billion tons of waste is using again after utilization.
Waste may cause complex negative impact to the landscapes of territories, to biosphere and to the human health. Especially dangerous are toxic waste. The problem of it negative influence to the human's health both in industry and in domestic conditions have become especially important for the last years as due to the significant volumes of it as or the high toxicity [1]. For example, toxic waste of chemical nature may cause different negative impact to the humans leading to the damage of cardiovascular and respiratory systems, skin damage, toxicity poisoning and other negative sequences.
Influence of toxic waste may cause significant negative impact to environment. For example, atmosphere pollution by lubricating cooling liquids impact may occur not only in the process of it exploitation, but also due to evaporation and combustion of lubricating oils. Used lubricating cooling liquids may be considered as dangerous toxic wastes, utilization of which is very difficult [3, 7].
This paper is devoted to the problems of improvement and realization of waste management system of urban territories.

2. Analysis of peculiarities of organization of waste management system in Russia

In general existing system of waste management in Russia may be subdivided into the different directions:
- waste collection, transportation, utilization;
- waste temporal storage;
- waste displacement in special sites;
- monitoring of waste management on the different stages;
- ecological education, organization of efficient system of teaching of specialists in the field of waste management;
- enlightenment and upbringing of population in the field of waste management;
- improvement of legal and normative documentation in the field of waste management;
- development and implementation of methods and technical solutions for reduction of waste negative impact;
- informational provision of waste management etc.

In fact waste management activity in Russia may be considered as a special cluster, the main purpose of which is provision of efficient interaction of all variety of specialists which are deciding particular questions. General purposes of cluster are:
- Integration of subjects of waste management and of secondary resources between clusters and inside of clusters;
- Development of markets of secondary resources;
- Promotion of economics of knowledge in system «upbringing – education – science –production - consumption».

Detailed purposes:
- Initiation of fundamental research of different stages of increased waste vital cycle and on topical directions of resources saving;
- Creation of conditions of accelerated certification of waste with variation of status in system "waste – secondary resource - product».
- Development of logistics of recycling;
- Determination of priorities of projects realization;
- Optimization of regional normative-legal base for reaching of strategic purpose «zero of waste».

Advantages of cluster alliances in the field of waste management are evident, and it is possible to determine it as priority direction of further development and increasing of efficiency of activity of enterprises of industry of waste treatment:
- supporting of creation and functioning of system of using of secondary resources;
- unification of resources on the basis of regional mechanisms for implementation of modern technologies of waste treatment;
- development and implementation of informational-technical systems and it using in frameworks of common informational space;
- joint training of staff of all levels;
- collaboration with foreign enterprises on exchange of advanced experience and new achievements.

In Samara region of Russia there is a special program "Improvement of system of industrial and domestic waste management and forming of cluster of using of secondary resources on the territory of Samara region". Main purposes of the program are:
- creation of joint system of industrial and domestic waste management on the principles of consolidation and unification of state structures with all the representative of professional society;
- finding of investments into economics of Samara region, creation of additional working places, provision of ecologically safe keeping, treatment and liquidation of waste.

In Samara region of Russia investments are directed mainly for construction of sorting stations, logistics organization, establishment of conditions for wastes temporary storage and treatment. In more high technological level are arranged waste collection and temporary storage, new container sites are created. Main task is separation of waste and re-using of resources. It allows reduce negative impact to the environment, to reduce a number of polygons of waste disposal and a volume of waste.

Regional and municipal legislative base of Samara region in the field of waste management is continuously improving. In this case much importance is attached to the development of system of waste management in the big towns of Samara region: Samara, Togliatti, Syzran, Zhigulevsk.

On the territory of city district Togliatti system of industrial and domestic waste collection, transportation and utilization is arranged in the following way. Utilization of solid domestic waste and large size garbage forming as result of vital activity of population of city district is financed by the city budget.

Scheme of industrial and domestic waste utilization in Togliatti city is integrated too the cluster of secondary resources of Samara region and includes such enterprises as "POVTOR" company, solid waste treatment plant, "PLODAR" company etc.

All the volume of solid domestic waste and large size garbage of Togliatti city is primarily delivered to "POVTOR" company, where is sorting of waste is provided. Organic waste is treated by bio-thermal composting method in solid waste treatment plant. The volumes of waste that it is not possible to utilize and to treat are disposed in special polygons.
Existing system of utilization of solid domestic waste and large size garbage of Togliatti city allows to provide efficient treatment of waste and to reduce a total volume of waste disposed at polygons up to the value of 25 % form the total value of waste.
Implementation of system of a separate collection of waste is important and complex task requiring a hard work on organization of ecological enlightenment and upbringing, motivation of inhabitants to separate paper, glass, plastic in total waste volume.
It is also an interesting experience of work of association of Samara region "Waste management" uniting as enterprises activity of which is connected with waste forming, disposal and utilization, as educational institutions.
It is necessary to underline that in Samara region of Russia much importance is attached to ecological education, enlightenment and upbringing, including also the field of waste management. Some universities of Samara region are teaching the students to ecological specializations. Mass measures, actions, exhibitions, competitions with active involving of population of region are carried out. For example, in September 2013 in frameworks of international ecological congress ELPIT-2013 in Samara was help international round table devoted to waste management problems with active participation as of heads and of specialists of enterprises, as scientists and of public organizations and citizens.

3. System of waste monitoring in Russia. General methods and approaches of reduction of negative waste influencing.

In Russia there is a system of waste monitoring including observation, control and collection of information at different levels:
- monitoring of impact to environment;
- monitoring of waste displacement etc.

Monitoring of environmental impact assessment provides for control of the following parameters: object of control, methods of research, frequency of measurements, methods and equipment of control, periodicity of measurements data processing and analysis, methods of estimation of environmental impact assessment, methods of estimation of environmental damage. In result it is necessary to implement the measures allowing to reduce the exceeding values of waste negative impact and to arrange control measurements.
Monitoring of all parameters of observation, control and analysis is carried out is provided during all the chain of waste treatment and disposal. Collected information is transmitted to the information-analytical center and than to forecasting center where is modeling of possible events during negative impact to environment is modeling.
The general methods and approaches of reduction of waste negative impact are including:
- collection and transportation of total mass of waste;
- waste separate sorting;
- waste treatment;
- waste utilization and secondary using;
- waste disposal.

Especially important is the task of toxic waste treatment. In Samara State Technical University new method of utilization of oil containing waste is suggested including processes of atmosphere and vacuum distillation with further oxidation. Such solution allows to return to production cycle of oil distillation row materials in wastes of oil gas industry. It allows to significantly reduce negative impact of oil gas sludge to environment.

4. Conclusions

It was shown that problem of waste management is especially important in Russia due to the negative waste impact to environment and the human health and because of a large volume of waste that is not utilized. Analysis of peculiarities of organization of waste management system, in Russia is proposed.
Existing system of waste monitoring in Russia is described including observation, control and collection of information at different levels. Suggestions of improvement of existing waste management system in Russia are considered. The general methods and approaches of reduction of waste negative impact are submitted.
It is possible to conclude that the task of reduction of waste negative impact to the population and to environment may be achieved efficiently only by realization of complex approach including waste collection, transportation, disposal, treatment, utilization, education, information of population etc.

Thus, only realization of complex approach allows to decide efficiently important and topic task of reduction of negative waste influence to the man and to environment.

Acknowledgement
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Bibliographical References

[1] KARABASOV, U.S., CHIZHIKOVA, V.M. Ecology and management: *Book for universities*. – Moscow: MISIS, 2006. – P:712.

[2] VASILYEV, A.V. "Green politics: problems and structure. *"Pro et Contra" Journal*. 2002. Vol. 7. № 1. pp. 84-93.

[3] VASILYEV, A.V. Research of toxicity of organic waste on the territory of former "Phosphorus" company. *Proc. of the IVth International Environmental Congress (VIth International Scientific-Technical Conference) "Ecology and Life Protection of Industrial-Transport Complexes" ELPIT-2013,* September 18-22 2013, Togliatti – Samara, Russia. – Togliatti: Edition of Togliatti State University, Volume 5, Scientific Symposium "Urban Ecology. Ecological Risks of Urban Territories. International Workshop "Problems of Waste Management and of Secondary Resources Using", pp. 46-51.

[4] VASILYEV, A.V., KHAMIDULLOVA, L.R., HYUKHTINA, L.V. Environmental Control Of Toxicity Of Urban Territories Using Biological Monitoring Methods. *Proc. of the international scientific conference (X International forum) Less More Architecture. Design. Landscape "Le vie dei Mercanti"*, 30 May – 4 June 2012, Aversa-Capri, Italy, pp. 1245-1252.

[5] VASILYEV, A.V., KHAMIDULLOVA, L.R., HYUKHTINA, L.V. Environmental Control Of Toxicity Of Urban Territories Using Biological Monitoring Methods. *Proc. of the international scientific conference (X International forum) Less More Architecture. Design. Landscape "Le vie dei Mercanti"*, 30 May – 4 June 2012, Aversa-Capri, Italy, pp. 1245-1252.

[6] VASILYEV, A.V., BUKHONOV, V.O., VASILYEV, V.A. Approaches to Environmental Impact Assessment of Physical Pollutions of Territories During Design and Construction of Industrial Objects and it Realization in Samara Region of Russia. CD Proc. of the International Scientific Conference (XI International Forum) Heritage. Architecture. Landesign Focus on Conservation, Regeneration, Innovation "Le vie dei Mercanti", June 13th – 15th 2013, Aversa-Capri, Italy, Edition of La scuola di Pitagora, Naples, Italy. - pp.1183-1190.

[7] VASILYEV, A.V.,, MELNIKOV, P.A., ZABOLOTSKIKH, V.V. Approaches to Classification and to Reduction of Negative Impact of Lubricating Cooling Liquids. Proc. of the International Scientific Conference (XI International Forum) Heritage. Architecture. Landesign focus on Conservation, Regeneration, Innovation "Le vie dei Mercanti", June 13th – 15th 2013, Aversa-Capri, Italy, Edition of La scuola di Pitagora, Naples, Italy. - pp.1191-1195.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Musealization and Exhibit Questions inside the Archeological Site

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Abstract
The archaeological area is increasingly seen as a place of connection with the space of the active, cultural and civil life, towards the overcoming of the idea that archaeological sites are places situated on a separate dimension , which is unrelated to everyday life.
This tension obviously implies the need for special attention paid to the problems of preservation and protection, but it opens up the fields of action and research to a growing awareness and management of the communicative possibilities and of the opportunities to spread knowledge through physical and direct experience of the site.
This process is widely evident in all those cases in which fragments of architecture, frequently discovered by chance in stratified cities, interpose themselves within urban routes, public and also private spaces, providing the opportunity for the construction of an awareness of the history of the places even for a distracted citizen, who is not driven by a particular intention of knowledge and of realization of the idea of widespread museum.
But this is also found in the increasing attention paid to the possible, even if temporary, exhibits, achievable within the sites , which allow the general public to a more intense use, and the scholars to an even more depth one, thanks to the use of technologies and techniques, which are less and less invasive in terms of materiality, but more and more effective.

Keywords: memory space, urban life, widespread museum, communication, stratified cities

1. Relationship with the urban context
The problem of archaeological sites located in urban areas allows us to verify the path taken by museum design over the last hundred years in the direction of overcoming an idealistic conception of the cultural legacy as well as in the direction of a progressive reduction of the distance between what is the object of musealization and the daily lives of its users. How this process has been able to sustain the design research of the museum and its setup is the subject of extensive and numerous treatises, reflecting, in the materiality of the spatial structure and manner of presentation, the instances underlying the evolving of the ways of cultural fruition and the broadening of the target audience of museums and exhibitions. In practices related to museums this has resulted in the passage from a contemplative dimension, drawn from the flow of everyday life, of cultural fruition to a greater tension to participation and understanding of the meanings attached to the objects displayed. The architecture of the museum has abandoned its traditional aspiration to being a temple, in favor of the vocation to be a place of communication which is particularly meaningful in contemporary social life. Similarly, the techniques and the exhibiting methods have been refined to facilitate the exploitation of documents and in bringing them to different users, for all ages and interests. The concept of cultural legacy itself has undergone a process of extension beyond the concept of excellence and masterpiece, has included examples of material and immaterial culture capable of returning the complexity of human life and thought in a given time or in a given context. As a corollary of the renewed concept of cultural legacy, a lot of importance can be returned to the context of source and documents and works, as opposed to the process of extrapolation from the target issue and favoring instead the reading of ties

with the physical and cultural environment of belonging, as well as the theory on the idea of widespread museums has deeply investigated.
The area of urban archaeological sites offers the opportunity to read this passage from a situation of exclusivity to inclusivity in the relationship between the site and the context and between the site and the user. Work on sites and fragments found underneath, within, in between the gaps among other existing buildings and layered over them offer the opportunity to make some observations on the relationship between integration and mutual enrichment between architectural design and construction and archaeology. This framework also emphasizes the importance that the spaces of connection between the archaeological sites and the active city, as well as from one site to another have: in fact these are the sites of a link not only physical, but also conceptual, between the values of which the remains are carriers, and contemporaneousness.
This discussion does not want to get into the substance of the arrangements for the restoration of archaeological sites, but in the way it deals with the problem of their exploitation and the way it treats the relationship that they weave together with surrounding spaces, in which the vision of the findings dissolves in the most diverse and daily functions.
As in every other dimension linked to the problem of musealization, even that of archaeological sites is struggling between instances of conservation and those of communication, both essential, but in hindsight, in conflict with each other. Paradoxically speaking, from the point of view of conservation, once a site is found, after having studied and drawn the most scientific information, the best assurance of its preservation may just be given by its backfilling.
But this would go against one of the purposes underlying the archaeological interest, which is to enrich the lives of present and future generations with the historical, cultural, aesthetic values substantiated in those remains. Communicating those values, enhancing the sites, and deciding how to treat the problem of their connection with the context is no longer just a problem of conservation, but rather of design, which writes the archaeological site fully into the flow of transformation processes of the contemporary city.
Traditionally, the archaeological site was drawn from this flow, protected and isolated from the environment, even physically, by a wide margin of green area, legacy of a romantic view of the ruins and a symbol of a sort of transition necessary to be able to reach the ruins themselves, from a prosaic and mundane dimension to an “other” dimension, lofty and extrapolated from everyday life.



Fig. 1: Hans Hollein, Michaelerplatz Archäologiefield, Wien, 1991-1992

This forcing the archaeological site into an *enclave* conflicts with the implicit vocation of urban archaeology to highlight the processes of stratification experienced by historic cities where it is not possible to extract and crystallize the contribution of a given epoch from those preceding and following: almost all European cities clearly show how each building or street, or square has been designed on the trail of pre-existing ones, using this as “project material”, in the concrete or conceptual sense.
The permeability in the arrangement of the archaeological site can allow not only to marginalize the remains and to promote the fruition, but to read the continuity between the various measures of change between the built environment and the human stories that have generated the same action.
An example of maximum permeability, woven by the plan of the arrangement between the discovery and the urban context, is given by the solution of Hans Hollein for the Michaelerplatz Archäologiefield in Vienna, built between 1991 and 1992. The design of the pavement, of the minimum structures of protection and viewing, summarizes in a contemporary feature the comparison between the signs and sedimentation of the different historical periods experienced by the urban fragment, already the scene of the encounter, as never in history emblematic of architecture, between the Looshaus and the Baroque architecture of the Hofburg.
The permeability and integration between the site and the context must not, however, be seen as coinciding with the lack of boundaries or transparency, which often becomes a commonplace in architectural design solution for the protection of archaeological finds. Like the protective band of green, the frequent use of the *glass box* at times seems obvious and predictable, where building an architecture with its materiality mediates, protects, introduces, interprets or at times evokes, is a more responsible and intentional act, although more risky. Action taken in 2001, always in Vienna, by Christian Jabornegg and András Palffy for the redevelopment of the archaeological area underneath the Judenplatz, with the rearrangement of the Holocaust Monument by the English artist Rachel Whiteread, is an example of strong integration, but not so much visual, as conceptual. The Monument is made up by a rectangular cement block, of approximately 10 meters by 7, almost 4 meters high, consisting of walls of books, objects not normally present in the urban space, a symbol of the stories of the men involved in the tragic events, arranged so as to present the spines inward, thus anonymous; on the base are the names of the places of extermination. The books cannot be read, their decoding refers to a further deepening of the events of the story. The monument, highly *site-specific*, is located above the remains of a medieval synagogue, which was destroyed in one of the many persecutions suffered by the Jewish community, found in recent times. The path that leads to the excavation, completely underground, starts in the arrangement of the pedestrian area where the monument is located and leads within the Mizrachi Haus, where a branch of the Jewish Museum is set up, focused on the life of the Jewish community in the Middle Ages. In this embodiment, both the urban development and the draft of the Monument, and the museum set up and enhancement of the archaeological site flow into the next, materially reflecting the connection among the various interrelated historical events.



Fig. 2: Christian Jabornegg & András Palffy, with Rachel Whiteread, Judenplatz Museum, Wien, 2001. View of the model.



Fig. 3: Christian Jabornegg & András Palffy, with Rachel Whiteread, Judenplatz Museum, Wien, 2001. Room whit the remains of the sinagogue.



Fig. 4: Christian Jabornegg & András Palffy, with Rachel Whiteread, Judenplatz Museum, Wien, 2001. The square with the monument.

2. Hybrid spaces

One area of special importance is given by those hybrid archaeological spaces, oftentimes found casually in the layered cities, where the action of valorization and protection of the site joins easily with projects of places entrusted for the most various functions. These cases constitute realization examples of that ideal of widespread museum that aims at connecting the object of the musealization action with its context of belonging: in these cases the works, the sites, the artefacts, to meet the visitors, who carry out their normal daily activities, showing with evidence their presence, and with that aura of fascination that are capable of exercising, the density of the historical layering of the city where they live and work. The city of Naples continuously offers these occasions of similar interventions, exactly for the thousand year layering on top of the same track: the building of the Line 1 of the Underground railway, about to be completed, took on an important occasion to verify this phenomenon and to test, through various media, different solutions to the fruitful living between instances of efficiency of a contemporary infrastructure and valorization of the identity and wealth of a city full of history.

The excavation works necessary for the building of the Metro have unearthed a huge amount of artifacts, ranging in time from the prehistoric period to the Spanish domination. While this has caused a huge slowdown in the advancement of the works, on the other hand it has provided an important opportunity not only for the advancement of archaeological studies on the city, but also for the work of the designers involved that had to deal with the need to adapt the design solutions to the needs dictated by the finds.

The quantity and quality of the finds was such as to suggest the creation of Neapolis Station, an exhibition space open access that lies along the railway museum and in fact falls below the National Archaeological Museum, of which it forms a part. This showroom is not particularly significant for the display solutions, but rather for being a museum out of its traditional isolation to meet the potential visitors, carrying out the same working approach to the citizen by culture which is at the basis of the general idea underlying the project of the Art Stations by Achille Bonito Oliva, a museum where you find yourself immediately immersed, while tending to your own daily tasks.



Fig. 5: Oscar Tusquets Blanca, Toledo Station, Line 1 of the Metro, Naples, 2012.

If the Neapolis Station brings together small artifacts, sculptural works and utensils, the architectural finds fall into the contemporary project of the stations where they have been found, becoming for instance a key of clear indication of the descending into the various historical and physical layers of the city, like in the Toledo Station, by Oscar Tusquets Blanca, where the wall fragments of the Aragonese epoch talk equally with the materials of the architectural project and the contemporary works of art, like the mosaics by William Kentridge or the “Galleria del mare” [*Gallery of the sea*] by Bob Wilson.
The 1st century temple A.D. found in the area of the Duomo Station becomes the focus of the Fuksas project, visible from outside through a clear cover that can be visited from the inside, along with the other archaeological remains found.
In these projects, the archaeological remains become the protagonists of the architectural projects, together with the works of the contemporary art, combining past and present, but also combining functional and efficient response to the infrastructural needs of the city of the present day with the opportunity to enrich the culture and beauty of everyday life, and not just on special occasions, in line with the most current meaning of the sense of the action of a museum.
This combination of factors ultimately becomes the qualifying factor of the urban invested by each intervention, finally overcoming the enclave status as alluded to earlier.
The most important intervention playing for the urban impact is the one designed by Alvaro Siza with Eduardo Souto de Moura for the area of Piazza Municipio, where a significant and extensive archaeological area has highlighted the port areas of antiquity.
Due to the layout of this area, which will remain largely in the open, even if it includes within it a museum of some vessels found *in situ*, it will be possible to read the transformations from the coastline bringing together the archaeological site with the built landscape, from various ages, with the natural one, something precluded to the underground arrangements.



Fig. 6: Alvaro Siza and Eduardo Souto de Moura, Municipio Square Station, 2000, work in progress, view of the model.

3. Exhibit and space experience

These actions show how extensively archaeology can fuel and substantiate the architectural design, which is forced to evolve with the progress of the excavations and hone its ability to interpret the site and restablish a connection with the context. As mentioned earlier, every action of interpretation and exploitation becomes an act of design that exceeds the size of the conservative direction of greater bond with the contemporary project.

The architectural design can work depending on the strengthening of its ability for fruition and reading of the archaeological site, acting on its fringes, beside and around it, mediating the relationship with the environment. But it can also act on the inside, with minimally invasive tools on the material plane as effective in terms of the effects obtained. All types of communication support which can be placed inside of an archaeological site, such as plastic panels, showcases containing smaller artifacts and furnishings, can increase understanding of the values of the sites that you visit. They can become tools for reading the spatial and architectural values of the site, not only for the scientific depth and reliability of the information contained or supported, but for project control and compositional sensitivity at the base of the way they are designed: for example, *lining-out* can complete the reading of partial remains or allow to read the position of interventions in different times with a much higher efficiency than that of site plans and engineering drawings placed on the side of the ruins, since the spatial allusion allows to immediately build the distribution and dimensions of the architectural space. A very difficult field of intervention, which can be only mentioned here, is that of protection covers, which can assist the primary function of a cultured interpretation and reconstruction role of environmental effects. Similarly the use of *ghost structures* may return, for instance, the idea of the complexity of the *raumplan* of the Domus, typically mortified in the common perception of only layout reading. Therefore inserting of showcases containing furnishings or projections aimed at rebuilding the treatment of the walls tend to mend relations among the space, decoration and furnishings which were made either by time or mutilated by previous conservation interventions and museums that separated the space from the furniture, frescoes and even decorated mosaic floors.

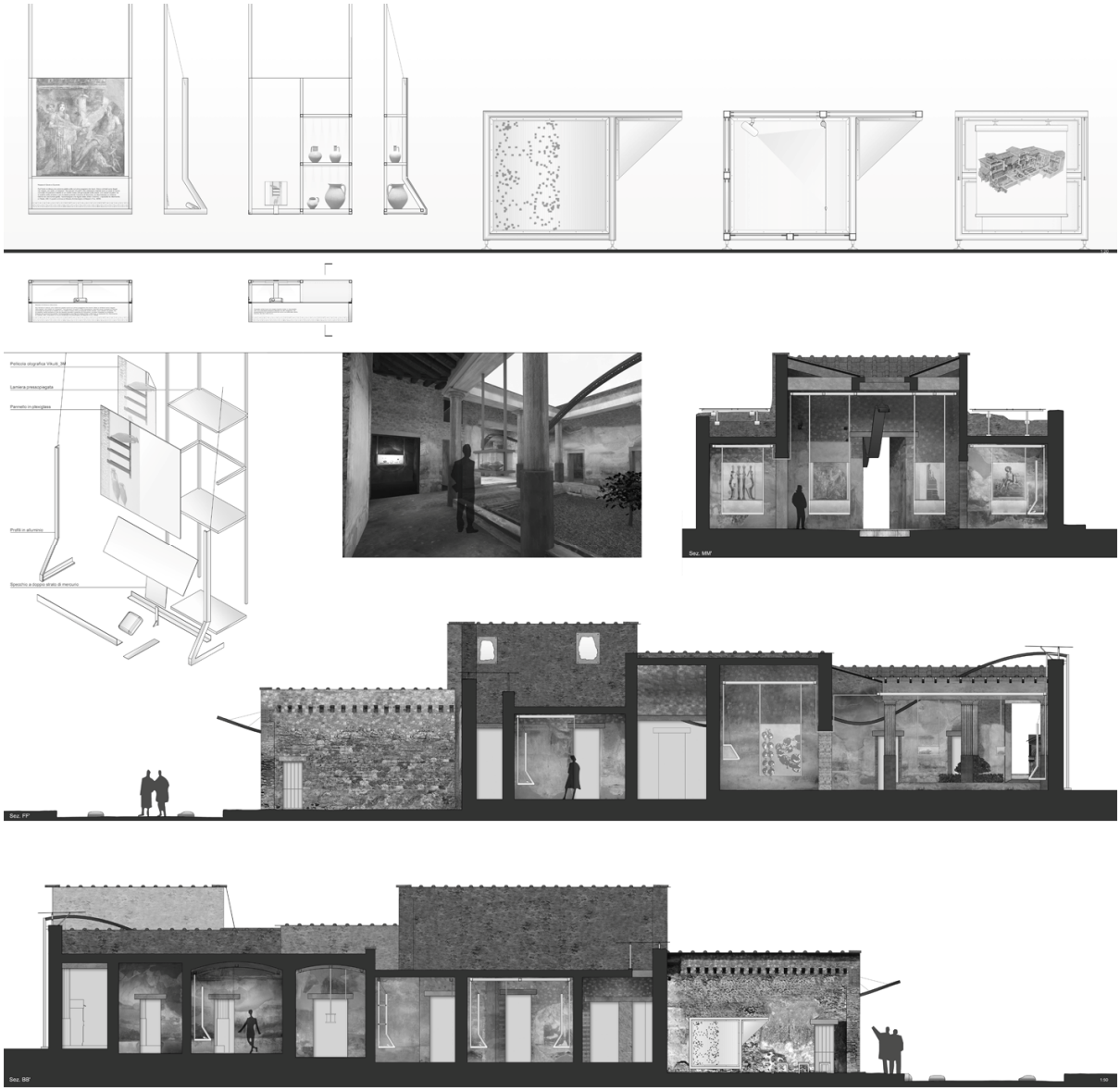

Fig. 6: Design of a temporary exhibition in the House of the Tragic Poet in Pompei. Thesis of L.Celli, Corso di Laurea Magistrale in Architettura, Arredamento e Progetto, Università degli Studi di Napoli “Federico II”.

The use of multimediality and virtuality is rightly seen as an opportunity of huge interest for communicating archaeology, precisely due to the possibility these tools offer to return to the spaces of the past their entirety and completeness through decorations, furnishings, lost colours. Oftentimes however, these reconstructions bring back an image which, although an interpretation, draws the space represented by the flow of transformations, freezing it in a predetermined time. The resulting image is often deprived of many of the qualities that belong to the physical space. The potential of multimediality are huge in helping us see what is not visible, such as what has gone destroyed or what has been backfilled, or even operate network connections between sites and museum contexts among which there are significant cultural and historical ties. Of course the use of the *touch screen,* is very advantageous as with the use of a plain *app* that each and every one of us can download on our phone, allowing us to intensify and widen the information related to visiting the archaeological site. However, I believe it is important to reflect on whether the communication tools offered by augmented reality are seen as useful aids in intensifying the experience of archaeological sites, carefully avoiding the risk of replacing it. The physical and sensory experience of the site is essential despite the success that many exhibitions collect that make use of more sophisticated tools of modern technology: being in front of a screen, although we believe to manipulate and guide the exploration of the images being offered, is absolutely not as meaningful as being inside. Often these exhibitions are independent from the actual site, far from it, as well as alien to the involvement of other kinds of materials. As such they belong more to the operations connected to on line museums than those actions aimed at valorising the actual sites. Even when making use of technologies that bring together the body gestures with the images projected on the screen, borrowing systems widely used by the world of videogames, as in the case of the recent exhibition in the Palazzo Te at Mantova, “Order and light. A virtual tour in the evolution of interior spaces in the history of Greek architecture up to the Renaissance”, not all too convincing however is the discounting of the subject of the study to pure image, its stripping of all those meanings linked to the sensorial experience, the tactile dimension, the opportunity to read the relationship with the context and landscape, and, last but not least, the possibility of measuring the space to the bodily dimension, that’s to say all those aspects intrinsically connected to the actual architectural space. The importance of the physical experience remains essential in my opinion, the role of the design and construction of a museum may be of great weight in the effectiveness and intensity of the experience of this reality, whose value also lies in the fact that it has “materially” come to us. The massive and above all unique appeal to virtuality moves in the direction of spectacularization and discounting to pure image of the architectural heritage and may for that matter proceed towards distancing this from the actual and cultural life, in the opposite direction of the work accomplished by modern museums.

Bibliographical References

IRACE, Fulvio. *Design & cultural heritage,Immateriale, virtuale, interattivo,* vol.1. Milan: Electa, 2014. ISBN 9788837097516

MANIERI ELIA, Mario. *Topos e progetto. Temi di archeologia urbana a Roma.* Roma: Gangemi, 1998

RUGGIERI, Maria Clara., Urban archaeology without the archaeology / Archeologia urbana senza l’archeologia, in GERMANÀ, Maria Luisa., RUGGIERI, Maria Clara. *Urban archaeology enhancement / Valorizzare l’archeologiaurbana.* Pisa:ETS*,* 2013*.* ISBN 9788846734440

RUGGIERI TRICOLI, Maria Clara, *Musei sulle rovine.* Milano: Lybra Immagine, 2007. ISBN 9788882230920

RUGGIERI TRICOLI, Maria Clara, SPOSITO, Cesare. *I siti archeologici.Dalla definizione del valore alla protezione della materia* . Palermo: Dario Flaccovio, 2004

VAUDETTI, Marco, MINUCCIANI,Valeria,CANEPA,Simona.*Mostrare l’archeologia, per un manuale-atlante degli interventi di valorizzazione.*Torino:Umberto Allemandi & C., 2013. ISBN 978-88-422-2248-4

VENEZIA, Francesco. *Che cosa è l’architettura,* Milan: Electa - Collana Architetti e Architetture. 2011. ISBN 9788837086619

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Restoration of the feudal castle of Ventimiglia family in Castelbuono (Pa)

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Abstract
This paper concerns the restoration of the castle of Ventimiglia family in Castelbuono; the initial part, come from the medieval period (XIVth century), underwent considerable transformations in the XVth century by Giovanni Ventimiglia, Count of Geraci. He transformed the old castle, which is primarily defensive, in their own home and restored the chapel dedicated to S. Anna, then reconfigured in 1683. Since the XIXth century the castle had a progressive deterioration and in 1920 it was purchased by the Municipality of Castelbuono. The postwar years were characterized of a further deterioration of the castle; it was remedied with partial actions since 1978. These interventions have been coordinated by the State Department for environment and historical buildings and by the architect Rodolfo Santoro.
A significant intervention involved the consolidation of the foundations through the creation of micro poles and execution of archaeological excavations. Then, using a research agreement with the University of Palermo, the surveys, structural and geotechnical investigations were completed. In 1994 the opportunity of draw up a plan gave it a designation for exhibitions and conferences.
The works of monumental restoration, aimed mainly at the *Palatium*, concerned:
- The static restoration through the consolidation of the foundations, the walls, floors and roofs;
- The architectural restoration;
- The reuse of the complex with the outfitting of the interiors.

Keywords: architectural restoration, architectural history, construction techniques.

1. The castle over the centuries

The castle of Castelbuono enjoys an elevated position on top of the hill called San Pietro, at the foot of which lies the town. On the basis of archival sources its foundation, by count Francesco I Ventimiglia, dates back to 1317, as demonstrated by a document with which the bishop of Patti grants in exchange for the count the hill of San Pietro belonging to the Church in exchange for a certain area of land in the territory of Castelbuono [1].
Its construction, according to tradition, was linked to the desire of the noble Ventimiglia's family to adopt a feudal residence alternative than that of the highest and cold Geraci, capital of the feudal state [2]. More recent studies [3], however, have reduced the residential role of the castle, also in view of the existence of other dwellings owned by the Ventimiglia's (as the *Domus Magna* of Cefalù), rather than tying the construction of the building to the role of homeland defense. The castle, in fact, due to its strategic location, not only was a safe protection and a refuge for the population of the neighboring houses, but closed the access road to the Madonie.
Between 1454 and 1456 Giovanni Ventimiglia did perform works likely to make the castle more comfortable and suitable for residential functions and in the same year moved from the chapel of the castle of Geraci, where he had previously kept, the skull of St. Anna, that become subsequently the patron of Castelbuono. Probably this date can be traced back the first reconfiguration of the chapel, presumably dating from the early XIVth century.

In the XVIIth century further processes were performed, which gave the castle its final form. In particular, in 1683, Francesco Rodrigo Ventimiglia did reconfigure the old chapel which at that time was fully covered with a magnificent decoration in *stucco*, by brothers Giuseppe and Giacomo Serpotta. At the same time can be traced restructuring of many interiors and the realization of the internal staircase to the court, to replace the old medieval scale, traces of which can be detected in the presence of two pointed arch doorways currently bricked, and which thresholds do not coincide with the landings of the staircase. Were opened large balconies on the northern elevation of the building and was made the painted wooden ceiling that covers the main hall of the castle. Finally, in the inner court was built a theater later transformed.
The castle remained in use throughout the 1700s and early 1800s, receiving some damages from the earthquakes of 1818, 1819 and 1823, which caused the collapse of some of the battlements and roofs, initiating the process of degradation of the product.
The northern slope of the hill on which the castle stands has been subject to landslides which resulted in years of instability phenomena, together with the seismic events. In particular, the earthquakes of 1693 (Val di Noto), 1818, 1819, 1823 (with an epicenter between Cefalù and Pollina) produced many damages.
Purchased in 1920 by the town of Castelbuono was subject to a first restoration and was allocated a school inside the castle. In the 70's were made partial actions: the town restored the "great room" and the tower of the south- east, while the Superintendent of Monuments intervened in the roofs and in the chapel of St. Anna.
A global project for the restoration of the castle was drafted in 1980 by the architect Rodolfo Santoro, whose works were concerned essentially the realization of some archaeological essays and restoration of the static foundations through the injection of micropoles depth of 15 m along the north and west sides. In fact, the castle had a large crack pattern that affected most of the exterior and interior walls. The wall of the west elevation was characterized by a high spin that had required the construction of buttresses. The vaults had diffuse small lesions and the wooden decks were characterized by significant depressions. Having to complete the interventions of consolidation was drafted a comprehensive restoration in 1994, extended to these structures, drawn up by the aforementioned architect Santoro.
During the course of the works, carried out between 1996 and 1999, it was necessary to prepare a variation to the original project. In particular, in April 1996, during the leveling of the cordoned ramp to the allocution of the premises intended for technical installations, were found some human skeletons and architectural wrecks, causing the suspension of works , waiting to develop a special expertise to start their continuation. In May of the same year, during the tests for the assessment of the plans of laying the foundations of the cellar floors called "formaggiere", came to light the great defensive archers. Following this discovery the State Department for environment and historical buildings annulled the creation of local technical services under the cordoned ramp and prescribed the execution of essays with stratigraphically at the premises called "formaggiere". At that point, it required the drafting of a new project that would address the above issues, that was approved in 1997.

2. The architectural configuration

The monumental complex consist in the *Palatium* (that represent the castle) and the surrounding area defined by the wall circuit around that.
The layout of the castle consists of a quadrangular body with five square corner towers, four of which are square and the fifth cylinder combined with the square tower of the north-east. The building is spread over three floors above ground and a basement. Inside the castle there is a small open-air courtyard with a staircase connecting the floors.
The construction is characterized by massive limestone walls on the ground floor with thicknesses between 1,5 and 2 m. The load-bearing walls are made of quarzarenitic stone having different sizes and different degrees of squaring bound with lime mortar. In some parts of the castle, the stonework is made of large blocks of stone arranged in parallel horizontal rows, while in others it is characterized by grossly blank and shapeless stone and has many fragments of stone and brick in the interstices. The roofs of the rooms of the ground floor are made of real barrel vaults and cross vaults, made of stone and lime mortar, while the first floor is covered mostly by wood floors, with the exception of a few areas where remain vaults. The roofs are made of trusses and wooden beams.
Originally the castle consisted of a series of squares, and accessory units, enclosed by walls, which the Arch of St. Anna opened towards the city, which was the main entrance to the castle.



Fig. 1: South side of the castle.

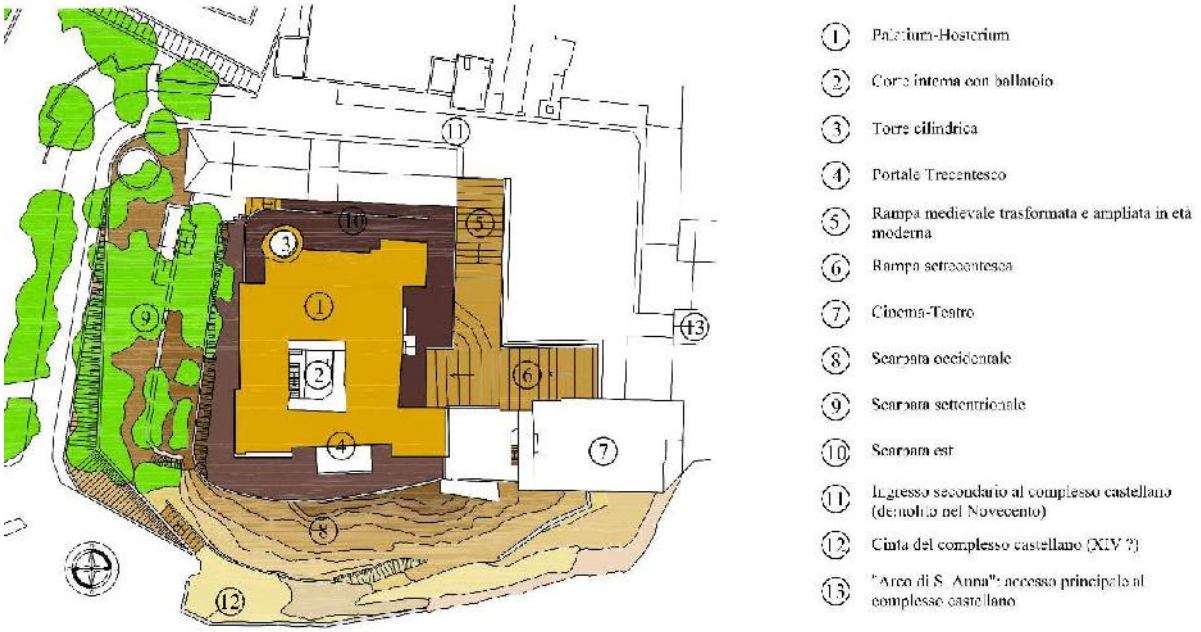

Fig. 2: Planimetry of the castle from the original project.

2.1 The great scarp accommodation

This is basically an extended sloping scarp on earth and rubble covering the artificial “Motta”. This in ballast stones of varying size mixed with earth and well tamped has an extraordinary importance both for the era in which it is supposed was made, both for its presumed functions (static and defensive) and for its uniqueness in the almost feudal castles in Sicily. The hypothesis on the dating system of the great scarp should be assumed to date back to the late XIIIth century. The scarp should be dated to a period that could coincide with the confiscation directed this feudal territory (1269-1282) because only the royal “protomasters” knew and applied the scarp as other defensive devices introduced after the trip to Sicily of Federico II in the Holy Land (1230).

2.2 External sides

Currently there is a considerable stretch of the outer curtain wall stationed at the foot of the West great scarp, but it is lined on the outside by a wall built behind in the '60s. The throw light on this part of the wall was crucial for defining the outer perimeter of the castle and also for the dating of the curtain wall itself estimated by the early XIVth century.

Until about thirty years ago, on the western side, was still visible a large portion of the upper surface of the medieval scarp, later covered by natural vegetation. It was a wall of blocks of stones in various sizes linked by residues of lime mortar covered at the top by a gray gradient that defined a smooth

surface with constant incline. Before the restoring works the soil and vegetation had covered everything. Weeding and the cut have returned the physical evidence of the old scarp.
Then was expected an excavation to 2 m depth where was accumulated by gravity the greatest amount of land also carried by the wind over the centuries. Quantity that weighs statically on old wall, especially when it soaks water due to the rains.
The accommodation on the northern scarp of a "public garden", made a few decades ago, was a solution that unfortunately was planted on a medieval defensive item valuable from the point of view of history, then completely unknown to the medievalist culture. Walls, stairways, masonry benches were constructed and trees were planted. The latter, of no value, grew up in the decades after finishing to create a thick curtain of branches and foliage that completely hides from view the prospectus north of the building of the castle, the statement that it is the least known.
The eastern side (especially at the corner of SE) is presumably the point of arrival of the oldest access ramp, the one linked to the first implant of the castle dating from the late XIIIth and early XIVth century. The previous medieval configuration, however, was partially devastated by the earth and the masonry of the following centuries.
On the southern side there is the most important entrance of the castle. Assuming that the current curbs ramps are works from the XVth to the XVIIIth0 century, these have shattered the previous medieval arrangement referred to a planivolumetric trend of the palatial building that is completely different from the current one.

3. The restoration of the castle

The interventions carried out between 1996 and 1998, were made on the basis of the draft prepared in 1994 by the architect Santoro, who was also director of the works [4].
They were mainly in reference to the so-called *Palatium* and consisted of:
- the static restoration of the building through the consolidation of the foundations, walls, vaults, floors and roofs;
- the architectural restoration (cornices, pilasters, balustrades, exposed brickwork, plastering, fixtures, etc.) that aims to restore figurative dignity to the building;
- the reuse of the complex through the layout of the building interiors for effective allocation of the new functions.

The restorations of the artistic decorations (plasters, carved wood and painted murals) were instead carried out between 1998 and 1999.
The actions planned, thanks to a research agreement signed with the University of Palermo, were preceded by a campaign of surveys and investigations carried out by the consultants that were part of the Department of Representation, the Department of Structural and Geotechnical Engineering and the Department of Project and Building Construction, as well as the Institute of Archaeology, which made the archaeological excavations.
Surveys “in situ” and laboratory tests were carried out in order to evaluate the chemical and mechanical characteristics of the building and of the foundation soils, as well as endoscopic and thermographic investigations.
These interventions have been inspired by conservation, reversibility and compatibility policies in compliance with the applicable technical standards [5].

3.1 The static restoration

Structural interventions carried out on the castle were inspired by reversibility policies and guaranteeing the minimal alteration of the original static behavior.
The static restoration of the building has involved the consolidation of the walls in elevation, of the vaults, of the wooden floors and roofs.
The walls in elevation have been consolidated by injecting lime mortar in order to fill all the voids that existed within the wall structure. As regards the toothings, were performed crossed perforations with hot galvanized steel bars with improved adherence. To achieve a greater costraint between the walls, and in particular to stabilize the northern outer facing, were arranged tie rods consist of both bars with threaded ends, both strands in harmonic steel sheathed in graphite grease.

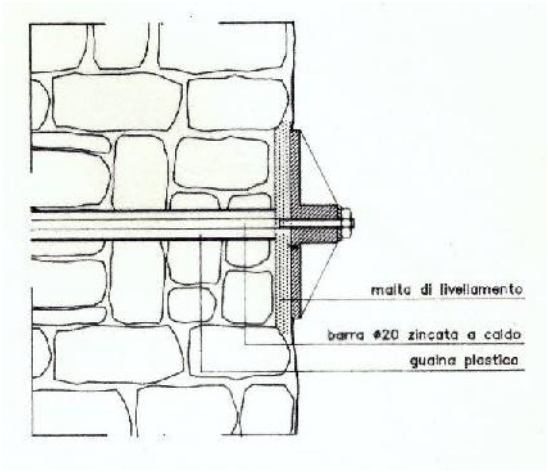

Fig. 3: Detail of tie bars.

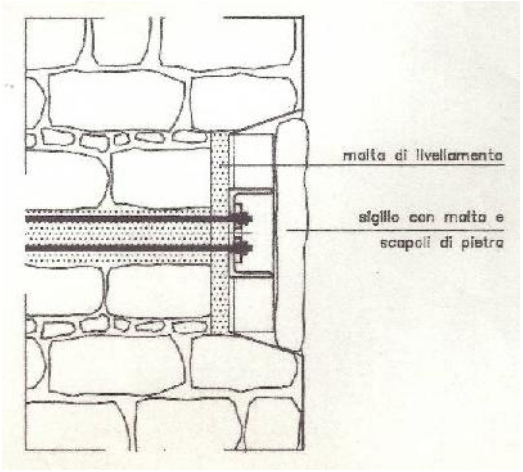

Fig. 4: Detail of harmonic steel rods.

For the damaged vaults was performed the disposal of the upper pavement and emptying of the material until the structural extrados of the vault; later was provided for the sealing of the lesions, the insertion of the connectors and to the jet of a thin backvault thick 5 cm in concrete with non-shrink additive, reinforced with mesh. Finally the whole thing was filled with a lightweight inert material (expanded clay), reconstituting the screed and the floor.



Fig. 5-6: Interventions on the vaults.

In two specific cases, the advanced state of instability of the vaults involved the disposal and subsequent reassembly:
-the cross vault that covered the vestry, for which it was decided, by mounting a special bending wood, the disassembly of the upper part, the numbering of all segments shaped, and the subsequent replacement;
- the cross brick vaults, that covered the landing of the middle floor, for whitch was carried out the reconstruction.

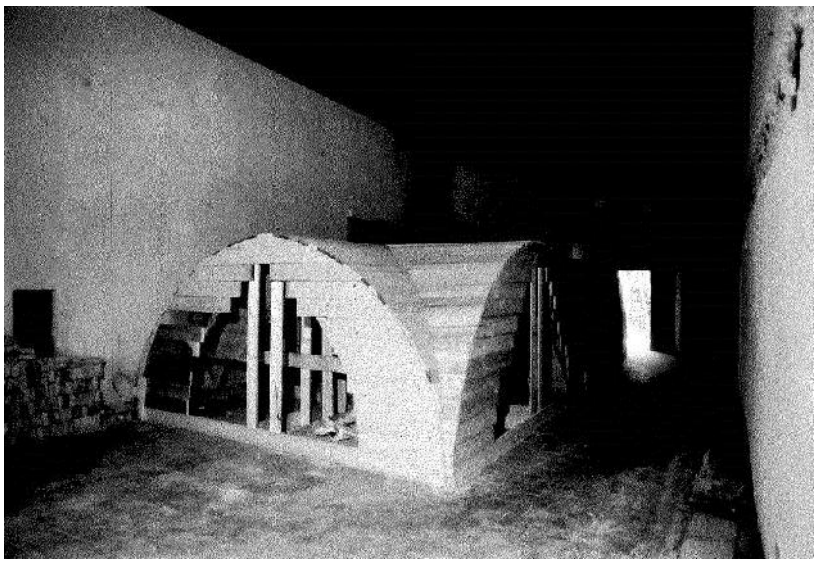

Fig. 7: Preparation of the cross vault ribs.

For wooden floors, was proceeded to the disposal of the flooring above and dismantling of the plateau and the wooden structure in load-bearing beams. Then the main beams found in good condition were relocated and it was decided to replace the deteriorated with new beams of the same size. The new plank made of boards with a thickness of 4 cm was placed, above which was made a reinforced concrete slab, after construction of a steel structure having the function of connection of the perimeter walls, together with the above slab costrainted to the walls with dovetail joints, completing the work with the screed and flooring.



Fig. 8: Detail of the painted wooden ceiling.

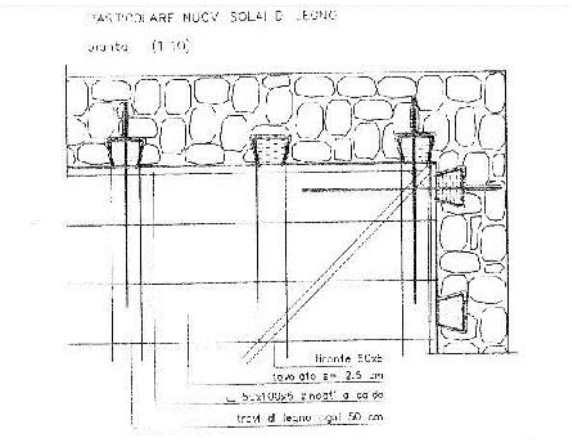

Fig. 9: Plan of the new wooden floors.

During the disposal of hedges have been avoided damages to the wooden trusses still in good condition, presenting in remaking the original typology, paying particular attention to gutters and downspouts, the first made of copper driving rainwater in to descendants in terracotta (*catusi*).



Fig. 10: Example of a new truss inside the building.

A more substantial intervention covered the trusses that supported the roof of the chapel of St. Anna, characterized by a particular provision of the lower metal chain, whose shape was diverted for the presence of the vaulted ceiling plaster of the chapel, as evidenced in the figure 11, which is also the organization of the curbs and the system of water collection.

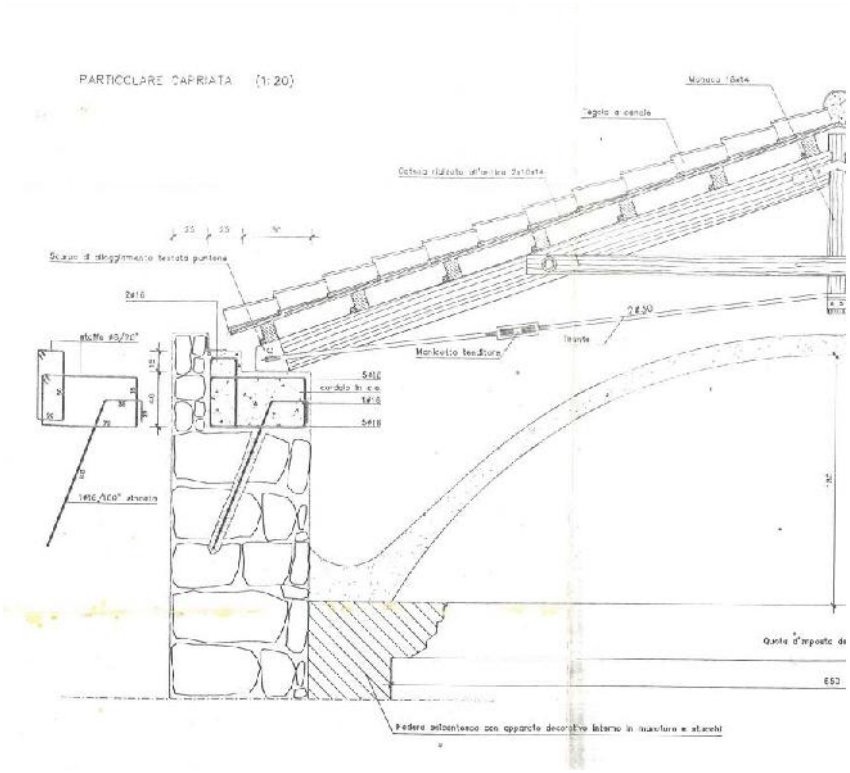

Fig. 11: Section construction of the roof of St. Anna chapel.

A particular intervention was designed to cover the cylindrical tower in order to protect the excavation within the tower itself. Coverage was initially conceived as a hipped roof with octagonal structure with profiled iron and glass. Subsequently, the project completion has been amended with a single pitched roof made of wood and glass.

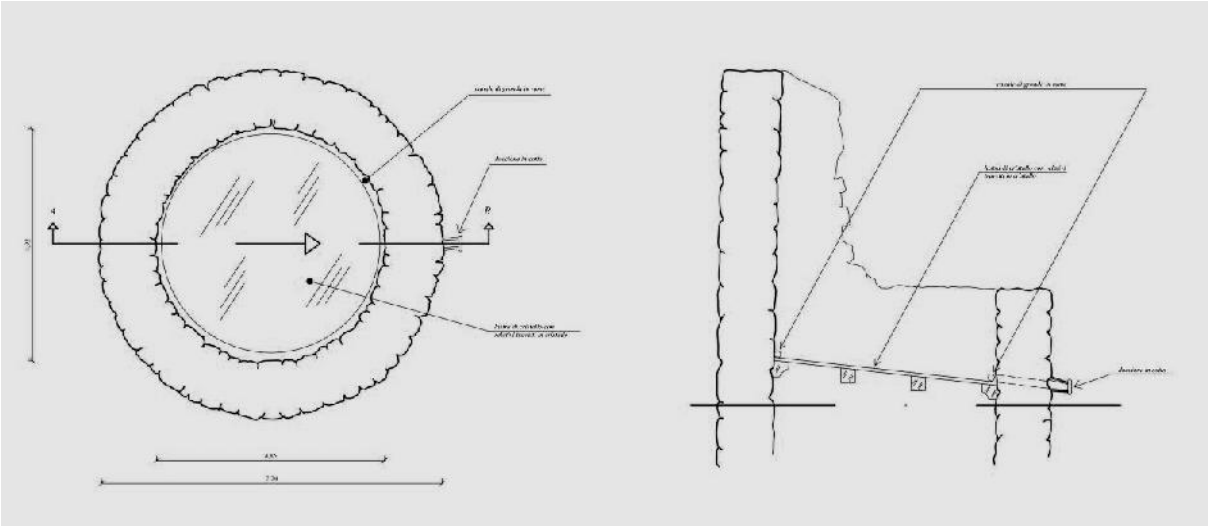

Fig. 12: The new coverage of the cylindrical tower.

3.2 The architectural restoration

The architectural restoration was conducted with the aim of respecting the historicity of the building, allowing the reading of the castle as it stands the XVIIth century, when the artifact received his final and most lasting configuration.

Was proceeded to the disposal of plaster of recent bill, which had concealed some rooms, highlighting the original wall hangings and the loopholes, buffered ports, dials arches, yet guessed thanks to the presence of the characteristic splays. The realization of the new plaster was performed proposing the types of the original ones (earthenware, tufopesto), the composition of which has been developed through specific laboratory analysis.

Were then consolidated the upper battlements of the walls drowned in the subsequent masonry highlighting with appropriate scrapes.

Another intervention involved the divestment of most of the floors, some of which are of recent construction, not congruent with the history of the building, using bricks and terracotta flagstones.

The realization of new partitions, in order to limit as much as possible the alteration of the original distribution, only involved toilets.

For the realization of some elements, such as doors and windows, railings of the balconies and the closing railings of the windows of the ground floor, as well as some works in stone (shelves balconies, cornices, pilasters, bases) has been followed the principle of stylistic restoration, through the repetition of elements executed in imitation of the original ones.

The restoration also covered operations on elements in wood, restoration of fresco paintings and restoration of stucco elements.



Fig. 13: Intervention to restore a wooden floor.

3.3 The reuse of the complex

The reuse of the complex provides for the placement inside of the museum of Castelbuono, assigning the castle to museological activities and conferences, functions that have been found to be compatible with the reconfiguration, the number and capacity of indoor spaces that characterize the castle.
The principle that has guided this intervention was the enhancement of the building, while preserving as much as possible its original configuration compatible with the new features provided.
In this sense, the intervention tried not to alter the distribution structure of the building, limiting the construction of new masonry partitions to only necessary, for example, the creation of new toilets.
The general objective that was tried to achieve was to make the castle a point of reference for the social and cultural life not only of the town of Castelbuono, but of the entire area of the Madonie, placing it at the center of a series of museum and cultural activities, and conferences. In order to the social use of the complex, moreover, was considered not only the *Palatium* itself, but also the area of the outer court, that, especially in the summer, was the place chosen for the realization of outdoor cultural events, such as plays and concerts .

Bibliographical References

[1] CANCILA, Orazio. *Castelbuono medievale e i Ventimiglia.* Palermo: Associazione Mediterranea, 2010. Mediterranea: ricerche storiche n°12. ISBN 9788-8902-39311.
[2] SANTORO, Rodolfo, GOVERNALI, Silvio. *La contea dei Ventimiglia: il castello di Castelbuono.* Palermo: Officina di studi medievali, 1984. Il Teatro del sole n°4.
MAGNANO DI SAN LIO, Eugenio, *Castelbuono capitale dei Ventimiglia*. Catania: Maimone, 1996.
[3] CANCILA, Orazio. *Castelbuono medievale e i Ventimiglia..*, cit.
[4] SANTORO, Rodolfo. *Progetto di restauro del castello feudale dei Ventimiglia.* Relazione tecnica, 1994.
[5] D.M. 24/01/86 *Norme tecniche relative alle costruzioni sismiche*; D.M. 09/01/87 *Norme tecniche per la progettazione, esecuzione e collaudo degli edifici in muratura e per il loro consolidamento* e D.M. 14/02/92 *Norme tecniche riguardanti le opere in c.a. e a strutture metalliche*.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The digitalization of Cultural Heritage's tangible & intangible dimensions

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Abstract
The paper aims at discussing the advantages and challenges of the digitalization of the Cultural Heritage. Within the application field, historical and cultural sites are recognized as keepers of traditions and values, which run the risk of extinction due to the fast growing phenomenon of globalization. This essay presents an overview of the strengths and weaknesses of the Building Information Model (BIM) as a dynamic, graphic, and multidimensional platform for the management of the tangible and intangible attributes of the Cultural Heritage and for the generation and dissemination of culturally nuanced information related to materials, the state of conservation and the methods of construction. This paper analyses BIM's potencial when it is applied to new fields such as the Cultural Heritage, its documentation, conservation and management. In addition, it disusses the connection of BIM with the Geographic Information System (GIS) in a multi-scaled approach. The integrated use of these Spatial Information Systems allows us to disclose and explore, new dimensions at an architectural and territorial scale, such as the dimension of time (4D) and of the intangibility of the Cultural Heritage. The integration of these Spatial Information Systems - GIS and BIM - would support the documentation and conservation process. In addition, it would be able to communicate historical, religious and cultural values to current and future generations. These values are intrinsically connected to the Built Heritage. GIS and BIM can provide a platform for the creation of new meanings stemming from the interaction of different users and stakeholders engaged in its preservation and enhancement.

Keywords: Cultural Heritage, documentation, conservation, BIM , 3D content model.

1. Introduction
In the last few years, the acquisition and use of geo-referred data and 3D modelling have become a growing field of interest in architecture and planning.
Currently, these processes are also being applied to the domain of Cultural Heritage.
Moreover, the current innovations in the Information Communication Technology (ICT) field, especially as regards the uses of open and restricted data, have revolutionary consequences on many different sectors of human activities and is also influencing the Cultural Heritage today.
In addition, open-sources and freeware solutions encourage any user to experiment and learn freely.
According to these consideration, it is interesting to explore the advantages and challenges brought about by the so called 'Digital Revolution' for Heritage conservation and enhancement.

2. The challenges of the digitalization of the Cultural Heritage
The use of multimedia technology to integrate and enhance the presentation of complex data was studied and conceptualized since the advent of advanced ways to visualize images and videos (P. Faraday, A. G. Sutcliffe, 1997). Furthermore, the potential of the integration of 3D data with other types of information was clearly set right from the beginning of Internet. Unfortunately, their use was

delayed by the lack of a standard format for data and visualization. Nevertheless, virtual environments enriched with textual information have been thoroughly studied in all their aspects, adding to virtual navigation, the disposition and readability of the text (H. Sonnet et al. 2005; J. Jankowski et al. 2010), and the usability of interaction paradigms (D. A. Bowman et al., 2003).
Large-scale digitization and information aggregation projects for the Cultural Heritage provide an unprecedented wealth of knowledge. Technological advances with new and alternative instrumentation and processing software allow for the creation of immensely detailed 2D or 3D representations of material objects and audio-visual data which allow us to capture events of the intangible Cultural Heritage. Indeed, the understanding of the Cultural Heritage comes from comprehensive access to the diversity of phenomena and plurality of views, as well as from understanding the context of information and the provenance of the knowledge of Cultural Heritage. On one hand, large-scale information integration fosters comprehensive access. On the other hand, it obscures context and provenance. Interpretation of data that is obvious in a local framework may become ambiguous or incomprehensible taken out of context. In order to be able to offer a balanced view, we have to face the problem of objectivity and reliability.
A possible solution to this issue would consist in: disclosing data, communicating procedures and results, getting open solutions, enabling final results to be verified, establishing methods, enabling anyone to be able to reproduce the project's procedures, updating databases and optimizing final outcomes. By making data available and systems interoperable, such a methodology is capable of improving these outcomes and, at the same time, guaranteeing the quality and reliability of the output.
Taking into account all previous considerations, potential perspectives may be studied as part of the research on further methods and instruments, so as to guarantee the conservation of the Built Heritage and the preservation and communication of "The spirit of the Site" (World Heritage Convention, 1972), indicating all those cultural and traditional aspects characterizing the identity of a monument and of a place.
An interesting field of research could be the in depth analysis of BIM's potential, strictly connected to the use of GIS applied to the Cultural Heritage, for its documentation, conservation, management and promotion. An integrated use of both system would have some benefits. Firstly it would guarantee a completed analysis, documentation and representation at both architectural and territorial scale. Secondly the integrated use of these two instruments allows us to disclose and explore, new dimensions, like the one related to time - temporal dimension (the so called 4D) - and the intangibility - immaterial dimension - of the Cultural Heritage.

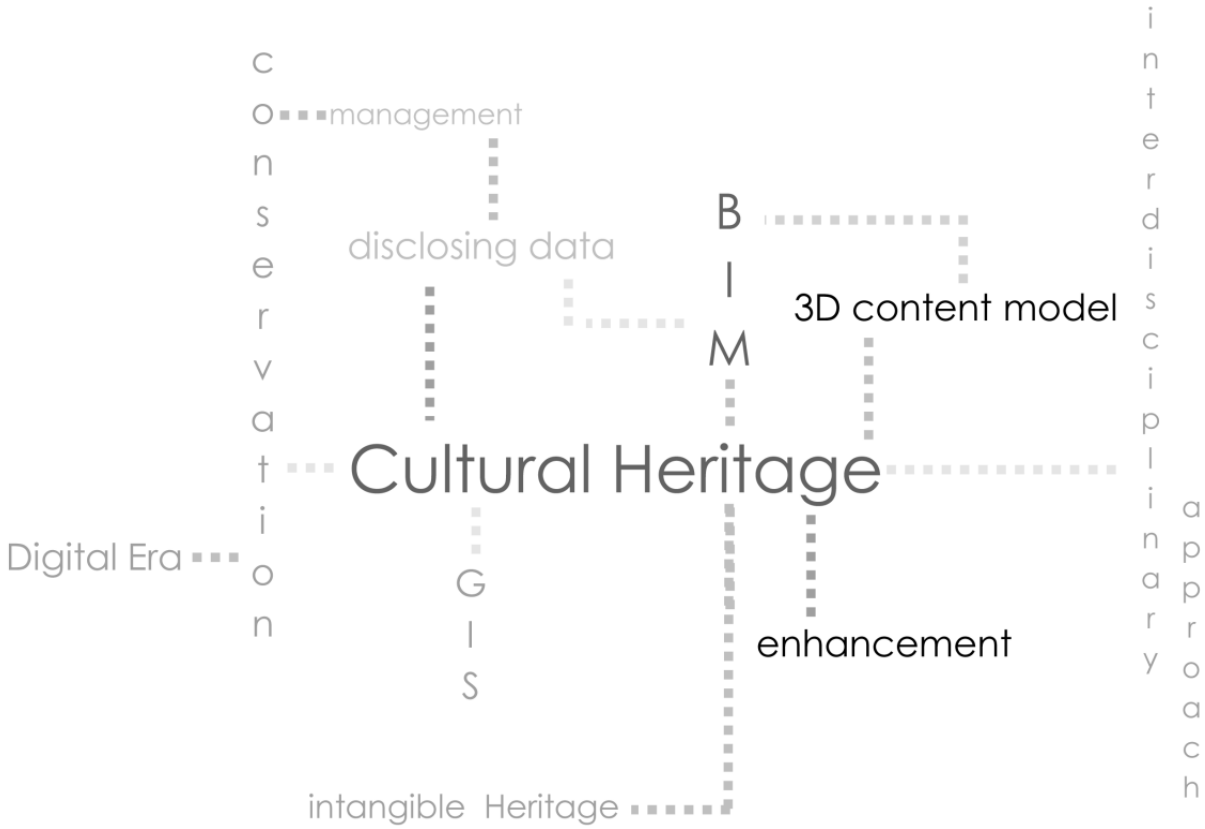

Fig. 1: Features related to the digitalization of the Cultural Heritage.

3. The Building Information Model (BIM) for the Cultural Heritage

Within the framework of the 'Digital Revolution' it is interesting to consider the great challenges offered by Information and Communication Technologies (ICTs) in the documentation, conservation and promotion processes of the Cultural Heritage. This is not just a matter of introducing new Information Technologies (IT) systems (A. Osello, 2012). On the contrary it has much to do with new working methods and allocation of roles developing better integration between the different disciplines to manage and enhance the Built Heritage.

Digital modeling is an excellent tool for learning to visualize complex shapes and their interactions, a skill that is of greater importance than simply tracing superficial information without a deeper structural understanding. Currently, the digital instruments are playing a key role in the 3D modelling sector. Moving from the 3D surface modelling of buildings and urban contexts to a semantic description 3D model it is possible to improve the quality of information, increasing the efficacy of the documentation and guarantying the efficiency of the management.

According to these consideration, the Building Information Model (BIM) system is moving from the application in the Architecture, Engineering and Construction (AEC) sector to the development of the application of new devices for the Built Heritage. With BIM technology an accurate virtual model of a building can be digitally constructed containing any kind of information about the construction, specification and detailed documentation of the features of each building. The system is composed of a set of processes that can be applied to catalogue, record, manage, communicate and disclose information. In other words, the BIM is a data rich object oriented, intelligent and parametric digital representation that can also be used for the Built Heritage.

Indeed views and data can be extracted and analyzed by different users (A. Osello, 2012) in order to generate information that can be used for diagnostics, planned preventative maintenance, restoration project and promotion activities.

In addition BIM does not only represent an opportunity to transform the documentation from separate models into 3D semantic models, but it is an extended methodology placing the focus on process improvement, the optimization of documentation and efficient collaboration between different aspects related to the Built Heritage (i.e. surveying, historical analysis, restoration project, economical management, etc.).

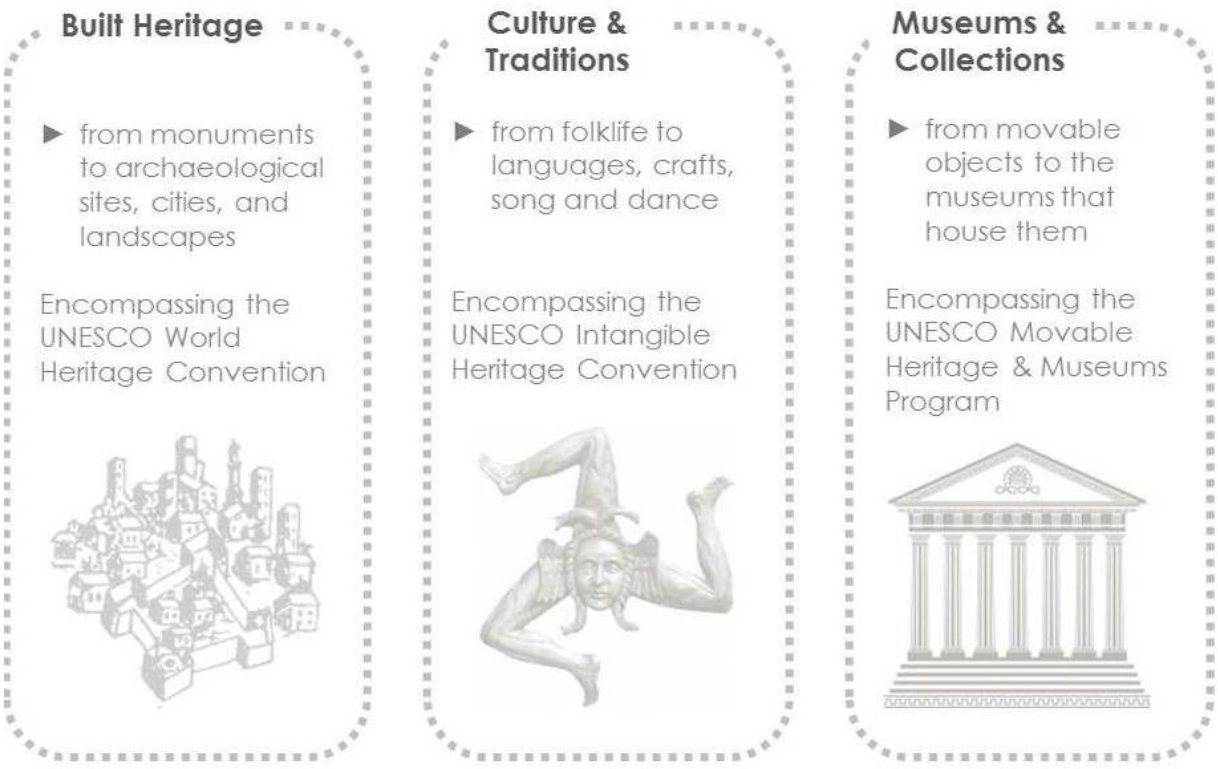

Fig. 2: Possible BIM's application fields within the Cultural Heritage areas.

3.1 BIM's weakness

In writing about BIM, David M. Foxe points out that *"the certainty and precision of the model are only as powerful as the knowledge and accuracy that went into creating it."* This is certainly true, and a primary concern with the use of this technology is the potential to confuse the accuracy of a model with its precision.

Due to the nature of digital modeling, a very high degree of precision is possible -much higher than can be readily measured in the field. Because of this, digitally modeled 3D elements appear to be accurate, but in fact may not be. This is particularly true and evident in the historical buildings characterized by asymmetry, irregular shapes, etc.

A second general shortcoming of BIM, especially in regard to recording historical structures, is the inability of BIM to readily model non-planar surfaces. Another concern with the use of BIM is the digital obsolescence (M. Hedstrom, 1998), a problem shared by all rapidly evolving electronic media. While the digital model may be useful today, it will be worthless tomorrow without the means to read the file.

Beyond the above general limitations of BIM, there are also specific limitations to the use of BIM in the field of the Cultural Heritage.

First and foremost, it is important to outline the interoperability issue. Indeed, only one member of the recording team is usually a trained operator of the software. This is a problem because it greatly slows the input of data. If more than one team member could use BIM, multiple aspects of the building could be recorded simultaneously, either in a single, shared file or through the use of multiple files which could be later combined.

BIM's weakness	General BIM trait	Specific to Built Heritage application field
Confusion of precision and accuracy	⊗	
Inability to quickly model uneven surfaces	⊗	
Digital obsolescence	⊗	
Too few trained software operators on project		⊗
Difficult to operate in inclement conditions		⊗
Difficult association of pure geometry to irregular objects		⊗
International Framework for Dictionary (IFD) not exhaustive per the historical building domain		⊗

Fig. 3: Table of the BIM's limitations.

3.2 BIM's strengths

Beyond the obvious visual and spatial comprehension benefits of using a 3D model to describe and exchange information, it is interesting to deepen the usefulness of some general characteristics of BIM for the Built Heritage.

Firstly, the model itself serves as the single repository of all information and this attribute is useful for its economy.

Secondly, the model is the only basis for all outputs that are internally consistent.

Thirdly, BIM can rapidly generate any 2D view (elevation, plan, section, perspective or axonometric projection) and 3D view (internal, external, section, etc.) of the model that is desired. Finally, BIM can export to compatible software for further manipulation and interpretation such as the creation of 3D animations, demonstrations of construction sequencing, or any number of lighting, energy, or materials analyses.

BIM's strenghts	General BIM trait	Specific to Built Heritage application field
Model is single repository of all information	☑	
Consistent basis for all output	☑	
Generate any 2D and 3D view	☑	
Model can be widely shared	☑	
Consolidate collected data		☑
Demands understanding of 3D structure		☑
Walkthrough inspection for completeness		☑
Simultaneous cross-check of measurements		☑
Expand from isolated data		☑
Interoperability instead of a documentation coming from separate sources		☑
3D manipulations to compare it to the building itself and inspect it for accuracy and completeness		☑

Fig. 4: Table of the BIM's benefit.

Used as a tool for the exploration, recording, and analysis of a historic building, BIM serves as a single, unified, and consistent repository for information on the dimensions, location, condition, and any number of additional parameters on elements of the subject building as they are being discovered or uncovered.
Additionally, the creation of a BIM model simultaneously allows and demands the user to understand the elements comprising the totality of the actual building as its virtual simulacrum is assembled, piece by piece. As eloquently expressed by John A. Burns, "*there is no way to appreciate an existing, working structure…like making a careful drawing of it."* This statement is even more true when the construction of a fully articulated 3D model of a structure is undertaken. The model can be viewed in any of a multitude of projections and sections, and subjected to 3D manipulation to compare it to the building itself and inspect it for accuracy and completeness.
In addition, the BIM model allows for the simultaneous cross-checking of measurements across multiple dimensions.
For example, measurements taken of interior rooms can be easily compared to measurements taken from the exterior of the building, not one elevation at a time but as a volume. As John A. Burns has noted, *"with the help of architectural and engineering documentation one can study a building…without necessarily visiting it".* Constructing a detailed model of any sort is an excellent means to understand a building. It is a methodology of visual and cognitive dissection, a protocol for the careful examination of a building. John A. Burns writes in *Recording Historic Structures,* "*quite apart from whatever value measured drawings may have as a historical record, the process of measuring and drawing careful records to scale is the most effective way to gain an understanding of a building's fabric.*" This perceived value is noted elsewhere by Edward A. Chappell, who writes that *"measuring a building encourages the recorder to recognize relationships among different parts"* and that *"doing measured drawings of a building is the best way to discover some of its consequential secrets."* A key to BIM system as an approach to studying and operating on Built Heritage is the thorough understanding of the fabric and its parts, through a careful and detailed inspection and recording of all elements that contribute to unveiling the features and the meanings (the "secrets" of Edward A. Chappell) that they hold.

3.3 On-going development

BIM is more than just impressive renderings representation. It is the creation of a common database that can be shared by all project participants in both two and three dimensions. Further, as George C. Skarmeas wrote: "*if the model is properly structured and can be used in the future, it can be the proper vehicle to monitor the behavior, performance, and deterioration of a building, using meaningful metrics that can help its long-term preservation.*" It is certain that a well-constructed and supported BIM model can have an extended and expanded utility in the service of Built Heritage Preservation. Each building component can be accurately measured and located in a complete digital model that emulates the original construction very closely.

In addition BIM's potential consists in the ability to query the parametric model with hypothetical '*What if…?'* questions (F. Lèvy, 2011). To this potential we have to add the benefits of the BIM model as a data base for the systematization of the information within a 3D semantic model to extract views from.

This powerful tool would also allow us to explore and visualize the so called fourth dimension – the time – and the intangible one, revolutionizing the approach to the research and the work on the Built Heritage.

Through this instrument of multifunctional representation it would be possible to preserve and bequeath the density of tangible and intangible (cultural, historical, ethno - anthropological) meanings of the Heritage to the future generation.

4. Integrated and multiscalar Spatial Information System for the Built Heritage

The cultural significance of the Built Heritage is what guides the management policy and consequent strategies for protection and preservation. To aid this task of cultural resource conservation, management and enhancement, many planning tools are available.

The Spatial Information System: Geographic Information System (GIS) and Building Information Model (BIM) are such tools for putting policy into practice. The Geographic Information System is a set of computerized tools to collect, archive, manage, retrieve, analyze and output geographic and associated attribute data.

While GIS is already used to assist Cultural Heritage managers in a wide variety of applications (P. Box, 1999) the BIM systems has not yet been applied to the Cultural Heritage field but is now under development.

The BIM is based on simplified parametric models - suitable for: archeological sites, monuments, ancient buildings and historical compounds, that can be applied constructively to Heritage documentation and management of the data on conservation and enhancement practices.

Moreover, a Building Information Modelling could be implemented in order to collect different kinds of specific data on historical areas (i.e. dimensional, geometrical, state of conservation, historical information, intangible values and constructive techniques).

As already said, BIM could support preventive conservation, information sharing and knowledge dissemination of both tangible and intangible Heritage dimensions for professional and non-professional users, researchers, local administrators, for institutions and experts involved in decision making process.

Preliminary studies showed the adaptability of some BIM's function related to heritage documentation and specifically to:

- Decomposition of building elements into categories;
- Contextual creation of graphic elaborates in 2D and 3D;
- Obtaining information from associated database;
- Interdisciplinary work settings.

As far as the potential of GIS is concerned, such technique may turn out to be particularly suitable to the documentation and the restitution of information in time and space dimensions. GIS may also be able to integrate History with Geomatics, by creating a multidisciplinary platform for the innovation of development strategies for the knowledge and use of the Heritage.

Furthermore, the integrated use of these systems would allow us to understand the outstanding value of the site by answering questions. Some examples are: Is the place associated with a historically significant theme, person or event? If it's a building, does it possess any specific features of interest for its architecture or design? Does the place have special meaning because of its landmark, spiritual or cultural associations? Consequently, the integration of more datasets within a unique conceptual system, able to provide simultaneous consultation to a wide range of users and stakeholders, who in turn can become providers of further information and interactive feedback on experience of the use of Cultural Heritage.

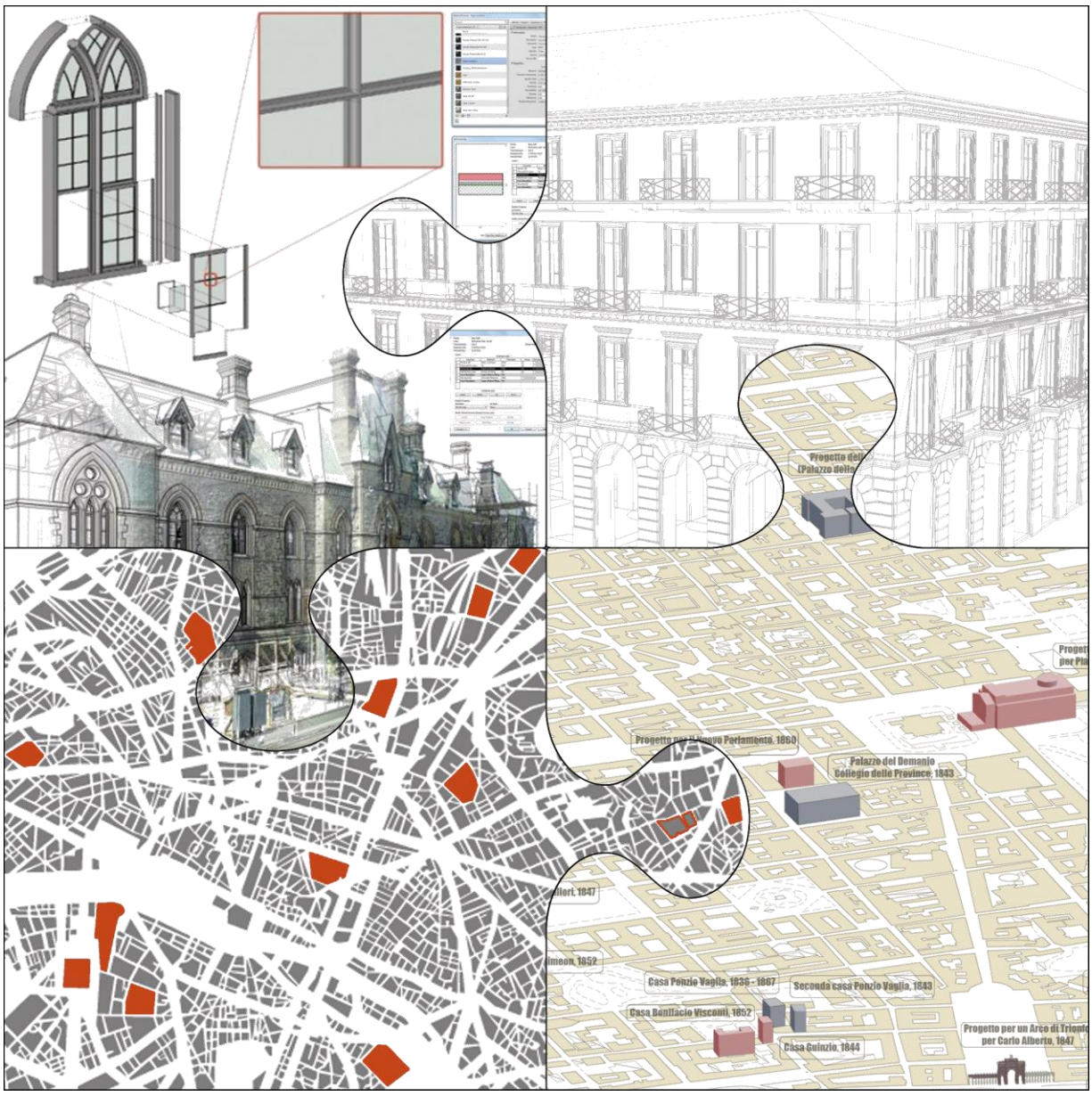

Fig : Representation of an integrated multi-scalar Spatial Information System for the Built Heritage.

5. Future perspective

Currently the historical and cultural sites which are recognized as keepers of traditions and values run the risk of extinction due to the fast growing phenomenon of globalization. However, they should be understood neither as static relics of a distant past nor as the passive objects of techno-bureaucratic knowledge and expertise. On the contrary, the act of conserving and enhancing tangible and intangible “goods” confers to Cultural Heritage an agency that is strictly associated with discourses of remembrance, techniques of governance and the affirmation of social, cultural and political identities enacted by the communities engaged in the endeavor preservation. Nowadays, as already mentioned, the use of 3D digital tools for recording, documentation, and information management for Built Heritage (e.g. Building Information Models, Computer Aided Drafting applications, 3D modelling, active and passive web–design, surveying instruments, photogrammetry, image processing, 3D laser scanning, and digital presentation) is demonstrating an incremental growth. According to this trend, it will be interesting to deepen the investigation on how to combine a bi-dimensional Geographic Information System (GIS) and a 3D content model with a Building Information Modelling (BIM) for an improved documentation, conservation, management and enhancement of the Built Heritage. Finally, according to the smart city’s context, an integrated and multi-scalar system would lead to a more efficient management of the urban historical centers through a more efficacy and interoperable documentation of all its elements.

Bibliographical References

[1] BOWMAN, D.A., NORTH, C., CHEN, J., POLYS, N.F., PYLA, P.S., YILMAZ, U. Information-rich virtual environments: theory, tools, and research agenda. In VRST '03. *Proceedings of the ACM symposium on Virtual Reality Software and Technology VRST '03.* New York: ACM, 2003, p. 81–90.

[2] BURNS, J. A. *Recording Historic Structures.* Washington, D.C.: American Institute Architects Press, 1989. 246 p. ISBN 1558350187 : 9781558350182.

[3] CHAPPELL, E. A. Architectural Recording and the Open-Air Museum: A View from the Field. In WELLS Camille. *Perspectives in Vernacular Architecture II.* Columbia: University of Missouri Press, 1986. p. 35-36.

[4] EASTMAN, D., TEICHOLZ, P., SACKS, R., LISTON, K., *BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors*. New Jersey: Wiley, 2008. 648 p. ISBN 9781118021675.

[5] FAI, S., GRAHAM, K., DUCKWORTH, T., WOOD N., ATTAR, R., Building information modelling and Heritage documentation. *Proceedings of XXIII International Symposium, International Scientific Committee for Documentation of Cultural Heritage (CIPA)*. Prague, 2011.

[6] FARADAY, P., SUTCLIFFE, A. G. Designing effective multimedia presentations. In S. Pemberton (Eds.), *Human Factors in Computing Systems: CHI 97 Conference Proceedings*. New York: ACM press, 1997, p. 272-279.

[7] FOXE, D.M. Building Information Modeling for Constructing the Past and Its Future. In *APT Bulletin* 41, no. 4. Association for Preservation Technology International (APT), 2010, p. 39-45.

[8] HEDSTROM, M. Digital Preservation: A Time Bomb for Digital Libraries. In *Computers and the Humanities.* Netherlands: Kluwer Academic Publishers, 1998, p. 189-202.

[9] JANKOWSKI, J., SAMP, K., IRZYNSKA, I., JOZWOWICZ, M., DECKER, S. Integrating text with video and 3Dgraphics: The effects of text drawing styles on text readability. *Proceedings of the 28th International Conference on Human Factors in Computing Systems (CHI '10)*. New York: ACM, 2010, p. 1321-1330.

[10] LEVI, F. *BIM in a Small- Scale Sustainable Design.* Hoboken: Wiley, 2012. 292 p. ISBN 0470590890

[11] OSELLO, A. *Il futuro del disegno con il BIM per ingegneri e architetti.* Palermo: Dario Flaccovio Editore, 2012. 324 p. ISBN 9788857901459.

[12] ORENI, D. From 3D Content Models to HBIM for Conservation and Management of Built Heritage. In MURGANTE, B., MISRA, S., CARLINI, M., TORRE, C.M., NGUYEN, H.G., TANIAR, D., APDUHAN, B.O., GERVASI, O. *Computational Science and Its Applications – ICCSA, Lecture Notes in Computer Science*. New York: Springer Heidelberg Dordrecht London, 2013, p. 344-357.

[13] SONNET, H. CARPENDALE, M. S. T., STROTHOTTE, T. Integration of 3d data and text: The effects of text positioning, connectivity, and visual hints on comprehension. *Proceedings of the working conference on Advanced visual interfaces*. New York: ACM, 2005, p. 63-70.

[14] SKARMEAS, G. C. From HABS to BIM: Personal Experiences, Thoughts, and Reflections. In *APT Bulletin.* 41, no. 4. Association for Preservation Technology International (APT), 2010, p. 47-54.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Accessibility of historical students' accommodation: methods and solution

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Abstract
Historical buildings were built without any kind of attention for persons with disabilities, but nowadays they are still used for a society where there is a new consideration for weak persons, as demonstrated by the UN Convention on the Rights of Persons with Disabilities (written in December 2006 and adopted in Italy with the National Law n. 18 in 2009). The architects and engineers have a new task: to improve the accessibility to historical places and cultural heritage.
In February, 2013 "Collegio Cairoli" (an historical students' accommodation of the University of Pavia) and EDiSU (Institution that manages services for students) decided to improve the accessibility of the building, inserting a new lifting platform.
The building was realised in 1781 in the downtown of Pavia, near the University. It is a students' accommodation since 1948 and it houses also visiting professors.
The area chosen for the platform is near the old church in the south – east side of the building, in a place with three differences in level. The lifting platform has to link the ground floor with the first floor (where the are some common spaces open also to people not living in Collegio Cairoli).
The project (project March 2013, realisation January 2014) was developed following the idea to preserve the original character of the building (limiting the intervention on the walls, both demolition and new construction) and to ensure the complete reversibility.

Keywords: Accessibility, historical buildings

1. Accessibility of historical and cultural buildings
Our cities have a large number of historical and cultural buildings from different ages. If we think about Italy, the buildings are from Roman age to nowadays and many museum, public offices, exposition and cultural halls, are inside these old buildings. This is very fascinating and richness for everyone, but it is not for everyone at all.
If we consider for example the Milan's Cathedral, Fori Imperiali in Rome, the downtown in Venice, the accessibility is not easy for everyone in order to morphological, material and constructive reasons.. This doesn't happen only for famous situations, but also for our everyday life.
Many people, old people, pregnant women, child, injured people or disable people, have a lot of problems and difficulties to reach some points of interest. In the centre of the cities, especially Italian cities with medieval origin, there is a great number of historical buildings with offices and services inside: it is our fortune and a memory of where our culture comes from. We have not to change them, we have to use and preserve our memory and our culture, but this could be for everyone.
"For everyone" is the most important theme of U.N. *Convention on the rights of persons with disabilities* (2006): "*To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information*

and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to: buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces […]" (art. 9.1) and "*States Parties to this Convention recognize the equal right of all persons with disabilities to live in the community, with choices equal to others, and shall take effective and appropriate measures to facilitate full enjoyment by persons with disabilities of this right and their full inclusion and participation in the community, including by ensuring that: persons with disabilities have the opportunity to choose their place of residence and where and with whom they live on an equal basis with others and are not obliged to live in a particular living arrangement […]" (art. 19).*

Art. 30 of U.N. Convention suggests to improve participation of people with disabilities into cultural life recreation, leisure and sport and Italian college are very important systems to take part to the life of the city

Students' accommodations are an opportunity for students from other cities to have a place to study and to spend their lives; these buildings are housing with facilities (such as rooms for studying, music, computer, etc.), where everyday students return to study and to rest. In Italy and especially in Pavia, students' accommodations are principally in old buildings in the centre of the city and they aren't only students' accommodations, but also cultural centres for the city.

Accessibility and usability are fundamental requirements for valorisations and conservation of cultural heritage. The response to standards about accessibility often comes after important decisional moments about distribution, materials and functions.

A multidisciplinary and participate approach is very important to find solutions to satisfy different needs with simple solutions for construction and for reversibility.

The method used in the University of Pavia is divided into four phases:

- analysis, that is divided in two different aspects (general analysis of the buildings and the surrounding and the analysis of the function inside);
- knowledge , that is the study of the solutions for improving of the accessibility;
- project, with the proposal of new solutions;
- communication, to sensitize society.

The historical building is an element inside a more complex system made of relationship between the building and the surrounding and it is a point of a physical web that is a characteristic of the identity of a place.

Designers must know the history and culture to make a net project with function that are compatible with the morphological, typological and constructive aspects to decide to use new or old material but different from original technologies to make the project recognizable.

2. Students' accommodations in Pavia

Pavia is a city with a very long history, whit different kinds of buildings and expansions. This town, especially for the presence of Ticino river, was occupied by Romans that created the plan of the downtown with Cardo and Decumano and the castrum system. After that Pavia was occupied by Longobardi, which made it capital until the arriving of Carlo Magno. In 1360 Pavia was enclose to the Duchy of Milan by Galeazzo Visconti that built the Castle and the park from Pavia to Certosa.

In 1361 there was a Studium Generale that had the same rights of the University of Bologna and Paris, and in 1485 it became the University of Pavia.

Almo Collegio Borromeo and Collegio Ghislieri were the first student's accommodations in the city since the XVI century and with Collegio S. Caterina and Collegio Nuovo they are the four student's accommodations for merit.

Emperor Giuseppe II of Austria founded Collegio Cairoli in 1781 as German and Hungarian college and it became a military barracks from the French occupation in 1796 till November 4th of 1948 when the University restructured the buildings and called it Collegio Fratelli Cairoli.

Today there are eighteen students' accommodations divided in: for merit (4), EDiSU (11) and private (3) with more or less 3.500 students (more than 15% of the students attending the University).

Collegio Cairoli is a students' accommodation managed by EDiSU that is an entity of the University to coordinate and managed services for students.

It accommodates 95 students (only men) and 10 guests and it is in the centre of the city, near the main building of the University and other students' accomodations: Collegio Ghislieri and Collegio Fraccaro.

There is a long and strong tradition about student's accommodations in Pavia. Every year there are a lot of events in which students from different structures oppose (football, basketball, volleyball leagues) and there are events for the city and for other students as parties and cultural encounters.

Students' accommodations have different stories and different approaches to the life of the city and they are very proud about their students: for example Carlo Goldoni studied in Collegio Ghislieri,

Federico Borromeo in Collegio Borromeo (that was also a film set for some films) and Alberto Arbasino studied in Collegio Cairoli.
So colleges are very important for Pavia and its history, they also manage courses for students and cultural events for citizens and for the University.

3. Collegio Cairoli

The college was built on the Monastery of S. Francesco according to the draft by Leopoldo Pollack with Piermarini's consultancy. Collegio Cairoli has a typical plan of buildings of the XVI century: it is a four-floor building with an internal courtyard and a double row of arcades on the ground floor and on the first floor.
On the ground and the first floor there are public spaces as art atelier, computer rooms, gym, music classrooms, rector's offices and house, canteen and an old church.
The ground floor is lower than the first floor and it creates an interesting effects entering in the internal garden. It is also in a lower level than the external spaces and the arcade is very simple unlike the arcade of the first floor that is higher and characterized by double columns.
The main facade is brick and in the main entrance there is a very interesting stairs with two ramps in white marble that lead to the first floor, near rector's office.
The courtyard is a typical Italian garden with two perpendicular main axes that meet each other in a circular point.
On the ground floor, rooms and public spaces are not at the same level of the arcade and the garden and there are many differences in level between inside and outside.
The first floor is the grand one and there are rooms with frescoes (as in the Aula Magna) and a big library with more than 65.000 books
Student's and guest rooms are on the third and fourth floor that has some terrace to watch the city.

4. The project

There aren't elevators or mechanical system to overcome differences in level inside the building. EDiSU, the entity that manages Collegio Cairoli needed to solve this problem and to create places for everyone where have meetings, cultural events and to allow people to enter in the building.
Today there are some ramps that try to solve the differences in level between the internal arcade and the rooms on it but there are also 4 stairs that don't allow people to moving free inside the building.
It was very important to maintain the historical assessment of the building and to control the project in order to preserve the internal structure and architecture.



Fig. 1: map of Pavia with students' accommodations.



Fig. 2: aerial photo of Collegio Cairoli (google earth).

4.1 Design choices

Considering the willingness of the customer and visiting the buildings, the idea was no to delete existing lofts to create a place for the elevator but to choice a place completely free where putting a new structure.

The idea is to put the elevator in the south – east side of the building, near the church, where there is a double high space. There were no possibilities to create a system that allow people to enter in the elevator at the same level of the arcade on the ground floor. It was primary maintaining the internal facade and using removable system in order to preserve the original structure.

The place is also near a technical room useful to put the electrical unit of the elevator.

The project tries to follow some simple themes:

- integrability;
- reversibility;
- easiness of construction;
- easiness of running.

4.2 The project and the historical importance of the building

When an architect or an engineer wants to make a project in an historical building there are some constraints that are important to follow.





Fig. 3: project area.

Superintendence of Cultural Heritage has an important role in deciding strategies and making demands. Collegio Cairoli is an historical building inside the old town of Pavia, so the Superintendence controls the interventions on it.
One of the requests of the owners and the Superintendence was to preserve the existing window and to maintain the existing colours around.
The first step to realize the elevator is to modify the existing ground with: the loft between the internal path and the space inside is on terrain so there are no problem to create a pit. The pit is 10 cm bigger than the elevator to allow the installation and it has small walls to support the pavement around, On this walls there are granite slabs to maintain the same materials of the existing.
The existing window is modified to change the overture of the door and to fit the structural elements to the measures of the elevator.
The wood of the existing window is used to create new structural elements and to do finishing works around it and the modified doors are stacked to be reuse in case of damage or to use it to fix other windows.
The elevator is completed illuminated from the inside to be recognized from users and to be easily identified inside the building.
As there are steps between the elevator and the internal path the project provides to modify the existing ramp to create a new one that is more comfortable for users.
There is also another ramp between the floor of the entrance of the elevator and the floor of stairs and church and also this ramp is modified as the first one. Both the ramps are completely removable to don't modify anything inside the building.

4.3 The elevator

According to the D.P.R. 236/89 the elevator has some minimal measures (1.20 x 0.80 m) with an entering platform in front of it. The choice is not to use this minimum measures but to considering them as a starting point to have something that could be useful for our project.
Considering the existing window, it was decide to maintain a blocked measures (half window, 1.3 m) and to use the dept of the space to create the other measure (1.6 m).
Having blocked measures, there was a problem for the entering doors: sliding doors are not possible to do, but, according with the company responsible for installing and the Superintendence we decide to have simple doors with automatically opening.
The elevator is steel and glass structure, that's because it is very important to have something light and to do allow people to watch the internal courtyard and the double arcades.
This kind of elevator is very specific for existing buildings: it need only 10 cm for the pit so it is very simple to modify the existing floor with a little foundation plate.
To put it in the floor the project expected to modify the intermediate existing stairs using the stone of the first step to underline the entrance of the elevator.
We decide to use the landing to create on arriving point for people coming from the ramp between the ground floor and the landing and for people entering into the elevator.

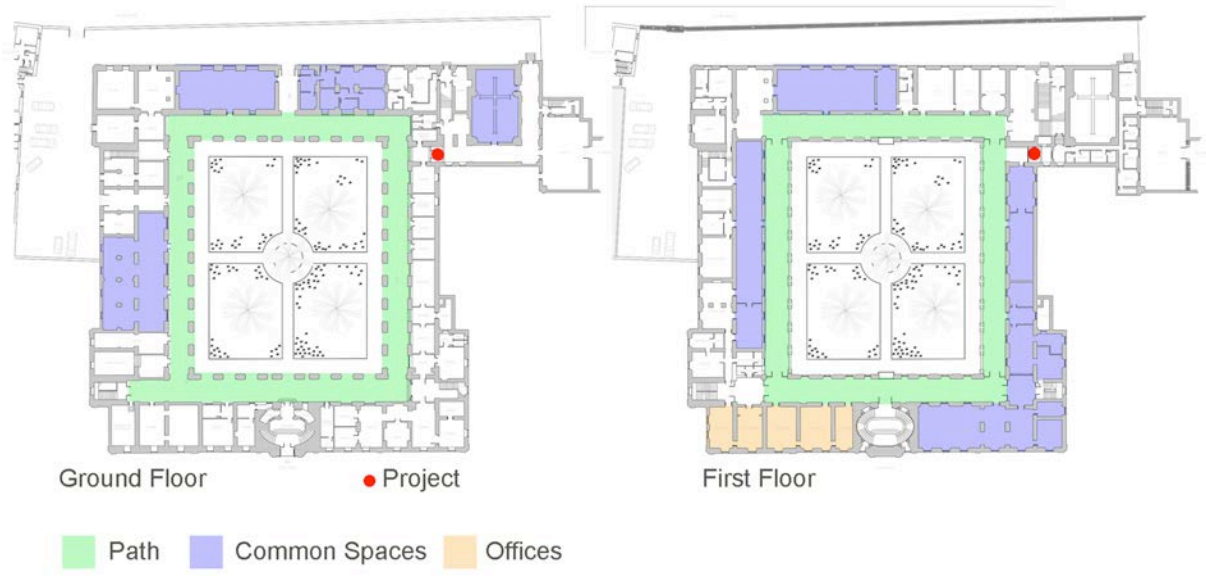

Fig. 4: ground floor and first floor.

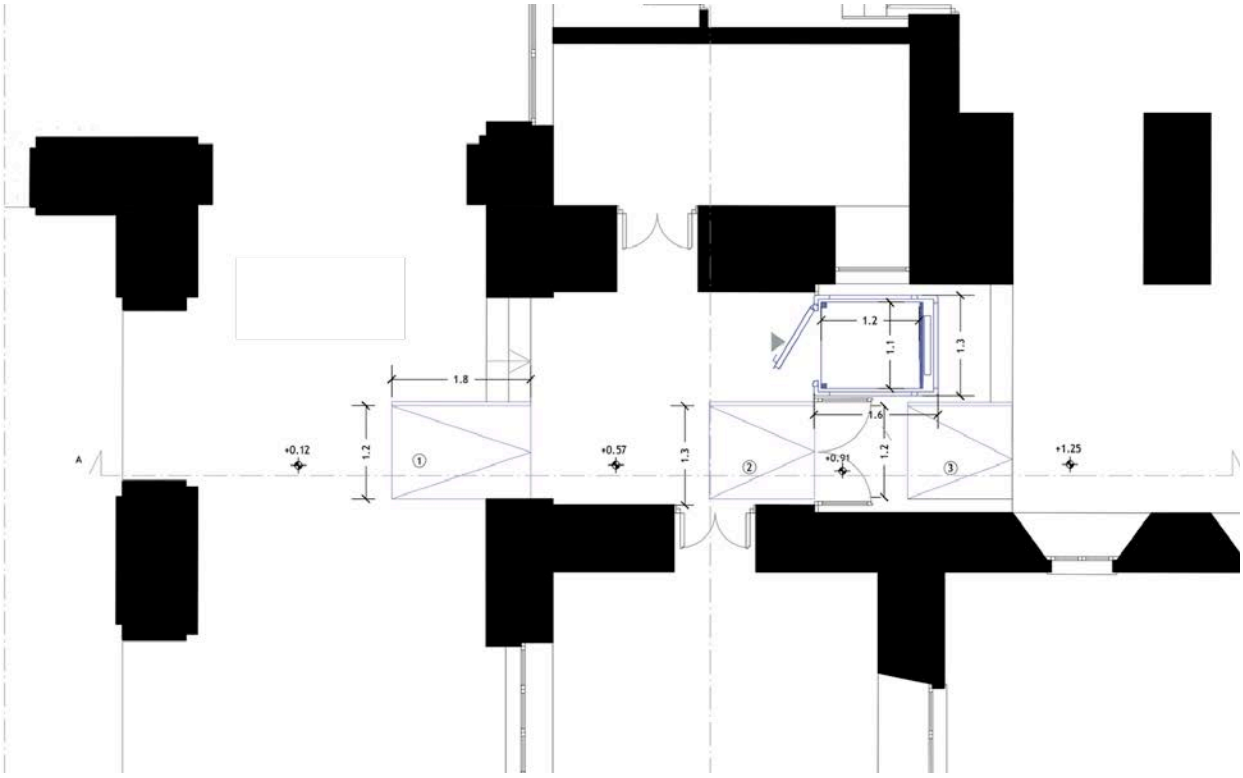

Fig. 5: ground floor - project.

The high of the elevator is defined by the structural elements of the window and there is a vertical element on the glass of the elevator to have the same draw of the window. At the first floor the railing has been modify to create the exit of the elevator and it is not in contact with the loft of the first floor but there is a little gangway to link the floor with the elevator.
Doors are automatic and the user has not to control the overture. The internal cabin is made of glass and steel with a functional pushbutton with Braille and a simple system to call in case of emergency.

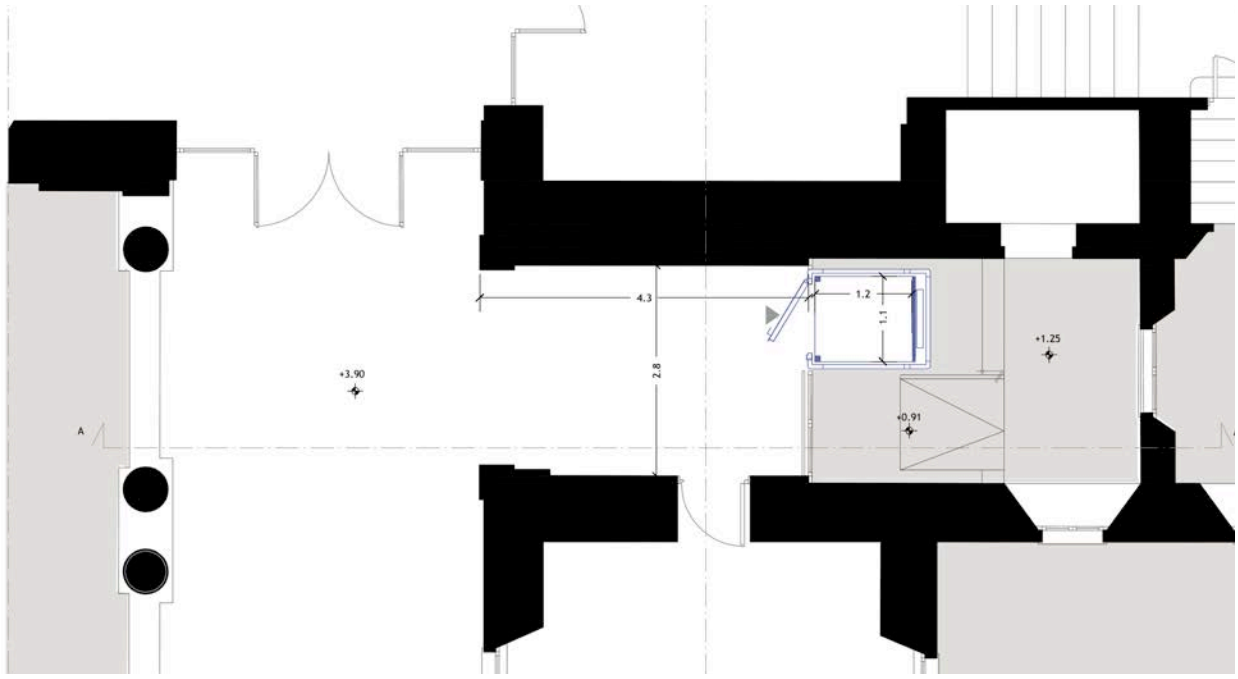

Fig. 6: first floor - project



Fig. 7: front of the existing window with the integration of the elevator.

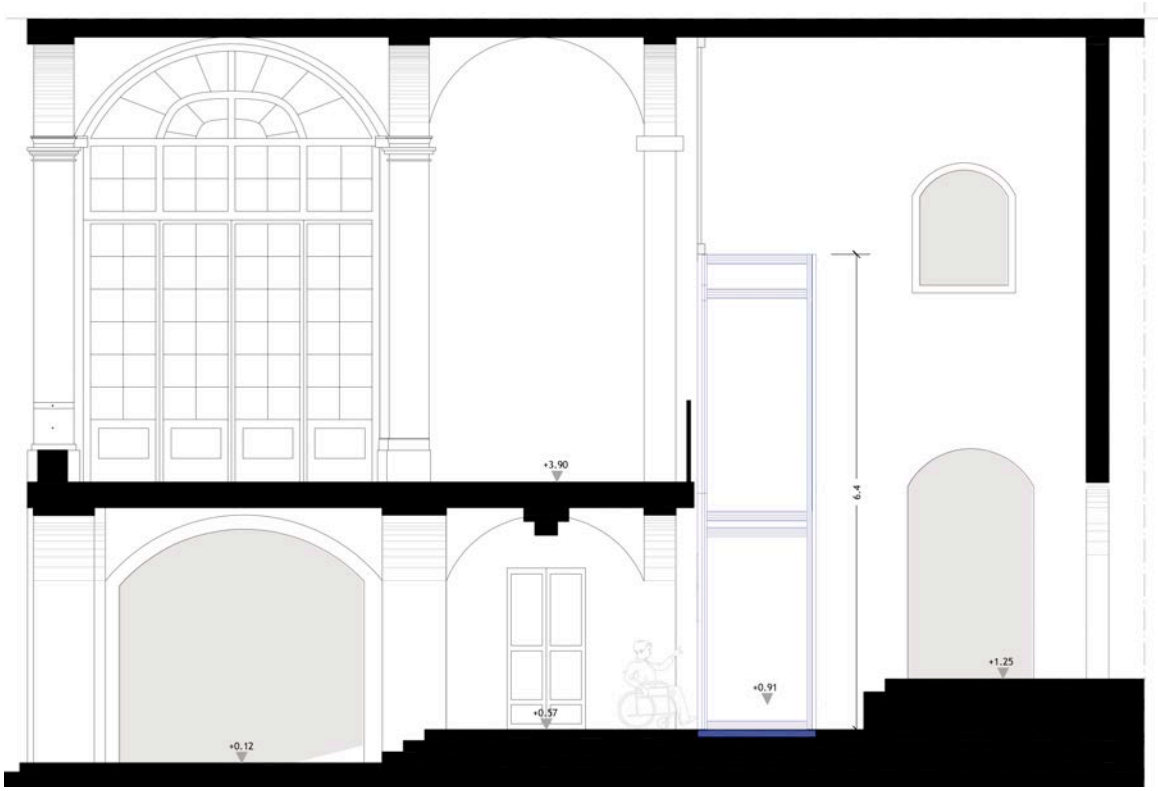

Fig. 8: section of the project.

5. Conclusions

A project inside an existing building is complicated and fascinating. Architects and engineers have to consider many variables and there is not always a precise knowledge of what can be found inside.
Making an accessibility project is another challenge for designers. It is not simple to explain to owners and citizens the importance to make an accessibility element.
In XXI century, accessibility should be an established data in a project and elevators, ramp and system that allow people to use a place are important as the building itself.
Designers have an important role inside the choice of this elements: producers as many different kind of products that can satisfy architects' and engineers' desires, but to make a good project Is necessary to create an object for a specific situation and building. Making an original and contextualized project is important to maintain and to respect existing buildings.
Reversibility is fundamental for a project in an historical building: the project must be recognizable and defined, but we have to use simple elements that can be assembly directly in the project area with minimum size. It is impossible to don't modify something existing inside the building when you are working on an historical building, there is always some intervention to do: architects and engineers have to make some choice to decide what is really important for the building for its history and its cultural value.
It is also very important to find products with high quality: maintenance and deterioration must be minimal and there are some situations where these elements have to work differently and they have to work everyday.
It is also important to understand that a new element inside an historical building could be a way to make something for everyone: accessibility is not an excuse to put something inside to have a more comfortable situation but accessibility is improving the efficiency of a building and to add a new value to it.
It is important to remember that sometimes in our life we could be disable for a period, but we need to be sure that our temporary disabilities is not a problem for us and for other people.
Accessible cities and buildings are one of the themes of the U.N. Convention of Rights of persons with disabilities and historical buildings are a great challenge to maintain a memory of the past and make it accessible in the future.



Fig. 9: photos of the project

Bibliographical References (Arial – 11 pt – Lower case letters - Bold – Left aligned)

[1] U.N. Convention of Rights of persons with disabilities

[2] AA.VV. Le barriere architettoniche nel restauro TeMa. Como: Edizioni New Press, 1998.

[3] AA.VV. Libro bianco sull'accessibilità e mobilità urbana. Linee Guida per gli Enti locali. Milano: FrancoAngeli, 2000.

[4] ARENGHI, Alberto. Edifici storici – turismo – utenza ampliata. La gestione dell'accessibilità nelle città d'arte. Como: New Press, 2000.

[5] ARENGHI, Alberto; DELLA TORRE, Stefano; TRECCANI Gian Paolo. Reversibilità e fruibilità dell'architettura: il tema delle barriere architettoniche. La reversibilità del Restauro. Atti Convegno INternazionale di Scienza e Beni Culturali, 2003.

[6] ASSINI, Nicola; ANICHINI, Sandra; GUERRIERI, Federico; TESI, Valerio. Manuale della progettazione dell'accessibilità. Milano: Ed. Sole 24Ore, 2002.

[7] DRUILLE, Murielle; SCARPA, ALDO. Per una città sostenibile a misura di tutti. Dal piano di eliminazione delle barriere architettoniche (peba) al piano di mobilità pedonale (Pediplan). Alinea Editrice, 2009.

[8] GROSBOIS, Luis Pierre. Handicap physique et construction. Paris: Editions du Moniteur, 1989.

[9] PICONE, Renata. Conservazione e Accessibilità. Il superamento delle barriere architettoniche negli edifici e nei siti storici. Napoli: Arte tipografica, 2004.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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FOLIGNO CITY LAB
The earthquake as a research opportunity

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Abstract
The dramatic effects of the earthquake that in September 1997 devastated Umbria and Marche are notorious. The electronic camera eye documenting live collapse of the tower lantern of Foligno municipal building provided viewers of every latitude with images that are still etched on their memory. Fifteen years after that event, the balance of the post-seismic reconstruction is certainly positive, so that the management model tested and the cultural know-how acquired during this experience have been exported and replicated in analogous emergency situations such as the 2012 earthquake in Emilia. Thanks to an interdisciplinary approach and contaminations between different scientific fields Foligno succeeded in becoming a city lab, able to adopt either conservation or transformation, depending on the occasional specificity.
By comparing the frame of the lantern during the instant of collapse with the picture of the Calamita cosmica by Gino De Dominicis surrounded by the amazing showcase of the former church of Annunziata, it is possible to realize that not only was the city of Foligno able to restore damaged buildings but also it deeply reinterpreted them. Under the sign of virtuous development, which derives from a shared knowledge.

Keywords: earthquake, interdisciplinarity, survey, design, Foligno

1. Introduction
Sadly, the disastrous effects of the September 1987 earthquake, which devastated Umbria and the Marches, are well known, fixed rhetorically and indelibly in the memories of TV watchers the world over by the live broadcast of the collapse of the lantern atop the tower of the Foligno Town Hall. As is the case in all earthquake situations, after implementing a timely response to the housing emergency to provide shelter to the homeless, conducting a careful survey of the damage to the built environment, and taking measures to ensure the safety of buildings subject to a risk of collapse or further damage, there comes the moment for planning the reconstruction. A phase both strategic and concrete, which can be undertaken with a variety of approaches, all of which, however, have in common the lessons learned from the great earthquakes of the past. In fact, after all earthquakes, “it is necessary to assume a retrospective point of view” [1] since “looking back at what was (...) is the only path to follow” [2] for planning and then implementing the measures necessary to ensure a return to a state of normalcy. Of course, the new state of normalcy will not be the same as that which preceded the earthquake, but it must, just as certainly, ensure the population the chance to look toward the future insecure and comfortable conditions. The city, lacerated by so much destruction, becomes a continuous construction site, in which the provisional nature of shoring up coincides with the perennial nature of transforming the city’s original image. Every fracture, every subsidence, every collapse of the urban fabric, constitutes the hard datum of a theoretical problem that must be formulated from scratch,

backed by the results of previous experiences, but which never presents itself in exactly the same circumstances because each building, like each person, has its own history and its own identity.
It is necessary, therefore, to establish an objective (generally *reconstruction*) toward which all project design is directed, including not only architectural, structural, and technological planning, but also economic, social, and cultural planning. Reconstruction systematically presents itself as a dilemma, whose solution is strictly tied to the memory "that belongs (...) to the community which inhabits a territory or a landscape." In some situations, "it is necessary to apply the celebrated formula 'where it was, as it was' (...). In other cases, it is better to proceed by way of opportune *overlapping dissolves* between what remains of a monument and interventions that allow a historical building to reassume its former role. In still other cases, it becomes necessary to demolish the ruins of even important structures, replacing them with new buildings. In this last case, the problem becomes whether to design and build the new structures in harmony with the shared *memory* of what has been destroyed, or to propose a completely different or partially new urban image." [3] Foligno, which has made an interdisciplinary approach a strategic element of its reconstruction planning, has constructed its own image as that of a city-laboratory, capable of adopting a conservationist approach or a transformative approach depending on the specific circumstances. In this sense, more than fifteen years after the earthquake, the Foligno experience(of which this present contribution wishes to provide further positive testimony, supplementing two previous periodical reports on post-earthquake reconstruction [4, 5], appears to be exemplary in terms of the profound redefinition of a local environment and a resolute affirmation of community identity. The city has demonstrated how to heal the wounds inflicted by the dramatic events of 1997, but has also treated those losses as an occasion for architectural experimentation and strengthening the city's economic and social fabric. Although hampered at times by the physiological weaknesses [6] that are inevitably part and parcel of any experimental approach, the reconstruction management model that has been developed [7] and the cultural know-how acquired in the process have been exported and replicated in analogous emergency situations such as the Emilia earthquake of 2012. A comparative examination of the pictures of the collapse of the city's historical symbol and the image of itself that the city projects today,illustrates how Foligno has successfully perpetuated the DNA of a city that has grown up from its own roots, making good use of the rule of "building on the built" without renouncing the city's present expressivity. It has restored to its inhabitants a fabric of places not only admirably restored, but also and above all, profoundly reinterpreted in the pursuit of a virtuous valorization rooted in shared knowledge.



Fig. 1: The collapse of the lantern atop the tower of the Foligno Town Hall (October 14, 1997)

Bibliographical References

[1] BELARDI, Paolo, BIANCONI, Fabio, BONCI, Alessia, VERDUCCI, Paolo. Emergenza, verifica, ricerca. Il terremoto del 1997 in Umbria. *Parametro*. ROSSI, Franco. 251, 2004. Bologna: Faenza editrice, 1970 – 2014.
[2] BOSCHI, Enzo. Prefazione. In *I terremoti dell'appennino umbro-marchigiano. Area sud-orientale dal 99 a.C. al 1984*. 1st ed. Bologna: Editrice Compositori, 1998, p. 9.
[3] BONOMI, Giorgio, MENCHETELLI, Valeria, L'architettura contemporanea tra il tempo e lo spazio. Colloquio di Giorgio Bonomi e Valeria Menchetelli con Franco Purini. *Titolo*. BONOMI, Giorgio. 6, 2013. Ponte S. Giovanni: Benucci Editore, 1990-2014.
[4] BOSI, Silvia, MORETTI, Alfiero; edited by. *Foligno 1997-2007. Dieci anni dal sisma*. 1st ed. Foligno: Centro Studi Città di Foligno, 2007.
[5] *1997-2007. Dieci anni dal sisma. Oltre la calamità. Sviluppo e innovazione*. 1st ed. Perugia: Quattroemme, 2007.
[6] SARTORE, Mariano. Umbria 1997. Ricostruire "dov'era, com'era". Ma basta? *Dialoghi Internazionali*. SANGALLI, Carlo. 13, 2010. Milano: B. Mondadori, 2006-2012.
[7] SEGATORI, Roberto. La ricostruzione post-sismica in Umbria come modello di governante. In SACCHI, Sergio; edited by. *Oltre la ricostruzione. Profili economici e dimensioni sociali in un processo di cambiamento*. 1st ed. Perugia: Regione Umbria, Quattroemme, 2007, pp. 49-58.

2. Architectural Surveys Conducted by the Department of Civil and Environmental Engineering of the University of Perugia

Conducted in two different periods, the architectonic surveys of the two outstanding monuments in Foligno's historic center, Trinci Palace and the Town Hall, are testimony to the City's constant attention for its own history as well as a useful snapshot of the characteristics of these two monuments.
In the case of Trinci Palace, the survey made it possible to document the historical events that characterized the transformation of a portion of the residential fabric (some row houses and a tower house) consolidated first into a noble residence and later into a papal residence. The survey revealed that the palace "was formed slowly over time by disdaining the use of the pre-existing buildings, or better, by availing itself of them and aggregating them harmoniously into an architectonic whole on which variations have been systematically overlaid, gradually giving rise to a unified complex." [1]. Some of the salient stages in this evolution (the creation of large internal salons, functional modifications, the restyling of the courtyard, the demolition and reconstruction of the external stairway) belie the gradual transformation in accordance with an overall design intended to bestow on the palace a more institutional air. Above all, however, the realization of a masking façade, overlaying the pre-existent one, employed as a consolidation strategy for the main entrance following the earthquake of 1832, was in line with the common practice in nineteenth century Umbria. This strategy also served as a pretext for conferring on older palaces with irregular and asymmetrical façades a more orderly geometric design, generally informed by neoclassical canons.
The same practice distinguishes the other building that was surveyed, the Town Hall, whose façade facing Piazza della Repubblica was the object of half a century of design studies, involving a series of the most illustrious engineers and architects of pre-unified Italy. After the earthquake of 1791, in fact, an initial design based on the "overlay of a masking-façade" [2], elaborated in 1795 by the Chamber architect, Virginio Bracci, later became the basis for the proposal presented by Luigi Poletti in 1833. Poletti's design aimed to give rhetorical emphasis to the palace's figurative presence by way of a narrow and thrusting central forepart. The proposal was not fully supported by the City Administration, which announced a competition for the development of a definitive solution. Of the three designs submitted, the commission selected the one presented by Antonio Mollari, in which the institutional image of the palace is entrusted to "a gigantic Ionic colonnade superimposed on an arched ashlar-work base [2], which was faithfully constructed in 1839.



Fig. 2: Architectural survey of Foligno Town Hall, elevation

Bibliographical References

[1] SOLETTI, Adriana, BELARDI, Paolo. Il rilievo del palazzo. In BENAZZI, Giordana, MANCINI, Francesco Federico; edited by. *Il Palazzo Trinci di Foligno*. 1st ed. Perugia: Quattroemme, 2001, pp. 171-194.
[2] BELARDI, Paolo. Profilo storico dell'architettura umbra dell'Ottocento. Dal palazzo Comunale di Foligno al palazzo del Governo di Perugia. In BELARDI, Paolo, BORI, Simone; edited by. *1861-1939 L'architettura della Perugia postunitaria*. 1st ed. Perugia: EFFE Fabrizio Fabbri Editore, 2013, pp. 23-49.
[3] Il rilievo architettonico dei Palazzi Pubblici. In BETTONI, Fabio; edited by. I Palazzi Pubblici di Foligno. 1st ed. Perugia: Quattroemme, 2014, pp. 41-63.

3. The Public Library by Arrigo Rudi

The great “opportunity” of the 1997 earthquake allowed the city of Foligno to move forward with its program of a complete renewal of its historic center, expanding on a project initiated in the 1980s with the rehabilitation of the delicate complex structure of the Trinci-Deli palaces. The commission was awarded to Professor Arrigo Rudi, a renowned architect who trained under Carlo Scarpa, and who worked for twenty years on an organic project of urban and architectonic regeneration, centered on the restoration, construction, and outfitting for museum use of new volumes destined to house the municipal archive and public library.
The historical evolution of this rich portion of the city, now meant to be joined to the palace complex, found in the cultivation and poetics of its new maker some special qualities that were synthesized in the intentional attenuation of the principle architectonic dichotomies: the relationship between modern and medieval; structure and form; interior and exterior; plan and elevation; solid and void; light and shadow; whole and fragment; city and architecture.
The new façade is detached from the posterior body, until then characterized by the ruins produced by the bombardment of 1944, and redefines the significance of the piazza. Its hierarchical monumentality clearly expresses substantial “political” reflections on the role of culture and of architecture, while dissimulating the insatiable search for the “unity of inclusion” proper to the history of the building. Its design of alternating horizontal bands, a historicist reference to the contiguous architectonic structures, blends with a certain continuity into the alternating bands of the pavement of the piazza, also meant to conceal a substrate of markings, which emerged during the work performed in2008. The correlated centrality of the passage is expressed simultaneously in the contemporary reinterpretation of the juxtaposed portico, in the philological reassembly of the city’s vital spaces obtained by way of semi-open tracings wedged into the volumes, and in the continuity between interior and exterior expressed by the semi-closed *promenade*.
In all of this, drawing, of which Rudi is such an expert, is shown to be a research tool, supporting and condensing reflections which are then gathered together in the spatial plan: from the sketch, which suggests the development of the project and the typological urban analysis, to the project drawing, which implicitly recalls the experience of Arienti in Perugia. The project drawing also cites, perhaps more deliberately, Rossinian motifs, with an obligatory passage through the surveys conducted by the University of Perugia, whose findings regarding the evolution of the architectonic forms contributed to the discovery of the meaning of the place.



Fig. 3: The Public Library, photographic view

Bibliographical References

[1] PASTOR Valeriano, LOS Sergio, TUBINI Umberto. *Arrigo Rudi Architettura, restauro e allestimento.* 1ª ed. Venezia: Marsilio, 2011.
[2] BENAZZI Giordana, MANCINI Francesco Federico; edited by. *Il Palazzo Trinci di Foligno,* 1ª ed. Perugia: Quattroemme, 2001.
[3] BOSI Giovanni. *Foligno, una stagione. La città fra Ottocento e Novecento,* 1ª ed. Foligno: Orfini Numeister, 2009.

4. The Italian Center for Contemporary Art by Giancarlo Partenzi and Getulio Alviani

“The earthquake as research opportunity” expresses perfectly the case of the CIAC (Italian Center for Contemporary Art) designed by Giancarlo Partenzi and Getulio Alviani. A work of contemporary architecture in the heart of the historic center, between the Church of Saint Francis and the Art Nouveau row houses in via Campanile, where, after the 1997 earthquake, all that was left were the ruins of a building that had been a milk plant and later a Post Office. The new building was financed by the Cassa di Risparmio di Foligno Foundation which, in collaboration with the City of Foligno, decided to give concrete expression to the city’s growing attention for contemporary art and artistic experimentation with a dedicated cultural center.The ruins and empty spaces left by the earthquake have thus been transformed into an opportunity for architectonic and cultural requalification and renovation.
The CIAC presents itself as a compact and massive monolithic structure in COR-TEN steel, disruptively inserted into a highly historicized context, displaying its force without altering the preexisting equilibrium but, on the contrary, conferring on the space a symbolic value of architectonic continuity between past and present. A reinforced concrete box wrapped in a rust-colored facing constituted by a smooth and continuous surface interrupted only by a deep-cut void, which identifies the main entrance to the museum. Externally, the purity of the volume is denied by the weaving effect produced by the joining of the steel plates and, above all, by the changing nature of the material which, by oxidizing at varying rates over time, confers a dynamic character on the perceived space.
The sensation of an impermeable exterior is countered by the surprise of an open and luminous interior space developed on two levels, one of which is partially underground. Passing through the entrance, which houses the bookshop and restrooms, you arrive in a spacious environment of significant height: an exhibition hall completely refinished in white plaster and illuminated by a square skylight, the only light source, emphasized compositionally by four pilasters, which define its planimetric dimensions.
The semi-interred level, connected by a series of vertical passages, opens itself to multiple interpretations: it is a depository for works not on exhibition, a laboratory, a warehouse, and at the same time an ulterior exhibition hall illuminated artificially by light sources encased in the ceiling which, arranged in a regular pattern, give the space a regular and characterizing cadence.



Fig. 4: The Italian Center for Contemporary Art, photographic view

Bibliographical References

[1] BELARDI, Paolo. La sostenibilità sostiene l’architettura. Dalle scale mobili di Perugia alla galleria pedonale di Foligno. In BELARDI, Paolo, MORETTI, Alfiero, MARTINI, Luca; edited by. *Una nuova porta urbis per Foligno. Sette progetti per la galleria pedonale di porta Romana*. 1st ed. Foligno: Viaindustriae, 2013, pp. 12-19.
[2] MARTINI, Luca. Centro Italiano Arte Contemporanea. In MARTINI, Luca; edited by. I luoghi dell’architettura contemporanea in Umbria (2006-2011). *Piacere Magazine speciale Festarch 2011*. GRANDI, Matteo. 2011. Perugia: Big Projects, 2004 – 2014.
[3] www.theplan.it (PAGLIARI, Francesco. Un edificio contemporaneo per l’arte contemporanea: Centro Italiano Arte Contemporanea CIAC)

5. The Church of St. Paul the Apostle by Massimiliano Fuksas

This work is the winning project of a national competition held in 2001 by the Italian Conference of Bishops for the design of new parochial complexes.It is composed of three elements identified with the functions of the religious center. The first element, the church, is a purely geometric monolith, almost cubic. The second element, a low, elongated parallelepiped, houses the sacristy, rooms of the pastoral ministry, and the rectory. A third translucent body, which houses the weekday chapel, unites and distinguishes the two principal volumes. Streams of natural light, which cut vertically and transversally through the space, create a sense of spirituality and contemplation directed toward the principal elements – the altar, the ambo, and the baptismal font. The imposing volume of the church is reached through the parvis, a long paved parvis that leads to the entrance: a crisp horizontal cut in the absolute compactness that characterizes the front elevation, a piece of periphery, and a possible attraction of signs and forms.
The perception of the entire complex is modified by the works of several artists, including Enzo Cucchi, with his monumental sculpture *Stele-Croce* in concrete and white marble from Carrara, an architectonic element in itself, placed in the parvis, and Mimmo Paladino, with his Stations of the Cross in the interior of the liturgical space.
The vision of the generic church handed down through history is that of a two-dimensional exterior (the façade) and a plan that defines a three dimensional and numinous interior. This formulation is quite clear for anyone interested in studying places of worship located in consolidated urban environments. This traditional interpretation, however, has been applied much less frequently in contemporary churches, which are characterized primarily by strong exterior images located in semi-suburban open spaces, reserving a subordinate role to the distribution of the interior space. With his design for the Church of Saint Paul the Apostle in Foligno (2001-2008), Fuksas brilliantly resolves this dystonia through the use of a double-layered envelope, body and soul, the intimate dimension and the communicative dimension. He rewrites the exterior space in the confrontation between the exterior volume and the surrounding context, while at the same time refusing to renounce the study of liturgical spaces and the human dimension with the smaller interior volume.



Fig. 5: The Church of St. Paul the Apostle, photographic view by Moreno Maggi

Bibliographical References

[1] Chiesa di San Paolo, Foligno. Massimiliano Fuksas e Doriana Fuksas. *The Architectural Review*. FINCH, Paul. 1347, 2009. London: The Architectural Press, 1896-2014.
[2] DIOCESI DI PERUGIA. *Sursum Corda! Chiesa di San Paolo. Un progetto di Massimiliano e Doriana Fuksas*. 1ª ed. Foligno: Quater, 2011.

6. The Former Church of the Annunciation by Guendalina Salimei and T-Studio

The devastating shocks of the 1997 quake in Umbria have become a propulsive force, which in Foligno, has transformed the tragedy into a fly-wheel of regeneration of urban structures fallen into disuse. A paradigmatic example is the former church of the Annunciation (1760-1775), an uncompleted work by Carlo Murena, deconsecrated in 1860 and since then almost never used. After the earthquake it passed under the ownership of the City of Foligno, in view of the post-quake renewal program, with the objective of determining its re-use as one of the sites of the Italian Center for Contemporary Art (2011).
The concept of the project is evident in the conservative restoration and structural consolidation of the church, while its new function is emphasized by an extraneous body that parasitizes the building and gives rise to an expository itinerary. Entry is by way of the octagonal hall on the east flank, which houses the information point, the ticket booth, and a bookshop. This area gives access to the main hall, illuminated by a newly designed skylight on which is mounted a fixture which filters the sunlight to create suitable lighting for exhibitions. On the upper levels, the exhibition itinerary alternates between inside and outside and concludes with a panoramic overlook, which flanks the hall of the church, and which constitutes a true and proper viral architecture of steel and glass [1]. The COR-TEN, which forms its outside skin, and the parapets that define its limits are decorated with a pattern of irregular solids and voids, which dematerialize it and at the same time allow for its illumination by natural light.
The museum houses the sculpture *Calamita Cosmica* (1990) an enormous humanoid skeleton which fills the central, poly-lobed hall. The alien origins of the creature are betrayed, aside from its dimensions, by its bird-beak nose and the gold rod planted in the middle finger of its right hand: a magnet/antenna oriented toward extraterrestrial worlds The work synthesizes the spirit of the entire project, in that what appears to be inanimate is a true and proper medium of communication with other worlds [2]. In the same way, the uncompleted and later deconsecrated church becomes a contemporary jewel case, which concretizes the relationship between art and architecture and signifies the dynamic by which cultural sustainability (inherent in the activity of design, which synthesizes knowledge, research, and redesign) not only “sustains architecture,” but contributes in a decisive way to the renewal of Foligno [3].



Fig. 6: The Former Church of the Annunciation, photographic view

Bibliographical References

[1] MARTINI, Luca. Restauro e riuso dell’ex chiesa dell’Annunziata. In MARTINI, Luca; edited by. I luoghi dell’architettura contemporanea in Umbria (2006-2011). *Piacere Magazine speciale Festarch 2011*. GRANDI, Matteo. 2011. Perugia: Big Projects, 2004 – 2014.
[2] TOMASSONI, Italo; edited by. *Ancona per Gino De Dominicis. Gino De Dominicis Calamita cosmic*. 1st ed. Ancona: Mediateca delle Marche, 2005.
[3] BELARDI, Paolo. La sostenibilità sostiene l’architettura. Dalle scale mobili di Perugia alla galleria pedonale di Foligno. In BELARDI, Paolo, MORETTI, Alfiero, MARTINI, Luca; edited by. *Una nuova porta urbis per Foligno. Sette progetti per la galleria pedonale di porta Romana*. 1st ed. Foligno: Viaindustriae, 2013, pp. 12-19.

7. The Archeological Museum of Colfiorito by Roberto de Rubertis

The new Archeological Museum of Colfiorito, designed by Roberto de Robertis in collaboration with “mtstudio” (Matteo Clemente and Tommaso Empler), is the product of the prolific collaboration between the City of Foligno and the Umbrian Superintendence for Archeological Heritage. Nonetheless, the MAC concedes nothing to mimesis and even less to its pseudovernacular surroundings, fearlessly displaying its own spatial dynamism, arrogantly wedging itself, almost like a piece of shrapnel gone awry, into the residual void between the walls of two small decommissioned military buildings belonging long ago to the infirmary of the Colfiorito internment camp. All of this, obviously, without renouncing a style that is boldly contemporary, in terms of construction as well as composition. Its metallic roof, in fact, in retracing the triangular shape of the lot, exhibits a spatial dislocation, which embodies in a single form the difference in height (almost eight meters) between the higher and lower parts, and resolves itself in a decidedly monumental point, realized with a large cantilevered element. This dramatic sign, embodying the metaphor of an arrow shot into the air by history, transfixes the intersection in front of the new museum, exuberantly announcing its presence. Equally bold is the entrance façade: a large tilted glass strip which, its upper edge running just under the roof line, incorporates and in a sense protects, the two preexistent buildings (which remain unchanged in semantic contrast with the new volume), functionally connecting them by way of a pedestrian bridge overlooking a surprising exhibition space; surprising because it is three stories high and because it has a panoramic view of the Apennine landscape. The exhibition, in fact, curated by Laura Bonomi Ponzi, is organized on three levels. Of these, the first two, which present archeological finds related to the Plestines (an Umbrian people whose period of highest development was between the VII and V centuries BCE) from the excavations conducted over the last fifty years on the high plateau of Colfiorito, also involve the two preexistent buildings, while the third level, meant to house temporary exhibitions, is served by a secondary entrance reached from the city street that runs above the museum.



Fig. 7: The Archeological Museum of Colfiorito, photographic view

Bibliographical References

[1] BELARDI, Paolo. Una freccia dalla storia: il nuovo antiquarium di Colfiorito. Quando il progetto è di qualità le architetture valgono per quello che sono. *Corriere dell’Umbria*. MOSSUTO, Anna. 29 marzo 2010. Perugia: Gruppo Corriere, 1983-2014.
[2] PISANI, Mario. Per il museo archeologico una vela in metallo e vetro. *Progetti e concorsi di Edilizia e territorio*. NAPOLETANO, Roberto. 28 giugno-3 luglio 2010. Milano: Il Sole 24 Ore, 2006 – 2014.
[3] www.floornature.it (MT studio - Museo Archeologico Colfiorito)

8. Design for the ex-Sugar Refinery by Gae Aulenti

At the end of the nineteenth century, the sugar refinery in Foligno represented a turning point in the economic development of the city. The refinery, designed by G. Aidmond, chief engineer of the "Societé Anonyme des Ateliers de Construction" and built on behalf of the "Società Italo-Belga per la Fabbricazione degli Zuccheri," is situated in triangle-shaped urban area and occupies a surface of 6.3 hectares [1].
The sugar refinery ceased operations in 1980, when its installations were dismantled and the land sold. During the 1980s the degradation of the plant was so severe that its potential rehabilitation was threatened. In addition, the seismic events of 1997 further aggravated the already poor condition of the structure, leading the City Administration to proceed with measures to ensure the safety of the plant or to demolish the buildings in danger of collapse.
The land was acquired in 2000 by the Coop Central Italy group, which promoted its rehabilitation within an overall plan for the rebirth of the city of Foligno. In 2011, Gae Aulenti, who died the following year, presented her preliminary proposal for the rehabilitation and reconversion for the area occupied by the refinery.
The project calls for the retention and consolidation of the remaining structures of the ex-refinery – the smokestack, the distillery, and the carpentry workshop. Following the indications of the Implementation Plan of 2004, Aulenti's project provides for 14% of the area to be occupied by buildings, 39% by parks and gardens, and the remaining 47% by infrastructure and services, including parking lots, open squares, and sidewalks [2].
Gae Aulenti's design highlights the role of innovation and productivity played by the sugar refinery through the insertion of an element capable of reaching the same degree of productivity and the creation of new jobs – the Science and Arts Park.
The symbolic element of the whole design is constituted by two towers 78 meters high to be constructed with prefabricated structures and destined to house multiple functions. The towers are a completely new element of urban design in Umbria. The region, in fact, has always been characterized by constructions whose development is primarily horizontal rather than vertical. The insertion of these two remarkably high buildings at the entrance to the park, adjacent to the surviving smokestack of the refinery is aimed at reducing to a minimum the occupation of the land, so as to ensure an improved and more coherent livability and usability of the multiple activities planned for the area.



Fig. 8: G. Aulenti, Design for the ex-Sugar Refinery, perspective view

Bibliographical References

[1] BARTOCCI, Fabio, COVINO, Renato, FIORITI, Maria Grazia. *Lo Zuccherificio di Foligno*. 3ª ed. Perugia: Electa-Editori umbri associati, 1988.
[2] www.umbria24.it (PORFIRI, Ivano. Foligno, l'ex zuccherificio da rudere a polo urbanistico di avanguardia: ecco il progetto)

9. Education and Training by the Department of Civil and Environmental Engineering of the University of Perugia

Disegnare Foligno tra storia e utopia [1] (Designing Foligno Between History and Utopia) is rooted in a simple but not banal idea, founded on a visionary simulation in which the field of intervention is represented by the Foligno of 1819. Its executors are nine Italian urban designers (AtelierMap, Ruggiero Baldasso Architects, Alessandro Bulletti, Ceschia and Mentil Associated Architects, studio KUADRA, MARC, Francesco Matucci, nEmo Group, and Giovanni Vaccarini). The designers have been assigned the task of redesigning the city's future urban development through the design of architectural projects inspired by nine ephemeral *folies*, designed by Foligno's Giuseppe Piermarini and digitally reconstructed in the courses of "Architectural Relief" and "Representational Techniques" in the graduate degree program in Architecture and Building Engineering. The new buildings are to be situated on the edge of the historical built environment, in the urban park within the perimeters of the XII and XIV century city walls, with the objective of imagining a possible future of the city's urban structure.
Una nuova porta Urbis per Foligno (A New City Gate for Foligno) is the slogan of the joint didactic exercise conducted in the courses of "Digital Design" and "Digital Design Laboratory," taught respectively by Paolo Belardi and Alfiero Moretti in 2012-2013 as part of the Graduate Degree Program in Architecture and Building Engineering [2].The exercise addressed the theme of the strategic and figurative redesign of the Porta Romana (Roman Gate) area. The area is situated on the edge of Foligno's historic center and, more than the city's other gates, it represents the urban design concepts of evolution (from defensive bulwark to diaphragm between city and country, and, most recently, traffic node) and stratification (from the homogeneity of the hypogean archeological finds to the heterogeneity of the twentieth century constructions). On the basis of seven project proposals, the area has now been transformed into a pedestrian gallery conceived as a city gate of the third millennium.
A.A.A. Comunità Offresi [3] (Community on Offer) is the slogan of the recovery and refunctionalization project for the industrial-archeological site of the Hoffman kilns in Foligno. The project offered the opportunity to experiment with a new model of contemporary urban living – cohousing – applied in a context rich in historical-symbolic value. The project is characterized by a functional mix in which the cohousing experiment exploits the advantages of reduced environmental resource management costs (natural and energetic, infrastructural and organizational), provides greater opportunities for new forms of socialization (mutual aid, sharing of common problems), enables the recovery of an agricultural concept of architectural design (roof gardens, hanging gardens, vertical agriculture) and returns work-home and home-services relationships to a human scale (through the introduction of self-managed services, and agricultural and artisanal activities). *A.A.A. Comunità offresi* is an experimental and contemporary project design for a new relationship between form and function, inserted in and enhancing a preexisting built environment where architecture becomes an active contributor to the formation of a new way of living.

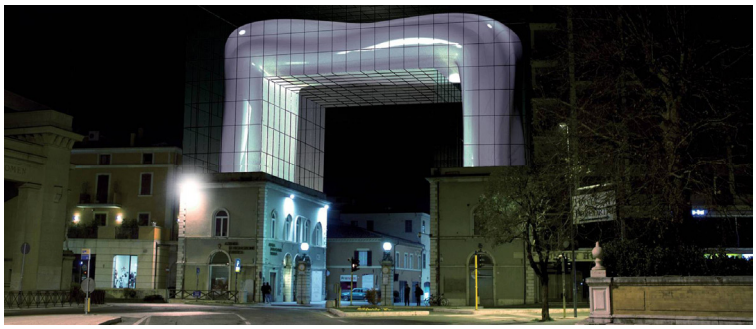

Fig. 9: J. Capitini, L. Cesaroni, M.G. Onali, L. Torricelli, *Porta 3.0*, perspective view (*Una nuova porta Urbis per Foligno*)

Bibliographical References

[1] *Disegnare Foligno tra Storia e Utopia. Omaggio a Giuseppe Piermarini*. 1st ed. Foligno: Viaindustriae, 2010.
[2] BELARDI, Paolo, MORETTI, Alfiero, MARTINI, Luca; edited by. *Una nuova porta urbis per Foligno. Sette progetti per la galleria pedonale di porta Romana*. 1st ed. Foligno: Viaindustriae, 2013.
[3] ERGASTI FILIPPUCCI, Elena. *A.A.A. Cercasi. Progetto di cohousing nell'area delle ex Fornaci Hoffmann di Foligno*. Università di Perugia, a.y. 2011-2012 (thesis in Ingegneria edile-Architettura, supervisor prof. eng. Paolo Belardi, assistant supervisors arch. Filippo Conti, eng. Giacomo Pagnotta, eng. Riccardo Vetturini).

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Paris Saclay - Urban textures

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Abstract
The area of intervention was one of the sites in the Europan 12 competition in which we took part.
This area is located to the south of Paris, a few kilometres from Versailles, and hosts a large multi-campus university called Paris-Sud. There are currently several projects underway in this area, involving town planning as well as construction, for both the medium and the long term.
These projects and programmes have the aim of radically changing the future of Paris-Sud University and its surroundings. The precise zone of intervention is southwest of the university campus in an area designated as the “western entrance”. The competition was for a project that would tackle the various problems and requirements currently affecting the campus. First among these were the isolation of the campus with respect to the surrounding towns of Yvette to the south and Orsay to the east, the neglected natural spaces by which the campus is enveloped, improved protection of the areas along the river Yvette which runs through the campus from east to west, the lack of new housing for students and researchers, the repurposing or demolition of a building known as “220” and the provision of new commercial facilities on-campus to replace existing ones which are insufficient.

Keywords: Europan 12, Paris Saclay, University Paris Sud

1. The project
The project aims to respond to all the requirements mentioned above, based on the resources and potential currently existing in the area.
The project focused on 5 broad sectors of intervention and for each of these analysed critical issues, resources and development potential:

green spaces and landscape
network/transport
sports facilities
services and commerce
housing/social activities

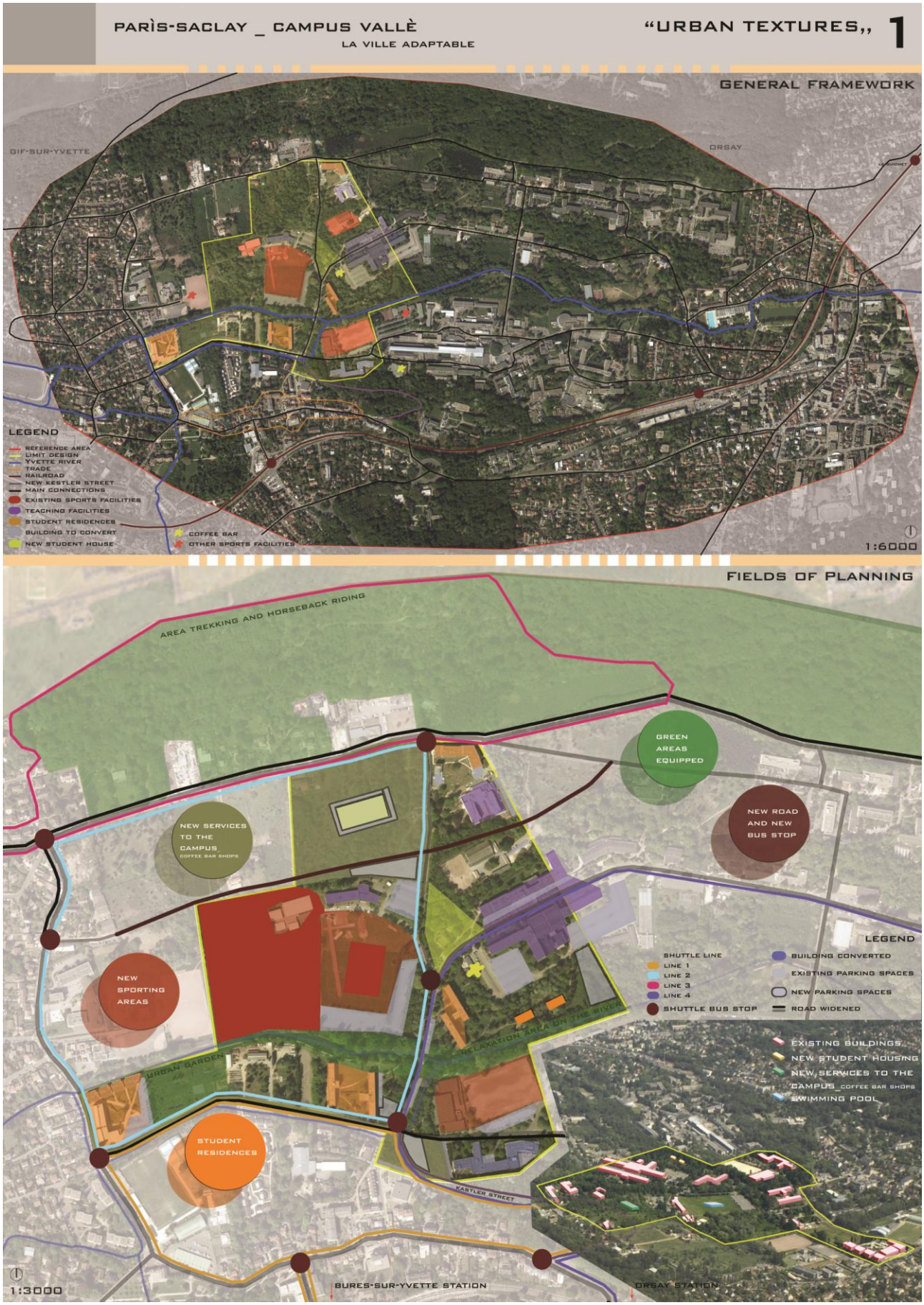

Fig. 1: General framework and five 5 broad sectors

1.1 Green spaces and landscape

This sector was in turn subdivided into three sub-systems defined by the area's own morphology: large green spaces, urban green spaces on-campus and riverside green spaces along the banks of the river Yvette.

The first sub-system (the large green space) could accommodate a series of activities that would bring improvement and would encourage citizens to enjoy the natural heritage available in their territory, with a view to actively safeguarding it.

Given the size of the area and its morphology, it would be suited for use as a themed park – specifically, as "an adventure park".

Naturally, in the context of such specific activities, existing trails would have to be refurbished for walking, hiking, cycling and, last but not least, horse riding.

The second sub-system (urban green spaces on-campus) would be refurbished in order to make a pleasant campus environment, eliminating areas lacking in environmental quality.

The project includes the planting, in the green spaces delimiting the roads across the campus, of a variety of trees, specifically for all times of the year, so that there will always be something in flower all year round.

The large green areas along the road Voie de la Faculté, currently unused, will be given over to "urban vegetable garden" activities. It will thus be possible to create specific projects and programmes for all types and levels of school, such as for example projects connected with nature and food education. Opening the gates to young people and children through the schools will be the first step towards integration and a system of relations between the campus and the town. The third sub-system (riverside green spaces) comprises the areas along the riverbanks. Here the project foresees just areas for relaxation, simply laid out as lawns, with a Wi-Fi connection from the campus making it possible and enjoyable to work on one's laptop, sitting comfortably on the grass.

The large natural spaces of the campus that currently have no specific function but
which are extremely beautiful could host installations of works of art, expressions of Land Art. Art and Nature together will bring to the campus a variety of activities and interests that will attract the attention of different kinds of visitors from month to month and at different times of the day.

1.2 The second sector: road network

This sector has also been divided into two sub-systems: the road system outside the project area and that inside the campus. On-campus, where possible, provision has been made to widen the roadway. Here, a light mode of transit is envisaged (cycle tracks) and it will only be possible to drive by car to some points, where easy parking will be available. The road network outside the campus has been improved and some roadways, where possible, have been widened and given cycle tracks.

1.4 Third sector: equipment for sport

At the heart of the project area there are spaces and equipment for sport. The project intends to increase these areas with tennis and basketball courts and an athletics track, partly already existing. A little sports city, open not only to students but also to young sportspeople and children coming from outside. Sport is undoubtedly a very strong form of aggregation and as such should be encouraged, thereby creating a more vital campus, where mothers and children could mix with professional athletes.



Fig. 2: Green spaces and landscape - road network - equipment for sport

1.5 The fourth sector: services and commerce

There are currently no shops inside the campus, so students are obliged to drive to the nearest shopping centre. The project includes a commercial building to the north of the campus, overlooking Rue de la Guyonnerie. This will not be built along the roadside, instead a broad green space will divide it from the road. The building has been conceived with low environmental impact and attractive colours, entirely clad in colourful wooden planks. The widening of Rue de la Guyonnerie and the capacious parking area, which will also serve as access to the “Adventure Park”, will make this area a hub that stimulates various interests.

1.3 The fifth: housing/social activities

There are various residential buildings within the campus, some undergoing renovation. The projects for these properties envisage enlarging rooms with a consequent reduction in the numbers of beds and a need to provide more beds, both for students and for researchers with their families.

The project foresees new residences in an area to the east of the campus, aligned with other residential building complexes, in a zone where there are no planning restrictions.

In line with the current demands of young students today – low costs, shared spaces, versatile buildings – we decided to suggest a project already tested in other European cities - the use of shipping containers.

These modular elements are light, versatile, eco-compatible and can be made aesthetically very attractive – all reasons behind this project choice, which is in line with the theme of “adaptable campus” and in tune with the rhythms and requirements of the evolution of time. While we used a criterion of minimal space for the students, a different concept was adopted for the residences of researchers and their families, who would be housed in a wing of Building 220.



Fig. 3: Services and commerce - housing/social activities

Bibliographical References

[1] Referring Web Pages Web: http://www.casecontainer.it/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Projects overlooking the Sea, between stone and leaves

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We intend to deal, in this paper, an important subject: the restoration of the modern project and the recovery of landscape, through two significant Sicilian examples, two impressive lesser-known structures, today abandoned. They are inside a “natural” context, endowed with a strong identity: three hangars, two by Nervi, bordering the coast near Marsala, and one by Garboli in Augusta, on top of a little green hill, next to the bay. These building complexes were analysed in the PhD at the University of Palermo. The results of this research will be part of our paper. Therefore, the restoration project takes advantage of the consideration around the *rules* of the architectures explored (which are examples of *Order*). These rules are "roots" of the new project and stronghold of *scientific* coherence. Regarding landscape and its relationship with buildings, the paper will shed a light on how, in the unity territory/architecture, it’s possible to rethink and to “redesign“ a place, activating synergies that correlate the landscape values with the anthropic values. In both cases the landscape and architectural recovery is focused on redesigning the landscape options, for example the botanical species planted, or to design landscape as a garden, which embraces inside and holds in itself great examples of architecture. Thus, the architectural territory, made of stone and living vegetation, “lives”, as an open air garden, by and bordering the sea. A long and deep waterfront between city and nature.

Keywords Architecture, landscape, Sicily, order, scientific project

Projects overlooking the Sea, between stone and leaves

This paper concerns two different themes, firstly, the relationship between architecture and landscape and secondly, projects involving the restoration of modern works. These will be applied to two little known, but important, large-scale industrial structures in Sicily, which are now abandoned, and part of an extremely connotative, seminatural context - the two hangars by the sea at Nervi, Marsala and the Garboli airship hangar at Augusta, which rises up from a small green hill overlooking the bay.

These buildings have been studied and reprojected in the context of the Palermo Architectural Design Doctorate and the results regarding them form the basis of our reflection. The restoration projects were begun after a careful examination of the rules regarding the architectural structures involved (which are examples of order); these rules are at the foundation of the restoration projects and are a guarantee of their scientific value. For these reasons, therefore, the planning operation, together with an in-depth analysis of each building, have formed the basic element of the doctoral thesis.

Furthermore, in both the cases examined, the projects are in a non-urban context, and in the period when the buildings were erected, were part of a rural setting in strict correlation to the sea and to several pre-existent historical factors of great impact, in one case the ancient city of Augusta and in the other the small area of sea known as the Stagnone, almost opposite the tiny island of Mozia. A doctoral thesis together with a separate project has been written by Giulia Argiroffi, who has tried to conserve the large unitary space involved and to approach the project without losing sight of the fundamental rule regarding the original construction of the building, which involved the assemblage of its various component parts. For this reason, an abacus of these component parts was prepared, and this then formed the foundation of the planning process. The project concentrates on the architectural structure, considered apart from its relationship to the landscape. This relationship must be examined

extremely carefully, not only because of the quality of the context involved, extremely connotative right from the beginning, but also in order to resolve the human pressures which have totally transformed the historical set-up in which the building originated. Today the area is overrun by an uncontrolled building sprawl which is gradually breaking up the rural areas, once covered with productive vineyards.

The idea of using the two buildings respectively as a marine museum and a sports center was suggested by their owners, the Provincial Administration of Trapani. This choice has made it possible to maintain, for the most part, the perception of the large space involved in the twin buildings and to use light materials for the reconstruction, which can be erected directly on the ground and linked to the various parts of the elements of the large arched roof.

The context is characterized by a system of great value that is based on the seniority of the historic city of Marsala, in which the matrix based on the Roman quarter and Hippodamian schema, is still present. In addition to the city, which today seems burdened by a development which came to be frayed at the back, both on the coast with comb-shaped second houses, the scope bears the traces of one of the most interesting productions of quality in Sicily: sea salt, Slow Food Sicily. This production has given rise to an environment of almost surreal beauty that is the "border" between land and sea, the Stagnone, where Mozia is.
In this case, the project of restoration of the landscape must face the sea front and the interior, mitigating the visual impact of the settlement without edges that interacts with a flat earth that does not have morphological limits. Had they been present, they would have curbed the wide expansion which covers rather evenly throughout the country.
The beauty of the sea front suggests, for the redevelopment, a walkway between the urban and the natural , which should put with great lightness and delicacy, visual and physical connection to the key places of the system, including salt marshes which, mirror water in the ground, multiply the light. In this system, water blades that change colour with the seasons, there are white and impressive windmills.
On the model of some waterfronts you should follow what the landscape suggests, with the skills that the integration between urban planning and architecture, move. Also strengthening the use of perceptual aspects whose values could be traced to some matrices of great architecture of the twentieth century, like those of Kahn, made of air, light and silence.
In addition to this it is important to work on the scale of the scope project, so that the regeneration of the landscape is integrated with that of the scale of architecture, thinking over, then, the space between the buildings, regenerating and interconnecting it with the seafront and the entire context.

The Augusta airship hangar, projected by the engineer Antonio Garboli in 1917, presents similar problems. It is situated on a small hill covered with trees, not far from the sea, near the fifteenth century forts of Garcia and Victoria, and a little further away, Augusta, the city of Frederick II. This is also therefore, an extremely stimulating area, and the doctoral project of Giuseppe Borzellieri has emphasized the aspect of the landscape, on the one hand, and the particular impact of the large space of the hangar on the other. His project involves nothing more than a bordering trilithon structure which supports in corten walkways leading to the various floors, the rearrangement of the main staircase and very little else. The use of the building as a museum also offers the possibility of exhibiting a copy of the original airships.

In this particular case, the theme of the landscape is directly linked to the pre-existence of the hangar, which is the strongest feature of the building. From this point of view the landscape as such becomes less important and the massive, stimulating view of the sea forts more so.

In the peninsula where Augusta is located, next to the mainland, there is the Castle which is visible from the site where the hangar stands. For the visible space, for the perception of the landscape, for the visual horizons and for the presence of historical architectures among which the sea fortresses Garcia and Vittoria, the context which is, among other things, next to Megara Hyblaea, has a enormous value and has a great fragility.
Besides on the waterfront, in addition, to the south of the hangar, there is the Giuseppe Samonà Electric Central Enel, among the best known industrial buildings in Italy, still working, but on the point of being disposed. Enel society plans to transform this site into a Museum, exposing the internal structures of the building . This possibility, however, that is being explored by the Architectural design Doctorate, suggests more questions to develop. In addition to the restoration and upgrading of the buildings, the hangar and the Samonà Central and the historical architectures, there is the focal theme of the redevelopment of the landscape as a whole and, specifically, a framework that brings together natural values, “ab ovo” present, anthropogenic values, those of historical and newer architectures, already mentioned, and strong negative values, the result of a uncontrolled transformation, the most

glaring that our nation has registered, the transformation that has eroded resources and changed the facial appearance of the area. So to deal with Architecture means also to face, in a caring and different spirit, the context in which the architectures themselves "live". The context, in fact, made from "scraps" unresolved, suffers with major fractures, visual and material breaks. Among these, for example, the area intended to Esso, which at this time would need to design solutions to mitigate the very strong impacts.
Another node is related to the transformation and growth of the settlement system. Difficult node that should be dealt with the planning instruments to ensure not only ground zero consumption, but also strategies for integration between plan and project, based on the ecology of the landscape.

It is obvious that the examination of a monument involves a great many commitments, but as Kahn said, the creative process is enriched and not hindered by such commitments. This approach means that the architectural operation presents a particular theory, since only a theoretical operation can be transmitted and described, in the same way as a teaching operation; in our opinion, this is how every architectural project should be. We maintain that architecture is a branch of learning, with its own, consolidated statute.

We are well aware that there exist different points of view regarding the idea of theory. We must not forget the words of Aldo Rossi who states that there should be a theory of architectural design, with a fundamental point consisting in the study of monuments; other ideas regard architectural forms and the understanding of the city.

On the other hand, Purini states that theory should be mentioned only *a posteriori* and not *a priori,* since architecture is an artistic science, or a scientific art, which may include not only the creation of forms, with their unpredictability, but also the construction of a scientific apparatus.

As we have mentioned, these are different positions, but they all accept the idea of the fundamental role played by theory. There should be a logical foundation in planning, even though each project may involve something new and unconventional; in this context it is interesting to remember the quotation of Diaz by Martí Arís in "Le Variazioni dell'Identità" ("*The Variations of Identity")* "planning a new project involves going against a particular type of project by means of a logical decision" (in our own paper we might call this infringing the rules.)

With regard to theory, we would like to mention the last, brilliant paper written by Bernard Huet, on the state of theory in XXth century architecture, in which he underlines the difference between doctrine and theory, stating that most of the production of the XXth century is made up of various doctrines only. He, in fact, defines the difference between doctrine and theory, the first is what every architecture says he or she sees in architecture, it is the explanation of a point of view, of an attitude towards architecture, while theory involves the systematic organization of the knowledge regarding architecture and of architecture; this is what makes it possible to consider architecture as an intellectual product, in order to be able to construct a theoretical object known as "architecture" (starting from the elaboration by Leon Battista Alberti).

Both the doctrine and the theory involve a conscious, intellectual organization, always based on the three categories of Vitruvio: *firmitas, utilitas, venustas.*

We certainly shall not forget the doctrines regarding modern architecture; Monestiroli, for example, states that the last theoretical elaboration is the classical one. We all know the work "*Vers une Architecture"* published in 1923 and the 5 points for a new style of architecture presented by Le Corbusier in 1927, used in their entirety for the project regarding Villa Savoye.

Every elaboration, whether regarding theory or doctrine, involves a system of rules which are applicable as long as the elaboration lasts. Let us consider, therefore, not only the 5 points, but also the contemporary reading by Le Corbusier of the 4 compositions, by means of which he analyzed four villas (La Roche, Garches, Citrohan at Weissenhof, Savoye), using parameters based on the project procedures. But we must not forget Leon Battista Alberti, who believes in the correctness of the relationship between pillar and arch, since they both belong to the masonry system, whereas the column should be associated with trabeation, since it belongs to the architrave system. This involves a clear relationship between the architectural and the constructive system, which we will come to later.

A system of rules can be read during the analysis of a monument (this is Rossi's position) and form the basis of the project choices to be made with regard to the monument itself, as in the case of the projects under discussion.

On the other hand, we agree with Grassi that the main part of the branch of learning known as architecture is made up of all the forms of architecture either built or planned. Architecture, therefore, is taught through architecture, by studying, deconstructing, modifying past works. This is a position which makes it possible to prevent modern architecture, in its more fashionable forms, from being transformed into a purely artistic form.

As previously mentioned, nowadays we are faced more and more with an attempt to refer back to the avant-garde position of the beginning of the XXth century, which also saw the start of the M.M., which claimed almost absolute creative freedom, typical of artistic production, not intended to be "useful" to anyone, whereas architecture should basically be concerned with human needs. In this way, such movements completely ignore what, in my opinion, are the foundations of architecture; there are no forms without order, but only aggregations. We must not forget that for Kahn, as for Mies, form is order.

Writing of the relationship between order and construction, Kahn says:

"The project involves the composition of form into order. Form emerges from a constructive system. Growth is construction. The creative force exists within order. The unknown can be revealed to the architect by what space represents.

From order, he or she can obtain the creative force and the power of self-criticism in order to give a form to this unknown. Beauty will evolve".

Le Corbusier also considers the idea of order as fundamental; this can be seen in the long process of the Modulor, during the war years, with the desire to reach not only a measurement system linked to human beings, but also a harmonious relationship, such as the golden section, seen in many aspects of nature, and the Fibonacci series.

Another fundamental problem of architecture regards the *construction.* We remember in this sense the words of Perret, in the aphorisms making up his text *Contribution à une Théorie de l'Architecture.* "Construction is the mother tongue of architecture; the architect is a poet who thinks and speaks in construction".

"Architecture is the art of organizing space, expressing itself through construction".

For Le Corbusier too the construction is the heart of the foundation of the new architecture. For him, the bearing structure of the building coincides with its logical structure.

An architectural project, especially in the case of the doctoral thesis, must be scientific, analyzable in scientific terms, and must give a solid answer to the definition of *the project as an instrument of knowledge*, emerging from the fruitful phase of the elaboration, especially Italian, which has led to the profound transformation of schools of architecture from professional institutes to places of cultural reflection on this branch of learning and its foundations.

Here we are dealing with a restoration project, but we must not forget the definition of restoration as an architectural project; it is superfluous to mention that nowadays, the majority of projects are concerned with previously-built constructions.

In any case, the modification of the use alone, involving almost all the examples presented, is made up of a project.

In conclusion, the problem of the scientific character of the project, revealed very explicitly in certain positions, especially in Italy, to consider the theme, is faced in our own case by means of *reference to the rules of the building* (to be restored), which gives a connotation of *scientific* to the procedure followed, thus going beyond a merely "intuitive" practical position of the project.

Bibliographical References

AJROLDI, Cesare, *Monumento e progetto,* Officina, Roma 2005.
AJROLDI, Cesare, *Il restauro del moderno: un convegno a Palermo,* in *Il restauro del moderno in Italia e in Europa* (a cura di E. Palazzotto), FrancoAngeli, Milano 2011.
ARGIROFFI, Giulia, *Gli hangar per idrovolanti a Marsala, di Pier Luigi Nervi,* Dottorato di Progettazione Architettonica di Palermo (tutor C. Ajroldi), 2008.
BORZELLIERI, Giuseppe, *L'hangar per dirigibili ad Augusta,* Dottorato di Progettazione Architettonica di Palermo (tutor C. Ajroldi), 2013.
ROSSI, Aldo, *Progettare per i musei,* in *Teoria della progettazione architettonica,* Dedalo, Bari 1968.
GRASSI, Giorgio, *La costruzione logica dell'architettura,* Marsilio, Padova 1967.
MONESTIROLI, Antonio, *La metopa e il triglifo,* Laterza, Roma-Bari 2002.
PURINI, Franco, *Necessità, molteplicità e contraddittorietà della teoria*, in *Parametro* n.267, 2007, and *La scena nuova*, in *Arc* n.8, 2002.
ARÍS, Carlos Martí, *Le variazioni dell'identità: il tipo in architettura,* CittaStudiEdizioni, Torino 1994.
HUET, Bernard, *Sur un état de la théorie de l'architecture au XXe siècle,* Paris 2003.
Louis Kahn (a cura di R. Giurgola), Zanichelli, Bologna 1981.
LE CORBUSIER, *Œuvre complète 1910-29,* 8^{a} ed., Les Editions d'Architecture, Zürich 1965.
PERRET, Auguste, *Contribution à une théorie de l'Architecture,* in GARGIANI, Roberto, *Auguste Perret 1874-1954*, Electa, Milano 1993.

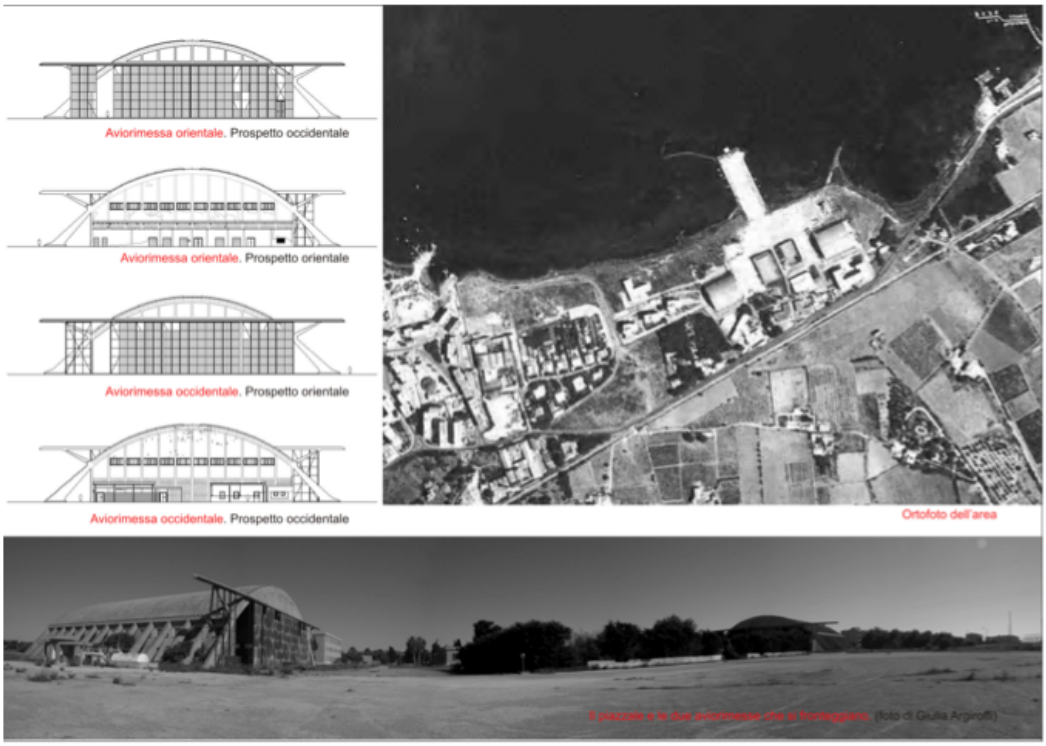

Fig. 1. Giulia Argiroffi, hangars in Marsala, drawings and views of the facto state.

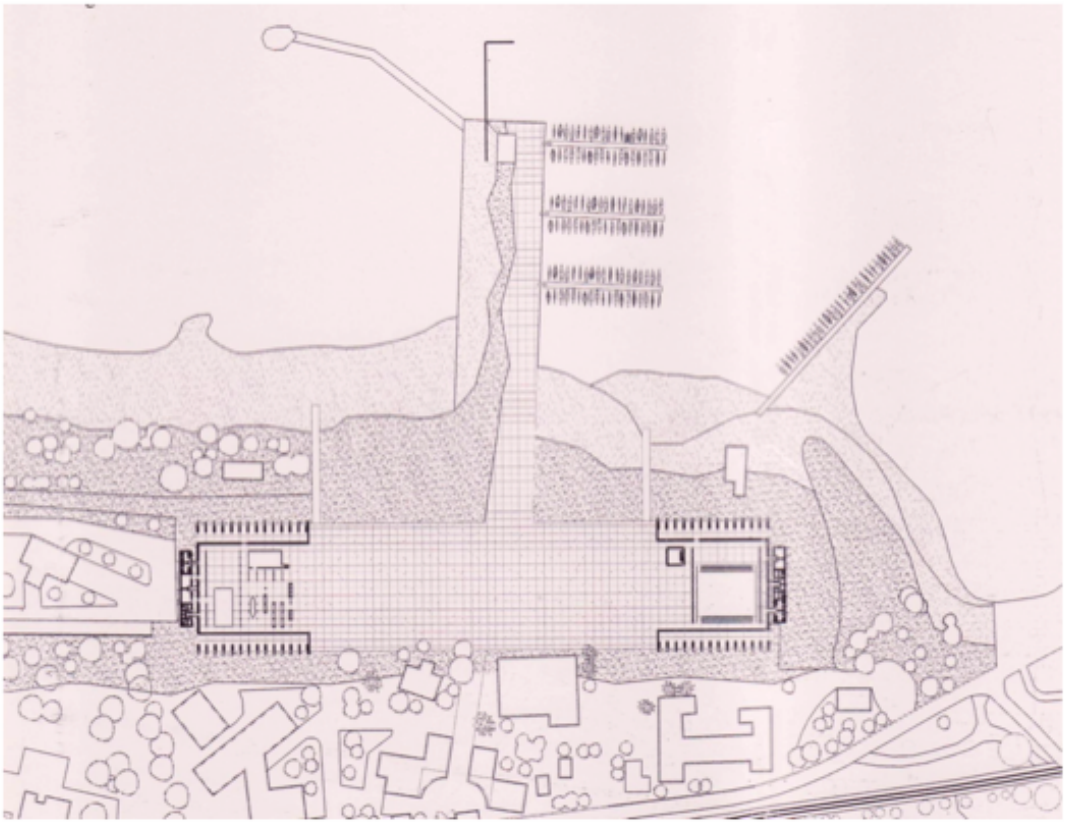

Fig. 2. Giulia Argiroffi, hangars project in relation with the landscape.



Fig. 3. The site of hangars in map of Marsala and the Stagnone, 1823.



Fig. 4. The Augusta hangar on the back with the fortresses Garcia e Vittoria.



Fig. 5. Giuseppe Borzellieri, design render



Fig. 6. Giuseppe Borzellieri, hangar project: perspective section.



Fig. 7. Map of Augusta, 1820 ca.: in red, from the left the sites of the hangar, the Enel Central, Megara Hyblaea

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The development of Bad Nauheim as Jugendstil spa complex

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Abstract
The buildings of the spa complex at Bad Nauheim (Germany) are among the most important examples of Jugendstil architecture in the world, but the place or the architect Wilhelm Jost are not mentioned in scientific works.
Salt water springs in this area were already exploited by the Celts and the Romans. The village of salt producers began to change into a spa in the first half of the 19th century, when the curative power of the salt water from wells was recognized.
At the beginning of 1900, changed hygienic and aesthetic ideas and expectations required the construction of new bathhouses. At that time, Bad Nauheim belonged to the Grand Duchy Assia-Darmstadt. The Grand Duke Ernst Ludwig of Hessen had commissioned artist of Jugendstil to decorate rooms of his New Palace in Darmstadt, and had summoned seven artists of Darmstadt to found an artist's colony. The new spa complex of Bad Nauheim absorbed the ideas emanating from Darmstadt, and the layout of the whole town was arranged according to the modern precepts of Darmstadt Jugendstil.
The paper describes the transformations and reuse of Bad Nauheim until nowadays, and analyzes typologies and decorative motives of the spa complex, excellent example of early Jugendstil in Germany, from the point of view both of history of architecture (Elena Manzo) and geometrical and morphological analysis of elements (Manuela Piscitelli).

Keywords: Spa architecture typologies, thermal city, Jugendstil, kursaal.

1. Best practices, conservation and management of architectures for spa tourism. The exemplary case of Bad Nauheim in Germany* (Elena Manzo).

On the basis of estimated objectives, it is now recognized that, today, thermal baths are one of the largest and most productive fields of the economic balance of the each nation[1].
The recovery of their historical and cultural identity, as well as their validation as a heritage to preserve even more than businesses that offer health and beauty treatments, a network of protected or marked sites has been developed, that has been able to awaken an intense movement of tourists.
Thus, the historical-anthropological approach has proved particularly effective in their revaluation, especially when it is thinking in terms of the economic potential of their architectural heritage. Thermal baths, in fact, thanks to the activation of a series of related multiple activities and services and supported by careful development policies, have played an important role in the tourism industry[2].
Spas, which were initially made popular during the Roman times and rediscovered between the fourteenth and fifteenth centuries, have lived intermittent and conflictual phases: during the Grand Tour, they were travel destinations in Italy, as well as other regions of Europe, as an upmarket resort for the bourgeois élite from England and Germany (consider Ostend, Baden-Baden, Bath, Monte Carlo). Finally, they reached their period of maximum splendor and development in the late nineteenth century, when the urban land expansion of the Industrial City was organized on the basis of

homogeneous areas and gave rise to new types of architecture, responding to advances in science and technology as well as changes to social needs[3].
Similar to bridges, stations, department stores, headquarters of new institutions, galleries, even the baths were the mirror of the emerging bourgeois class but their typological schemes were able to obtain models from the ancient repertoire.
Thus, the shape of the plan of the whole hydrotherapic factory was simplified not only to ensure a clear distinction between the areas frequented by women and men, but also to allow more joint and a faster connection between different rooms, which was increased with those primarily intended for social activities and entertainment, such as reading rooms, restaurants, or, as in the case of the Kursaal with dance halls, theatres, casino and other rooms for recreational activities[4].
On the other hand, the area reserved for ablutions, the model of which was traditionally composed of *caldarium*, *tepidarium* and *frigidarium* and where, in the ancient Roman Empire, also activities of social and political-economic relations took place, as well as exchanges in the space reserved for private moments and intimacy. The bathroom becomes private, reserved exclusively for a single guest or, at most, for three people and, therefore, equipped with single tanks and *séparé*[5].
Modern thermal baths, therefore, were founded while the Industrial city was consolidating, namely when the hygienist culture emphasized the importance of the therapeutic and curative properties of water and, just like the seaside resorts, the awakened interest in the health and physical well-being increased and promoted more frequent building programs for mineral springs.
Looking for an ideal climate, pristine water sources, soothing landscapes, intimate atmosphere, escape from daily routine, the thermal baths were proposed as an alternative to the urban chaos.
Developing as autonomous cities or suburbs, according to a phenomenon very similar to what had been the basis of *Company Towns*, they are built around a self-sufficient urban organism, whose morphological choices are traceable to common interpretative categories: on the one hand, the rooms for health treatments, with appropriate structures and modern irrigation and ablution systems and leisure rooms, on the other, the organization of open spaces, where long arcaded paths, made in brick or wood or iron and glass lightweight structures, were built among parks and gardens, according to the fashion of the time. This is the case, for example, of Vichy, renovated by Napoleon II, like a grand *Villes d'eaux*, making a prevalence of gardens and green areas and the architecture or Baden-Baden, which integrates itself with surrounding nature of the Black Forest .
On the other hand, Camillo Sitte had suggested to his contemporaries that «From the point of view of hygiene, the answer seems simple: more green is better. Thus, everything has been said. However, the same is not true for art, for which there should be due care on where and how to resort to greenery. Making use of this in the new neighbourhoods of modern villas is the most frequent and fortunate application of villas: in the famous fortified walls of Frankfurt am Main, in the urban parcelling of Wahring near to Vienna, on the edge of the old town of Dresden, as in the residential neighborhoods of all thermal cities, such as Wiesbaden, Nice, etc..»[6]
Among the greenery, that sanitary engineering culture considered a healing and purifying element like water, rest areas were designed and outfitted, with scattered pavilions for tea or reading, sports facilities and chalets, which suggested the icons of the Alpine or seaside resorts, the Cassa Armonica or the Kursaal, more and more frequently, in isolated locations in relation to the residential and treatment buildings. Every individual building or architectural element today should be considered monuments of these new types of extra urban settlement, like cathedrals, fountains, castles, monuments of the traditional city.
In contrast to the so-called “Towns of Work”, following the categories suggested by Max Weber, a system of attraction poles emerges, represented by the “Spa Towns” as new sites for the bourgeois and elite tourism. They were the “Leisure Towns”, that put together the pleasure of the *otium* and the taste for social entertainment with the therapeutic treatment for the body and mind care. Thus under the pretext of care and physical well-being, the main value of the bourgeoisie in the second half of the nineteenth century, the new class emerging made its free time “fruitful” and “profitable”, without having any scruples of unproductive idleness.
The awakened interest in architectural, structural and technological aspects of the Thermal baths emerges since studies of the contemporary scientific assays and books. French manuals are rich of examples, consider the attention given by the *École des Beaux-Arts* as well as the numerous competitions, organized for the *Grand Prix de Rome*, or the texts of M. Durand-Fardel, J. François, P. Planat, to name a few[7]. In Italy, however, this topic has had a significant systematization in the “treaty” of *Il Costruttore*, published between 1886 and 1907, in the repertoires offered by the *Enciclopedia delle Arti e Industrie* as well as in the important volumes edited by Daniele Donghi. However, wide resonance can be found in the pages of some of the most important magazines of that time, such as, in particular, *L'Edilizia Moderna* and *Rivista di Ingegneria Sanitaria*[8].
Today, the spa towns are known by the term most widely Spa, so called from the Belgian town Spa, southeast of Liege, famed for its healing cold springs that has been frequented since as early as the 14th century but in the second half of the 19th century, it underwent an enormous development and

became a destination prized by the country's aristocracy or bourgeoisie as well as those of its neighbours. Moreover, the first casino in the world was founded here, with building being started in 1763 by the prince-bishop of Liege.
However, by the early decades of the twentieth century, spa buildings have had a gradual and progressive decline; but, in the last twenty years, as previously stated, are again at the centre of revaluation of programs. This is due to a renewed interest in the physical care prompted by anti-aging medicine, which calls for the "prevention" of treatment and even more importantly, the management of their own health in terms of "promotion" and "exploitation" of conditions of physical well-being. In addition, it is now an established fact that State investment in the spa industry has important results due to the economic return on both a national and local level, in terms of increased tourism and employment. a wider interpretation of the idea of the tourist resort spa has therefore developed, which, among others, has shown that the thermal system produces a significant increase in jobs. In Italy, in particular, the experience of the other more advanced European countries in this area have undertaken legislative programs to facilitate management tasks, such as the passage of the former spa Eagat from the state to local authorities.
In May 2010, the European Historic Thermal Towns Association (E.H.T.T.A.), approved by the Council of Europe was recognized, with it being an International network aimed at the valorisation and preservation of the thermal cultural heritage in Europe to promote some routes towards approved important spas as well as to find a new strategy to increase a dynamic cultural thermal tourism[9].
It is implicated in the realization of showing «unique urban personalities of the towns by drawing on their common points: a thermal culture, which, in all its variety and local characteristic differences can truly be called European», of encouraging «the integrated development in thermal towns and to preserve their cultural and architectural heritage, in return for experiences at a European level», of promoting «the network, in close collaboration with the European institutions and with the support of European programs», of encouraging «the research development, analysis, studies and statistics in the thermal sector, in particular history, artistic and cultural heritage» and of «creating a new development strategy for the thermal sector which will take into account the potential for culture and tourists, contributing to the economy of the culture and the aim to achieve the objective of the Lisbon strategy»[10].
On these topics, Bad Nauheim could be considered an interesting and explanatory example. Bad Nauheim, known as Bathhouses of Hessen's State Spa, is a small town situated in the western part of Germany close to Munich, whose salt water springs were exploited by the Celts and Romans, which have been the reason for its economic welfare and its tourism to date. Although Bad Nauheim never lost its vocation linked to the exploitation of water and thermal resources and is one of the most important examples of Jugendstil architecture of spa in the world, it is understudied and is not mentioned in many scientific works of architectural history, since until 1981 most of its buildings had fallen into neglect. The river USA overflowed and seriously damaged many buildings, above all the *Sprudelhof* (Courtyard of the Major Spring), that was the landmark of the thermal city and the Bathhouses with their ornamental courtyards.
The Grand Duke Ernst Ludwig of Hessen and Rhin, extraordinary figure of enlightened sovereign sensible to culture and art, especially to Jugendstil, was the soul and mentor of the project, that was stared while the Darmstadt Artists' Colony in Mathildenhöhe was developing under the leadership of Joseph Maria Olbrich with the collaboration of several important artists of the Art Nouveau in Darmstadt, including Peter Behrens, Paul Bürck, Rudolf Bosselt, Hans Christiansen, Ludwig Habich and Patriz Huber.
Bad Nauheim, in fact, was planned between 1902 and 1912. Wilhelm Jost (1874-1944), *Großherzoglicher Regierungsbauinspekto*r (Building Inspector of the Government) at the Grand Duchy of Hesse, was the Director of the project, based on a uniform and organic design, which included the health resort. Graduated from *Tecnoche Hochschule Darmstadt*, Jost had a prestigious fame from the experience of the Bad Nauheim that, in the 1912, when he was just a member of the *Deutscher Werkbund*, was appointed City Planner to Halle[11]. Under his direction, a large number of artists were involved in carrying out the whole thermal complex, including Johann Josef Belz (1873-1953), the sculptor Ludwig Habich (1872-1949), who was one of the founding members of the Darmstadt Artists' Colony and among the "first seven" artists who took part, Heinrich Jobst (1872-1952), his successor at the newly establishment teaching workshop for applied art of Darmstadt, the Austrian painter Fritz Hegenbart (1864-1943), best known for his works of graphic and publicist based on grotesque and allegorical subjects, especially those which appeared in the *Jugend* magazine, the architects Leonhard Kraft (1876-1965) and Albert Marx (1877-1977), Ernest Riegel (1871-1941) who was the most important goldsmith of the Munch Jugendstil and so clever to win the gold medal at the Universal Exhibition of 1900, the *Regierungsbaumeister* Heinrich Petry (1880-1940)[12]. Most of these artists, seventeen of which worked on the design and execution of *Sprudelhof*, worked on Mathildenhöhe too and were members of the Darmstadt Artists' Colony.





Fig. 1: Bad Nauheim trasverse axis to the *Sprudelhof.*
Fig. 2: Bad Nauheim, the plan with the indications of 1. Library - 2. *Sprudelhof* – 3. Technical buildings – 4. Nursery Garden - 5. Station – 6. Trinkkuranlage or “Pump Room” complex – 7. Kursaal and Theater – 8 Beneke fountain.



Fig. 3: Bad Nauheim, *Sprudelhof* and the long pedestrian street from the station to the park.

Sprudelhof could be considered the main building of Bad Nauheim and one of the most significant examples of Jugendstil in Germany. It was built between 1905 and 1912, it is possible to see on the shaft of the columns, upon which the date of the construction of the arcades surrounding a large rectangular courtyard is carved. Located just in front of the station, *Sprudelhof* is a place where there are the spaces for the thermal treatments: seven Bathhouses in which there are both, on the first floor, 240 bathroom cubicles, cells for royalties, new fountain basins and, on the ground floor, halls, ballrooms and restaurants. The long arcade running around the perimeter of the rectangular courtyard, delimiting it, unifies the buildings, which are linked to the German tradition of living and of construction but the decorations conform the whole complex to the Jugendstil.
The courtyard has the value of the square. In fact, a large stone fountain welling thermal water with gardens surrounding are in the centre. A long pedestrian street, an imposing perspective axis, crosses the court, cutting it, and visually connects the station, that is the point of arrival in Bad Nauheim, with the surrounding park, where there are scattered buildings – *Stadtbücherei* (the Library), *Gärtnerei* (tha gardening and horticulture), *Trinkkuranlage* (the mineral water complex, so called the "Pump Room" complex), *Kurhaus* (the Kursaal) with the theater, *Benekebrunnen* - and some artificial lakes.
The fountain, made by the sculptor Heinrich Jobst, is decorated with allegorical subjects carved in stone, such as cornucopias or baskets of fruit, that symbolise copiousness and benevolent nature, which allude to the management and government of the Grand Duke Ernst Ludwig and promise health and well-being to the patients gathered around the spring[13]. It consists of two adjacent stone circles, supported by a base with figures of young males and females, represented with classical bodies. There are two springs of carbonated thermal saline water inside and, on the top, there is the Hessen's coat-of arms.
From 1910 to 1912, while the *Sprudelhof* was being built, the *Trinkkuranlange* was finished too. It was a horseshoe-shaped closed on big courtyard where there is a rectangular water basin with a shell-bandstand for the orchestra behind it. It is possible to see all the thermal city from here. The drinking hall or so called "Pump Room" is inside. It was a place for social gatherings.
The architectonical language used for the main buildings of the *Trinkkuranlange* is more classical than that of the *Sprudelhof* and this is because the aim of Jost was to inspire simplicity, calm and peacefulness.
As in the Darmstadt Artists' Colony, the influence of the theories of John Ruskin and William Morris is also evident in Bad Nauheim, especially the idea of achieving the "Guild of handicrafts". These two places are the expression of how the Grand Duke was able to realize his ambitious motto «My Hesse (my country) is to flourish, and the arts are to flourish in it». Everything is coordinated in accordance with the principle of *Gesamtkunstwerk*, which is the total artwork professed by Henry Van de Velde and both are, on the one hand, the recovery of *Heimatkunst*, interpreted nationalistic, that is as "the art of fathers and ancestors", on the other, the most progressive expression of art in this region of Germany. However, if the Darmstadt Artists' Colony famously consists of all different houses, built according to the plans of each artist, that is one of the its main qualities, Bad Nauheim was characterized by a strong formal and stylistic homogeneity.





Fig. 4: Bad Nauheim, *Sprudelhof.* Decorations on the pilasters of the arcade.
Fig. 5: Bad Nauheim, *Sprudelhof.* Dates carved on the shafts of the columns.



Fig. 6: Bad Nauheim, *Sprudelhof*. The fountain made by Heinrich Jobst.



Fig. 7: Bad Nauheim, the Jugendstil fountain in the park.

The theme of water is the Common denominator of the decorations and it emphasizes the uniformity of the composition. Thus, the atmosphere of Bad Nauheim is reassuring and magic, just like in a fairy tale but, at the same time, recalls the ancient technique of carving in the medieval cathedrals. Marine subjects, such as shells, crabs, fishes, octopuses, waves and mythological figures, in fact, are represented in every architectural elements, especially in the *Sprudelhof*, where the Tuscan capitals of the pillars of the arcades and their projection on the pilasters are different from each other, repeating a rhythmic sequence.
Jost, as it has been pointed out, «[…] had originally planned wide wall friezes with figures compositions for the upper zones of the administrative buildings and Bathhouses; but he eventually decided in favour of wave-like horizontal patterns cut into the render and incorporating gilded spherical shapes reminiscent of carbon bubbles rising from mineral waters. This is a much more abstract ornament than the original scheme, and many have been influenced by Olbrich's ornamental decorations of around 1900. Architects like Olbrich also taught Jost to make each façade different, so that a visitor walking round a building is constantly surprised by a new view. Jost used this formal device particularly in the administrative buildings»[14].
The *Kurhaus*, namely the Kursaal, although is the result of different projects, is a homogenous building which is perfectly integrated with architectonical language of the thermal site. It has been just built in 1864 and in the 1880 it was added with theatre and with wider restaurant and terraces.
In 1900, it was necessary to satisfy the requirements of a multipurpose complex room, for increasing visitors and for a wide variety of musical performances, festivals, conventions, which factors contributed to the enrichment of the building's role both in the thermal complex and in the city. In fact, between 1902 and 1904, Jost began the extension and a new concert hall, which, today is the theatre, conforming the language of his buildings and that one Neo-Renaissance of old ones behind a long arcade. At the same time, he established an architectonical dialogue with the surrounding park and with the *Sprudelhof.*
Inside, all is in Jugendstil design but the influence of Viennese Secession is evident, especially the reference to Josef Hoffmann.
So, the project's concept is extremely simple and clear and the final result is the most important Kursaal in Hessen.
Bad Nauheim began working by 1981 and, recently, has been admitted to the European "Réseau Art Nouveau Network" as the first German city.





Figg. 8-9: Bad Nauheim, Bathhouses for a couple or a single guest in the *Sprudelhof.*





Fig. 10-11: Bad Nauheim, Kursaal



Fig. 12: Bad Nauheim, *Sprudelhof*. A inner courtyard of the Bathhouses.



Fig. 13: Bad Nauheim, *Sprudelhof*. The main hall of the Bathhouse 3.

Notes

[1] COHEN, BODEKER (2008); VIRGINTINO (2013).
[2] BACON (1997), pp. 173-187.
[3] About these themes, see SICA (1992), vol. II, pp. 970-1016; BOSSAGLIA (1984-'86), 3 voll.; BREGANZE (1993); DINALE (1993).
[4] SADDY (1985); MANGONE (2003), vol. 1, pp. 487-501.
[5] Cfr. MANGONE (2004), pp.287-297.
[6] SITTE (1980) p. 131.
[7] DURAND-FARDEL (1862); FRANÇOIS (1863); PLANAT (1898). See also: LEMOINE (1998), p.97.
[8] *Il Costruttore* (1886-1907), ad vocem *Bagni*; PARETO (1894), vol. VI, ad vocem *Stabilimenti balneari, bagni*; DONGHI (1894).
[9] EHTTA. See also BACHERI (2012).
[10] See the website www.culture-routes.lu
[11] SPRANGER, *(*1983), vol. 48; ADAM, (1998), 25, pp. 1440–1443; HÖLZINGER, USLULAR-THIELE, (2005); HOMAGK (2013).
[12] HÖLZINGER, USLULAR-THIELE (2005).
[13] Ivi, p. 25.
[14] Ivi, pp.42-43.

***Credits:**
English translation by Sacha Anthony Berardo
Photographic reference: Elena Manzo

2. Documenting spa architecture. The complex of Bad Nauheim. (Manuela Piscitelli)

2.1 Elements and typologies of spa architectures

The origins of spas and balneology can be seen in the antique era, especially in Roman thermal baths, as it is still testified by numerous remains of public baths in the territory of the Roman Empire, in Rome, Pompeii, Baiae, Trevir, Baden-Baden, Bath, Bulla Regia, Timgad, etc. These baths are closely related to other structures that had over the centuries become standard elements of spa architecture (balnearium, nympheum, stoa, colonnade, vaporarium, valetudinarium, lavatrine, latrine).

This tradition never got lost, and many older spa location underwent renovations during the Baroque and Classicism era, but a real boom of spas could be seen in the 19th century. For numerous spa locations, this can be identified as a "golden era". The main spa centers grew up in large fashionable, globally famous spa centers as Karlovy Vary, Baden-Baden, Wiesbaden, Bad Ems, Spa, Vichy, Aix-les-Bains, Biaritz, Bayonne, San Sebastian.

A second boom, in the period known as Belle Époque, is attested by magnificent Neo-Baroque and Art Nouveau style complexes built in many spa locations as Vichy, Contrexéville, Bad Nauheim, Bad Kissingen, Bad Elster, Karlovy Vary, Mariánské Lázně, Teplice, Jáchymov, Poděbrady, Luhačovice, Jeseník.

The new indications about diverse healing treatments determined the structural and architectural appearance of spa facilities, thus leading to the creation of specialized spa buildings with particular structural forms, such as spa houses, large spa complex called *Stabilimento* in Italy, *Bain* in France, *Kurhaus* in Germany; inhalatoriums; warbling places; colonnades; pavilions; drinking halls; conversation halls; casinos; theaters; and overnight accommodation places. All these specialized structures put together form a typical spa architecture. Direct exploitation of the healing power took place either directly at the source, as in the case of springs, or in the surrounding buildings.

From the mid-1850's, the appearance of many large bath houses was modeled after ancient thermal houses with a private courtyard in the middle, the interior oriented towards the courtyard portal's corridor, giving access to individual rooms partitioned from the main room by anterooms with bathtubs adjacent to the main portal.

The original bath house composition with the central elevated pavilion and side-wing pavilions remained fashionable until the 20th century.

The need of structures capable of providing protection against unfavorable weather to a greater number of visitors, and simultaneously were suitable for socializing and promenading determined the use of long colonnades. The interpretation of the pure lines of antique compositions in the form of colonnades found application primarily in Germany during the first quarter of the 19th century in spa complexes like Baden-Baden, Wiesbaden, Bad Pyrmont, Heiligendamm, Lauterbach, Puttbus; as well as in the Anglo-Saxon localities as Cheltenham, and Leamington Spa.

The architecture of most spa locations has become the symbol of cultural integration in the European environment. Spa towns made enormous effort to build up luxurious, magnificent spa complexes that were to become their "attraction", not only by their architectural elements, but also by the quality of the treatments they provided, always using the latest medicinal knowledge and scientific methods. Their magnificent interiors combined extraordinary comfort with state-of-the-art medical technology.

Many spa towns represent unique architectural complexes with numerous historically valuable elements and objects. In many case they still demonstrate extraordinary integrity and authenticity, as well as preservation of their genuine urban and architectural value and spa functions, with historically buildings still used for spa operations.

In addition, the most prominent spas cities have a special *genius loci* that is accountable to their unique architecture. Many spa locations combine the health treatments with the beauty of natural environment, creating unique complexes and compositions where natural and man-made structural elements give the convenient comfort of the spa environment.

Documentation of spa architecture can thus be relevant to preserve and valorize exceptional testimony of cultural tradition, buildings, technologies, landscapes of European identity.

2.2 The spa complex of Bad Nauheim

The complex of Bad Nauheim, with its Art-Nouveau architecture and cosmopolitan characteristics, is one of the well-known spas of Europe.

The design of this genuinely unique Art Nouveau complex - Sprudelhof and Trinkkuranlage, Kurhaus and Theater, Inhalatorium, Trink-kuranlagen, Thermalsolebad, Kurhaus, Gradierwerke - is due to the architect Wilhelm Jost, who was able to realize the ideas of the Grand Duke Ernst Ludwig of Hessen and Rhin.



Fig. 14 Johann Vincenz Cissarz, “Bad Nauheim”, 1904. Promotional poster in Jugendstil graphic style.

Jost had the opportunity to study important modern spa layouts and furnishings built at the turn of the century at Berlin, Bad Elster and Karlsbad.
The landmark of the city of Bad Nauheim is the “Sprudelhof” (the Fountain Courtyard) which surrounds the bubbling mineral springs, justifying Bad Nauheim's vocation as a city of health.
The “Sprudelhof” creates a total work of art, which includes both the train station and the one kilometre distant Johannisberg. His basic concept was an artistically sophisticated frame of the main springs. An avenue should lead the arrivals from the train station over the spacious staircase, on whose sides are located the administration buildings, characterized by an elaborate and complex design.
The eye is drawn to the “Große Sprudel” (Large Fountain) and moves from there across the vast courtyard and the historic “Kurpark” (Spa Gardens) up to Johannisberg.
That means that the Sprudelhof is not only the centre of the new spa complex, but it is also the focus of the axis leading from the railway station to the town. In this way, the layout of the whole town was arranged in accordance with the modern precepts of Darmstadt Jugendstil.
Even if the continuation of the urban axis from the station to the large circular fountain is the centre of a symmetrical layout, this overall regularity is broken by a variety of interior courtyards and irregular details.
The curving roofs, portals and ornamental surfaces textures superimpose Jugendstil lines on a more classical overall design, while the varying heights, particularly of the roofs, create a diverse overall complex.
Between 1905 and 1911, immediately next to an existing park, Jost built the central engine hall including the boilers, a laundry and new buildings for operations of the salt production. Being functional buildings they are cut off from the spa complex proper by the railway line. They are carefully designed, even if they are functional buildings, and integrated in the overall layout, like an entrance for the spa visitors, even at the back of the station.



Fig. 15 The axis from rail station, passing through the Sprudelhof, till the spa gardens.

Jost also integrated his major buildings in the overall layout of the town, in particular the Pump Room Complex which replaced a covered iron hall. Jost created an inner area, made of horseshoe shaped walks, closed off from the road, but open on the adjacent park to the north.
At the first glance, many features of the central courtyard are reminiscent of late 18th century. But the clear arrangement of a path leading down a wide flight of steps into the courtyard with the basin of the Major Spring is not just reminiscent of baroque layouts, as it is also a variant of the layout plan of the 1901 exhibition by artists' colony at Darmstadt.
Two phases can be discerned in German Jugendstil: an early one, before 1900, that is mainly floral in character, rooted in English Art Nouveau and Japanese applied arts and prints; and a later, more abstract phase, growing out of the Viennese work of the Belgian-born architect and designer Henry van de Velde.
In Bad Nauheim both kind of decoration, natural and abstract, are represented.
The various ornaments are made up of organic forms as well as the geometric shapes typical of the style of the Vienna Secession. Common of all these ornaments is the subject of water, its plants, animals, and the mythological figures associated with it. Architecture, sculptures and garden design combine in a total work of art, rooted in the decorative principles of Jugendstil.
Jost was helped in the design of the complex by the sculptor Heinrich Jobst, Jakob Julius Scharvogel and Wilhelm Kleukens.
The many different stone sculptures used as architectural decorations represent another variant of Jugendstil. Aquatic animals, tritons and small mermaids decorate capitals, door frames and friezes in a humorous fashion. They are reminiscent of Munich rather than Darmstadt models, for example book illustrations or other graphic works.
Portals, quoins at the corners, mansard roofs, gables and large roofs turrets are only a few of the features in the modernised baroque style that Jost used here. But his buildings are not neo-baroque in the sense of an historical revival; all stylistic elements are reinterpreted from a Jugendstil perspective, and he reduced ornamentation to a few significant examples.
The treatment of the corners with their pilasters follows the formula of past architectural styles, yet the ornaments are more freer and modern.
The facades are decorated with wave-like horizontal patterns incorporating gilded spherical shapes reminiscent of carbon bubbles rising from the mineral water. This kind of abstract ornament may have been influenced by Olbrich's ornamental decorations of around 1900.
Stylized waves and bubble-like shapes are the leitmotiv of the Bad Neuheim spa, appearing also in ornamental details of the balustrades in the arcades, and even in the simple geometric ornaments of the fingerplates on the doors.
Regarding the prevalent colours, the interplay of grey shell limestone and rough white render, red roof tiles and the green bronze cladding of the roof turrets and gutters, creates a cheerful ensemble of contrasting colours. The stained glass present a prevalence of blue, recalling the water as most of the decorative motifs.



Fig. 16 Decorative motifs with stylized waves and bubble-like shapes.



Fig. 17 Decorative motifs on the pilasters of the arcade.



Fig. 18 Doorways recalling baroque models, reinterpreted with patterns and sculptural shapes inspired to Jugendstil.



Fig. 19 Doorways with geometrical decorations and sculptural shapes inspired to Jugendstil.

3. Bibliographical References

ADAM Hubertus, *Verhaltene Modernität. Wilhelm Jost als Stadtbaurat in Halle*, in “Bauwelt”, Jahrgang, 1998, 25, pp. 1440–1443

BACHERI Emilio, QUIRINO Nicola (edited by), *Rapporto sul sistema termale in Italia*. 2012, Milano: FrancoAngeli, 2012

BACON Willem, *The rise of the German and the demise of English spa industry. A critical analysis of business success and failure*, in “Leisure studies”, 1997, 16 (3), pp. 173-187

BOSSAGLIA Rossana (edited by), *Stile e struttura delle città termali, Bergamo: Nuovo istituto italiano d'arti grafiche*, 1984-’86, 3 voll.

BREGANZE Marino, *Urbanistica e città termali*, Rimini: Maggioli, 1993

COHEN Marc and BODEKER Gerard (edited by), *Understanding the global spa industry. Spa management, Amsterdam*, London: Butterworth-Heinemann, 2008; Virgintino Daniela, Spa management. Scegliere, gestire, lavorare nel benessere, Milano: Tecniche nuove, 2013

DINALE Sergio, *L'urbanistica delle città termali: analisi e prospettive*, Padova: Francisci editori, stampa 1993

DONGHI Daniele, *Manuale dell’architetto*, Torino: Unione Tipografico-Editrice, 1894

DURAND-FARDEL Maxime, *ad vocem Bain chez les anciens*, in “Dictionaire Général des Eaux Minérales e d’Hydrologie Medicale”, Parigi 1862

EHTTA, *Discovering the European Route of Thermal Heritage. 25 towns in Europe, Culture, Art, Architecture, History*, www.spatourisme.be/sites/341-ehtt-basdef_en_anglais.pdf.

FRANÇOIS Jules, *Notes pour servir à l’histoire des travaux d’amélioration des eaux minérales françaises*, Parigi 1863

HÖLZINGER Hiltrud A.M., USLULAR-THIELE Christina, *Jugendstil in Bad Nauheim*. Königstein im Taunus: Verlag Langewiesche, 2005

HOMAGK Mathias, *Gebaut habe ich genug.“ Wilhelm Jost als Stadtbaurat in Halle (1912–1939)*, Halle an der Saale: Hasenverlag, 2013

Il Costruttore, trattato pratico delle costruzioni civili, industriali e pubbliche, delle arti e industrie attinenti, Milano 1886-1907

LEMOINE Bertrand, BONFANTE-WARREN Alexandra, *Architetture in France. 1800-1900*, New York: Abrams, 1998

MANGONE Fabio, *Architettura e urbanistica. Città termali italiane ed europee tra fine Ottocento e primo Novecento*, in LERONARDI Andrea, HEISS Hans (edited by), Turismo e sviluppo in area alpina, Trento: StudienVerlag 2003

MANGONE Fabio, *Architettura eclettica nelle città termali: tipi e iconografie*, in Loretta Mozzoni, Stefano Santini, Il Disegno e le Architetture della città eclettica, Napoli: Liguori editore, 2004

PARETO Raffaele, SACHERI Giovanni (edited by), *Enciclopedia delle arti e industrie*, Torino: Unione tipografico-editrice, 1894

PLANAT Paul Amédée, ad vocem Casino, *L’Encyclopédie de l’architecture e de la construction*, Parigi 1898

SADDY Pierre, *Le casinò*, in “Villes d’eaux, 1985

SICA Paolo, *Storia dell’urbanistica. L’Ottocento*, Roma-Bari: Laterza, 1992

SITTE Camillo, *Der Städte-Bau nach seinen Künstlerischen Grundsätzen*, trad, it. Renato Della Torre, L’arte di costruire le città. L’urbanistica secondo i suoi fondamenti artistici, Milano: Jaca Book, 1980

SITTE Camillo, *Der Städte-Bau nach seinen Künstlerischen Grundsätzen*, trad, it. Renato Della Torre, L’arte di costruire le città. L’urbanistica secondo i suoi fondamenti artistici, Milano: Jaca Book, 1980

SPRANGER Britta, *Jugendstil in Bad Nauheim. Die neuen Bade- und Kuranlagen und ihr Architekt Wilhelm Jost*, in “Quellen und Forschungen zur hessischen Geschichte”, vol. 48, Darmstadt –Marburg: Selbstverlag der Hessischen Historischen Kommission, 1983

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Revitalization of Port Area as an Effort to Preserve the Identity of the City Comparative Studies: Clarke Quay-Boat Quay Singapore Albert Dock Liverpool and Sunda Kelapa Jakarta

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Abstract
Literally, revitalization has been regarded as an understanding of an activity or an effort to vitalize back an area within city or part of the city which was vital before. An area need to be revitalized because this area had been suffered or has degradation in infrastructure, utilities, as well as socially and economically. The process of revitalization of this area includes improving physical, economic and social aspects. Revitalization approach must be able to recognize and exploit the potential of the environment (history, meaning, unique location and the image of the place) that supports the local wisdom of an area or region. An effort of revitalization will support the identity of the city.

An activity of an area's revitalization as well as building's revitalization should be applied through a variety of aspects from physical and non-physical. In this case, physical aspects will include building form itself and its infrastructure, and non-physical aspect will be related to social, economic and culture of the community who live within surrounding area. It is intended to deliver positive impact for the surrounding area, particularly to enhance the quality of the environment and the community as well.

In the theory of revitalization which has been related to urban planning, revitalization could be categorized as a highly complex activity. In the implementation of revitalization, it is not only related to buildings, but also related to the area and the surrounded environment which will be linked to urban planning.

This paper is a comparative analysis between the three case studies in the application of revitalization concept for port area which has been known as an icon as well as an identity of the city. Case study of Clarke Quay-Boat Quay Singapore has been conducted as a succeeded case study of revitalization for port area in Singapore. On the other hand case study of Albert Dock Liverpool has been conducted to represent as an old area which has been designated as grade 1 of conservation area in Liverpool. And finally, the third case study is Sunda Kelapa Port in Jakarta, as an old town of Jakarta which had been designated as a conservation area in Jakarta. As a conclusion, it will be delivered a characteristic of three of port areas as an identity of the city.

Keywords: revitalization, port area, preservation, identity of the city

1. Introduction
In the activity of conservation either area's conservation or building's conservation, there are some terms to be underlined as follow: conservation, preservation, adaptation, conversion and revitalization.

Either revitalization or conservation, both of them have the same objective. Those activities have aimed to conserve and preserve historical sites/ areas or historical old building which become an icon or an identity of the city. Although both of those activities have the same objective, they are also having different concept in the understanding and the implementation. If the concept of conservation will be implemented to an object such as old buildings for example, on the other hand the concept of revitalization will be implemented not only to old buildings but also to historical sites/ areas. Literally, revitalization has an understanding as an activity to re-vitalize a function of an area which is lack of utility and not livable anymore.

Purwantiasning in her research about Conservation and Economic Development (2004) stated that conservation can be defined as a breathing life into old buildings, especially those that have the character of historical and has a meaning for a city. This surely cannot be left without any effort to preserve it. But the old buildings will not only require preservation efforts without referring back to the original function of the respective historical masterpiece. To this old buildings need to be breathed a life, thus that the figure of concrete is no longer like meaningless blister plant, but could be kept alive and give each image in accordance with its character.

Rypkema and Tiesdell (1996) in their book about revitalization of old buildings in cities, alleging that the old historic buildings mostly does not have adequate utilities so that the building is not feasible and does not have a value in accordance with their respective functions. The weakness in most of the old buildings in the end causing the buildings not functioned as it should be. With all those problems, revealed various efforts to revive old buildings in some countries that have historic building legacies. One example is in United Kingdom especially in the city of Liverpool, the town that has a lot of old buildings. From this background, then the research was started so that the success of the city of Liverpool, one of the cities in the United Kingdom which has many old buildings may be adopted by Indonesia, as a country which also has many old buildings were abandoned. Certainly can always remember about a statement that a great nation is a nation that always appreciates its legacies of history.

Furthermore, Purwantiasning in her article about “Aplikasi Konsep Konservasi Pada Kawasan Bantaran Sungai Studi Kasus: Clarke Quay” – “An Application of the Concept of Conservation on the River’s Banks, Case Study: Clarke Quay”, has discussed that the areas of conservation which have been regarded as an old historical sites with lack of utilities and not livable anymore, could be revitalized as a new place with new function. This effort will support the condition of social, economic and culture of the area. And as a result the succeed implementation will improve the quality of the environment as well as the quality of the human being within the area.

Revitalization is not only an activity which has been oriented to the physical solution, but also has an aim to enhance the economy of the community as well as their culture. To implement the activity of revitalization, there are some parties who need to be involved, because it will not work by government’s fund only, the roles of the community and their involvement are important as well. It should be underlined that the involvement and the roles of community will become main component of the activity of revitalization.

Basically, the activity of area’s revitalization in Indonesia has begun since 2001 which has been regarded as a sustainable program by central government which had delivered a stimulus fund to the local government. By delivering the program from central government, local government should be encouraged to enhance and improve the condition and the quality of historical sites within their city and could maintain their city as an identity of the city.

2. General Definition of Conservation and Preservation

In the 19th century, a jurist of the University of Copenhagen, Denmark, JJA Worsaae said that, *“Big nation is a nation that does not just look at the present and the future, but would like to turn to the past in order to see their passed historical journey”*. Similar to the speech above other expression emerged which confirmed by philosopher Aguste Comte with his tagline *“SavoirPour Prevoir*”, which means studying the past, see the present, to determine the future. Looking at the past that expressed by looking the physical existence of ancient building is certainly not only by seeing the figure of physical building solely, but the value of its history which attached to and wrapping it as a culturally meaning. Because the appearance of this meaning-wrapper can joined to determining the identity for urban area functioned in the future.

However, the problem that arises is how close we will be able to understand the term “Conservation”, which is now has undergone a change comes up with a new term, “Old-Historical Building”. In fact the

term conservation and preservation itself, has been used with various meanings. Preservation is a type of intervention aims to protect and repair of historic buildings, and in general the preservation term is widely used in America (USA). Similarly, the Conservation is an action to keep intact to as much as possible of the existing historic building's elements, one of them is with the traditional repair method, or with synthetic materials and current technology, and the term of conservation is more widely used in the UK and Australia (Larsen, 1994). With its diversity of understanding, finally other opinions appearing regarding about the preservation term as an effort to create or bringing back something where exactly as the original state without any change, including efforts to prevent the destruction, while in conservation term, conservation is an effort to conserve old building, efficient the usage and set the direction of development in the future. Even in the Burra Charter, conservation definiton may include all maintenance activities and in accordance with local conditions and situations and may also include teh act of: preservation, restoration, adaptation, reconstruction and revitalization (Purwantiasning, et al, 2013).

3. Illustration of Revitalization

Revitalization in Indonesia could be defined as an activity to preserve cultural heritage without doing any changes. For example, the activity of revitalization in Indonesia could be shown in the revitalization of Prambanan Temple in Central Java. As one of impact from natural disaster in 2006 – earthquake – the revitalization of Prambanan Temple was aimed to restore the authenticity of the cultural heritage of Prambanan Temple and to strengthen the structure which could be accounted in historical aspect, archaeological aspect as well as the technical effort in preserving a cultural and historical heritage. On the other hand, Borobudur Temple also one of historical temple which had been revitalized, but these days Borobudur Temple had degraded in quality, thus Borobudur needs to be revitalized again. Local government as well as Central Government have concerned with this condition, because Borobudur Temple has been regarded as the biggest Buddhist Temple which has high historical value. The potential spiritual value of Borobudur Temple and the surrounding environment have encouraged government either local or central to get some funding from many sources either from local or international who concern about historical heritage

The activity of building or area revitalization could be implemented through some aspects from physical or non physical. Physical aspect will cover the form of the building itself including the infrastructure within the building and non physical aspect will be related to social aspect, economical aspect and cultural aspect from the community who live in the surrounding areas of historical site. It is aimed to give positive impact to the area itself and surrounding area, particularly to improve the quality of the environment as well as the community. Thus could be concluded here, that the activity of revitalization should be related to the role and involvement of the community itself. The needs and interest of the community could be delivered into this activity. The program itself could be combine one to another within community development program through revitalization program.



Fig. 1*: Complex of Fatahillah Museum which is regarded as a part of Jakarta Old Town. This area is one of designated conservation area which had been chosen by government as an object for revitalization of historical heritage.*
Source: Private documentation, 2013

4. Revitalization of Historical Site

In the theory of revitalization, revitalization cannot be separated from urban planning. Related to urban planning, revitalization could be defined as a complex activity which should be related to some

aspects and parties. In the implementation, revitalization is not related only to the building, but also related to the surrounding area and environment within it. In the implementation of revitalization, it should carry out through several stages and will require certain period of time. It because in this activity will need some different thought and understanding in some aspects. Stages in revitalization will cover some important things as follow:

1.1 Physical Intervention

Physical intervention is an initial physical revitalization activity and will be implemented in stages, will cover the improvement and enhancement of the quality and physical condition of the buildings, green line, transportation system, signage and open spaces within historical site. Referring to the statement that image of the area is related to visual condition of historical site, thus this physical intervention will be needed to attract visitors. Issue of environment particularly sustainable environment become an important matter, thus this physical intervention should concern about environmental context.

1.2 Economical Rehabilitation

Revitalization which has been initiated with the process of urban artefact rejuvenation should support the process of economical rehabilitation activity. The improvement and enhancement of physical area in short period should accommodate economical activities either informal or formal (local economic development). These economic activities should enhance the value of urban area. In the context of revitalization, there should be delivered mixed use function within historical sites which will support the activities of economical and social within area (new function or new vitality).

1.2 Social Revitalization

The successful of revitalization could be indicated by the environment itself, the environment should become an interesting place to be visited, the environment should be a liveable place for the community surrounding historical area. It is not about a beautiful place after revitalization, but it is about how the place becomes an identity of the city which could bring positive impact to improve the quality of life for the community either social life of the community or economical life of the community.

Ridwan Kamil in his article has stated that an area could be revitalized if the place has some reasons as follow:

a. Degradation of economical activity
b. Degradation of spatial and physical quality of the buildings
c. Degradation of the image of the historical area
d. Lacking of area's infrastructures

5. Case Study of Clarke Quay and Boat Quay

Boat Quay and Clarke Quay is one of several conservation areas in Singapore. This area has been designated as an area of conservation since many years ago. Today the area of Boat Quay and Clarke Quay become place of interest for tourist either domestic or international. This area had been changed from an old port area to be an interesting commercial and business area in Singapore.

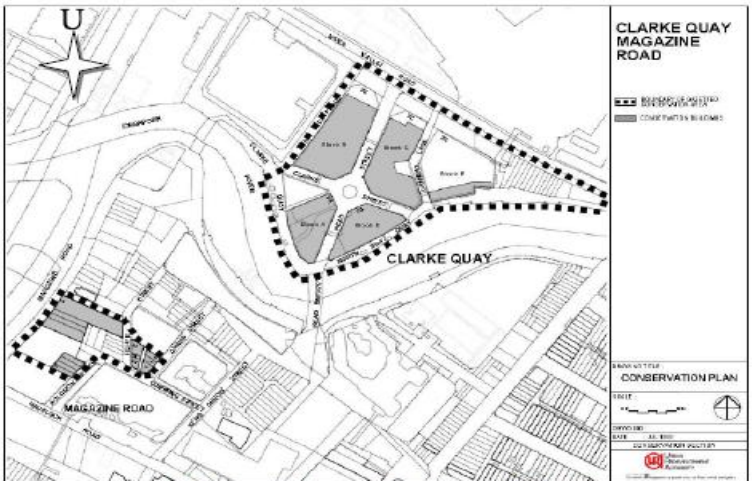

Fig. 2*: Map of Clarke Quay and Boat Quay area. This area had been designated as conservation area in Singapore*
Source: Urban Redevelopment Authority, 2013

Condition of this area before revitalization was very bad; Singapore River was a dirty river which supports the lacking of infrastructure of this area. Boat Quay and Clarke Quay used to be a port area which had many fishermen's boats and local traders. This condition had made the river full of economical activities and the condition of the buildings all the way Singapore River was very bad. The buildings were lack of utility, the areas were lack of infrastructure, and the buildings were almost completely destroyed. This condition had encouraged government to see the potential of this historical site as port area. By delivering revitalization program, the area of Clarke Quat and Boay Quay had been changed dramatically; the improvement of building appearances, the quality of economical aspect, social aspect as well as cultural aspect had been improved gradually.

The activity of revitalization within Boat Quay and Clarke Quay was based on conservation consideration from Urban Redevelopment Authority (URA) which has a specific criteria and requirement to decide which buildings of areas that feasible to be preserved or conserved. An area could be designated as an area of conservation if the area has some criteria such as specific character, historical value; the area will contribute in enhancing and improving the quality of the buildings as well as the surrounding area.



***Fig. 3a, 3b, 3c**: The condition of Boat Quay and Clarke Quay before revitalization*
Source: Urban Redevelopment Authority, 2013



***Fig. 4**: Colourful buildings within area of Clarke Quay*
Source: Private Documentation, 2013

Based on the above requirements, the area of Boat Quay and Clarke Quay had been designated as a conservation area, because this area have specific historical value and this area could be regarded as a combination of several cultures from Chinese, Indian, and Malay. It has been shown in the form of the buildings within area. As a result of the revitalization of this area, this area becomes colourful and livable, and become an interesting place to be visited as a tourism place.



Fig. 5a, 5b*: Buildings within area of Boat Quay, the buildings used to be warehouse of port area, but today those buildings had been revitalized become new function as bars, restaurants, and cafes.*
Source: Private Documentation, 2013

6. Case Study of Albert Dock Liverpool

Different country should have a different ambience and different environment. As the biggest port area in England, Albert Dock in Liverpool will represent the succeeded of the implementation of revitalization concept in England. As one of several designation area of conservation, Albert Dock in Liverpool has a specific character to be observed. As we recall, this port area has been known as a place that Titanic had been berthed many years ago before sinking.

Generally, city of Liverpool after World War II had been faced by destroyed environment including housing, business district and the city center as well. Within 1950s and 1960s, Liverpool had been encouraged to redevelop its city center and the neighborhood particularly housing for the community which is feasible and affordable such as flats. After the highly development within city within 1950s and 1960s, Liverpool had been declined economically and socially within 1970s and 1980s, it because the economical recession. This condition had affected the city of Liverpool. Liverpool became abandoned city in the past 1980s and become the highest unemployment city in England.

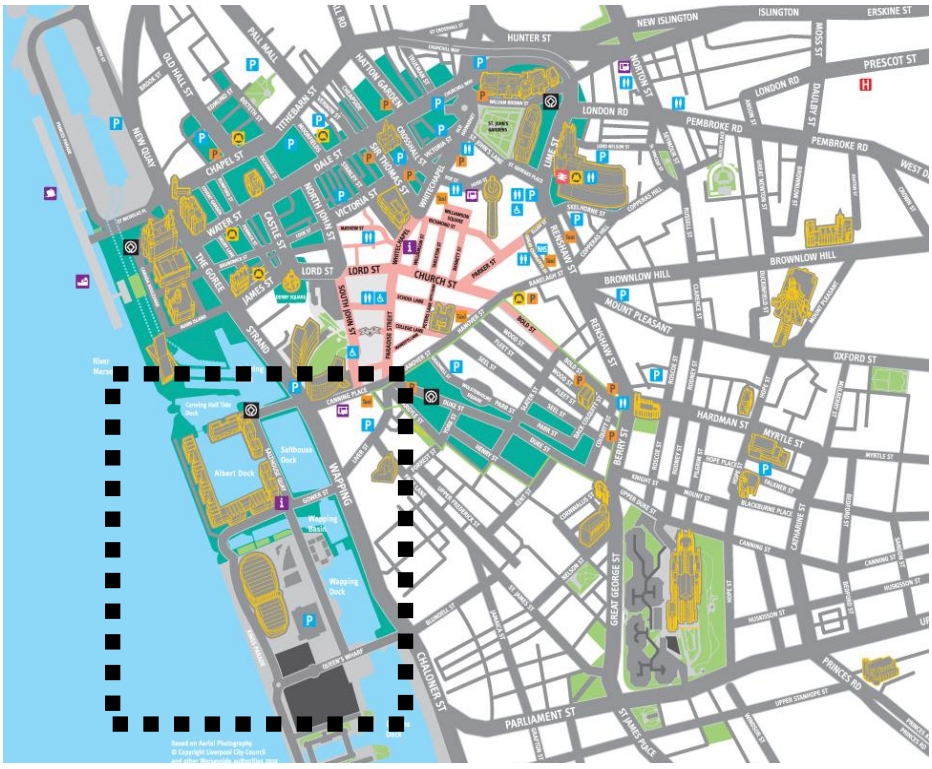

Fig. 6*: Map of Albert Dock area. This area had been designated as conservation area in Liverpool*
Source: http://www.myliverpoolconference.com, 2013

On the other hand, in the same year 1980s, area Albert Dock which has been regarded as dock and warehouse area in Liverpool had been designated as a historical area by local and central government. The activity of revitalization in Albert Dock area has been implemented in stages. New function within area which covers leisure (bars, restaurants, cafes), business (rental offices, shops), residential (rental apartment, hotel) and entertainment (museums, gallery) had been delivered. This concept has a similar concept with port area in Singapore-Boat Quay and Clarke Quay. Central government had seen the potency of the area and develops it as a commercial area. By delivering a concept of revitalization within area, the historical site of Albert Dock will not altered and remains the same atmosphere without changing the character of the buildings and potency of the surrounding area.



***Fig. 7a, bb**: pictures of old Albert Dock in 1930s and 1980s, left picture shows the condition of Albert Dock which full of fisherman boat, crowded and the buildings look like abandoned buildings. And the right picture shows the face of another side of Albert Dock area.*
Source: http://www.chesterwalls.info/gallery, 2013

It has been stated that area of Albert Dock has been part of Liverpool's landscape for over 160 years and remains a key feature of Liverpool's world-renowned Waterfront. Several old buildings within area of Albert Dock and Waterfront had been designated as a Grade I listed old building status in 1952 in Liverpool and become a conservation area in 1976. Those buildings had been transformed with new function in the early of 1980s and had been developed into the most popular tourist attraction and place of interest for domestic and international tourist. The changing of Albert Dock and the surrounding area will encourage most of private sectors to invest their fund. This condition will improve and enhance the quality of the area as well as the community within the surrounding area of Albert Dock. The historical and architectural importance of the Albert Dock become a special character of Liverpool City. This area of Albert Dock remains the same as an identity of the city of Liverpool. Tourist either domestic or international will feel the ambience of the Albert Dock as a former port in Liverpool.



***Fig. 8a, 8b**: Today's pictures of old Albert Dock, left picture shows the view of Albert Dock which still remains the same character of red bricks and red pillars, this row of building consist Tate Gallery, Museum of Maritime, Cafes, Restaurants and Bars. And the right picture shows the face of another side of Albert Dock area which consist new modern building – Museum of Liverpool which contextual with the character of waterfront area.*
Source: Private Documentation, 2013

7. Case Study of Sunda Kelapa Jakarta

Sunda Kelapa, Jakarta is a part of Jakarta Old Town Area which has been regarded as a conservation area in Jakarta. Sunda Kelapa is a former name of Jakarta, is has been known as a port area in Jakarta. Sunda Kelapa was an important place because this place is a heart of Jakarta as economical activities had been centered within it.

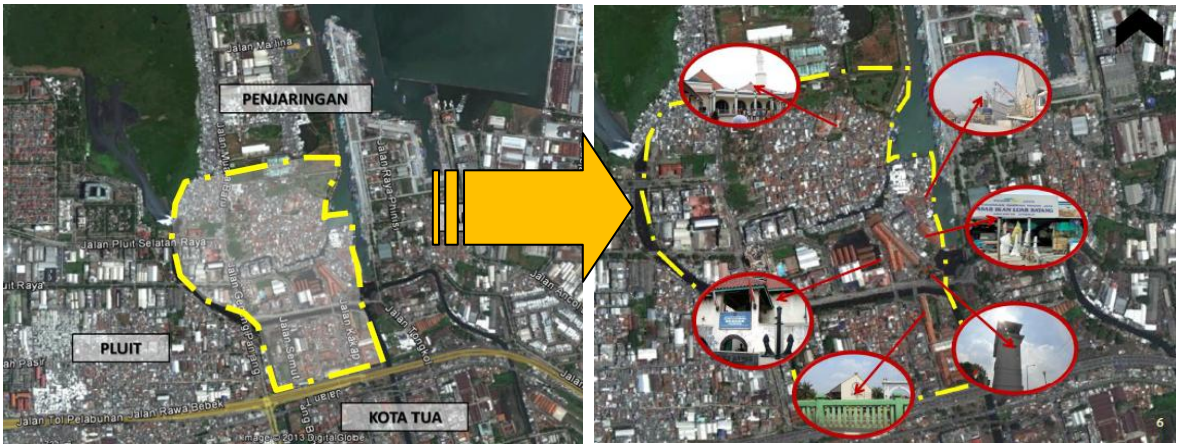

***Fig. 9a, 9b**: Map of Sunda Kelapa area. This area had been designated as conservation area as part of Jakarta Old Town Area. Left picture shows the area of Sunda Kelapa, and the right picture shows several old buildings within Sunda Kelapa area which have been designated as a listed old building.*
Source: Google Earth, 2013

Today, Sunda Kelapa has been known as a tourism area which deliver some attraction within area. The area of Sunda Kelapa has several place of interest such as Menara Syahbandar (harbor tower), Museum Bahari (Maritime Museum), Sunda Kelapa Port Area, Galangan VOC (VOC Dock), Masjid Luar Batang (Mosque). These old buildings have been designated as a listed old buildings within Jakarta Old Town Area. The condition of these buildings are relatively bad, physically these buildings need to be revitalized. Several proposal either from private sectors or NGO who concern about historical sites had been submitted to government, but there are still no significant action has been implemented.

By presenting two case studies in Asia – Singapore and in England – Liverpool, researcher will gain more experiences to present some alternatives solution for better quality of Sunda Kelapa area. Sunda Kelapa area has many potency to be explored, thus this will become main commodity for Jakarta particularly and Indonesia generally.



***Fig. 10a, 10b**: Today's view of Sunda Kelapa area. Left picture shows the Museum Bahari (Maritime Museum) view from Menara Syahbandar (Harbour Tower). Right picture shows the situation of Sunda Kelapa Port with building material's freighter.*
Source: Private Documentation, 2013

Several buildings within Sunda Kelapa area had been transformed into new function. For example, Galangan VOC which used to be a ship workshop, had been transformed into restaurant and cafe. And in the future, Museum Bahari (Maritime Museum) will be revitalized into new function as an outdoor cafe which still keeping the atmosphere of the museum. This building used to be a warehouse

of herbs and spices, but then to maintain the character of the building, central government had been designated and transformed the building into new function as a museum. Learning from several experiences from other countries, the revitalization of old buildings should improve and enhance the quality of the building itself economically and socially. Thus in this research, researcher will try to deliver new concept of the transformation of Museum Bahari as a commercial building to maintain the character of the building.



***Fig. 11a, 11b**: Today's view of Museum Bahari. Left picture shows the inner court of Museum Bahari (Maritime Museum) view from inside the buildings. Right picture shows the view of Museum Bahari's interior.*
Source: Private Documentation, 2013

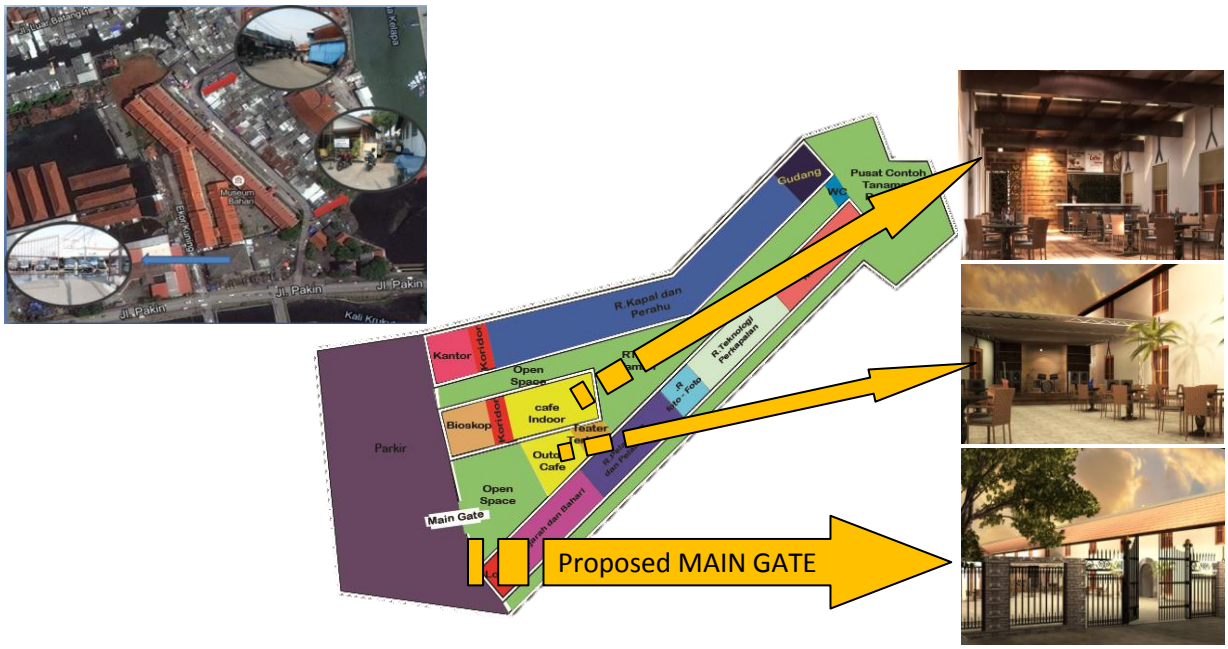

***Fig. 12**: Proposed revitalization program for Museum Bahari in Sunda Kelapa area. Right pictures from above to below: proposed indoor café, proposed outdoor café, proposed main gate*
Source: Analysis result, 2014

Conclusion

Learning from the successful revitalization concept in England with applications in several historic cities, and learning from the above case studies, then Indonesia could adopt the above concept by applying the concept of revitalization in some areas generally and Sunda Kelapa Jakarta particularly were considered as historic areas to enhance their quality of build environment.

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Bibliographical References

[1] ANONIM. *Sejarah Perkembangan Kota Tua Jakarta*. Kotatuajakarta.org.
[2] ATMADI, P. Arsitektur dan Pengembangannya di Indonesia. Universitas Gadjah Mada Press. 1997. Yogyakarta. Indonesia.
[3] BARNETT, Winston and Cyril Winskell. *A Study of Conservation*. London: Routledge. 1977.
[4] BUDIHARDJO, Eko. *Conservation and Restoration*. Gadjah Mada University Press. Yogyakarta. Indonesia. 1991
[5] BUDIHARDJO, Eko. *Konservasi Arsitektur sebagai Warisan Budaya*. Gadjah Mada University Press. Yogyakarta. Indonesia. 1997d.
[6] BUDIHARDJO, Eko. *Revitalisasi Pusat Kota Lama*. Gadjah Mada University Press. Yogyakarta. Indonesia. 1997e.
[7] BUDIHARDJO, Eko. *Arsitektur Pembangunan dan Konservasi*. Djambatan. Jakarta. Indonesia. 1997f.
[8] BUDIHARDJO, Eko. *Preservation and Conservation of Cultural Heritage in Indonesia*. Gadjah Mada University Press. Yogyakarta. Indonesia. 1997g.
[9] Dinas Tata Kota DKI Jakarta. *Rencana Induk Kota Tua Jakarta: A Vibrant, Diverse, and Living Cultural Heritage District*. PSUD. 2007.
[10] HEUKEUN, Adolf. *Historical Site of Jakarta*. Yayasan Cipta Loka Caraka. 2000.
[11] JONES, AN & LARKHAM, PJ. The Character of Conservation Areas. Report commisioned from Plan Local for the Conservation and Built Environmnet Panel. London: Royal Town Planning Institute. 1993.
[12] KAMIL, Ridwan. *Strategi Revitalisasi Kota-Kota Asia Dalam Konteks Persaingan Global*. Artikel ridwankamil.wordpress.com. 27 September 2008.
[13] LARKHAM, PJ. *Conservation and the City*. London: Routledge. 1996.
[14] LIN, EM. Adaptive Reuse of the Historic Boat Quay Singapore River, Singapore. http://web.mit.edu/akpia/www/AKPsite/4.239/singa/singa.html. without year.
[15] ORBASLI, A. *Architectural Conservation*. Blackwell Publishing. Singapore. 2008.
[16] PURWANTIASNING, Ari Widyati. *Konservasi dan Perkembangan Ekonomi*. Bias Arkade. Jakarta. Indonesia. 2004.
[17] PURWANTIASNING, Ari Widyati. *Sebuah Pemaparan Tentang Konsep Konservasi di Inggris.* Jurnal Arsitektur Universitas Pancasila HIRARCHI. Volume 1 Edisi 2. November 2004. Universitas Pancasila. Jakarta. Indonesia. 2004.
[18] PURWANTIASNING, Ari Widyati. *Konversi Bangunan Tua Sebagai Salah Satu Aplikasi Konsep Konservasi.* Jurnal Arsitektur Universitas Muhammadiyah Jakarta NALARs. Volume 8 Nomor 2. Juli 2009. Universitas Muhammadiyah Jakarta. Jakarta. Indonesia. 2009.
[19] PURWANTIASNING, Ari Widyati. *Aplikasi Konsep Konservasi Pada Bantaran Sungai Studi Kasus: Clarke Quay.* Jurnal Ilmiah Teknik Sipil dan Arsitektur Universitas Negeri Yogyakarta INERSIA. Volume VI Nomor 2. Desember 2010. Universitas Negeri Yogyakarta. Yogyakarta. Indonesia. 2010.
[20] PURWANTIASNING, Ari Widyati & MAULIANI, Lily & AQLI, Wafirul. *Tipologi Konversi Bangunan Tua di Pusat Kota Studi Kasus Pecinan di Singapura dan Petak Sembilan di Jakarta.* Jurnal Arsitektur Universitas Muhammadiyah Jakarta NALARs. Volume 11 Nomor 2. Juli 2012. Universitas Muhammadiyah Jakarta. Jakarta. Indonesia. 2012.
[21] PURWANTIASNING, Ari Widyati & MAULIANI, Lily & AQLI, Wafirul. *Building Conversion as an Application of Old Building Conservation, Comparative Studies: China Town Singapore, Petak Sembilan Jakarta.* Proceeding International Seminar Genius Loci. Universitas Negeri Makassar. 14-16 Februray 2013. Universitas Negeri Makassar. Indonesia. 2013.
[22] PURWANTIASNING, Ari Widyati.*Designation of Conservation Area as an Effort to Preserve a Local Wisdom, Comparative Studies: Chester England and Tenganan Pegeringsingan Bali.* Proceeding of International Seminar Genius Loci. Universitas Negeri Makassar. 14-16 Februray 2013. Universitas Negeri Makassar. Indonesia. 2013.
[23] REYNOLDS, J. *Conservation Planning in Town and Country*. Liverpool: Liverpool University Press. England. 1976.
[24] RTPI. *The Character of Conservation Areas*. A Commisioned Study. London: RTPI. 1994.
[25] SURJOMIHARJO, A. Sejarah *Perkembangan Kota Jakarta. Dinas Museum dan Pemugararan Propinsi DKI Jakarta*. Jakarta. Indonesia. 2000
[26] TIESDELL, S, Oc, T & HEATH, T. *Revitalizing Historic Urban Quarters*. Oxford:Butterworth. England. 1996.

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Requalification of historic buildings with special reference to the typological, technical and energetic aspect of collective residences

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Abstract
The theme of the requalification and reuse of historical and architectural heritage is a topic of great interest in a country like Italy, where many of the public functions are located in buildings of the past, for the excellent location and for the socio-cultural value that they have had over the centuries.
From here comes the interest of an investigation to improve technical and energetic performance of historical student residences in Pavia.
These buildings were constructed in very different historical periods compared to the times we are living. Today student residences should not only provide shelter, but they must "accommodate" students by offering them space in which to study, where to meet and share experiences.
The aim of this work is the definition of a useful tool for assessing the condition of a collective residence based on objective parameters through which define the possible actions on the same.
The assessment tool is organized in thematic areas, requirements and indicators to which are assigned different weights depending on the different incidence. For each thematic area are identified the requirements that must be met, and its system of indicators, which are associated the scores; the tool returns an overall score, determined by the sum of the partial scores for each thematic area. The different scores can determine the strategies and action priorities.

Keywords: Rehabilitation, Reuse, Assessment, Student residence, Performance

1. Introduction
The issue of requalification and reuse of historical and architectural heritage is a topic of great interest in a country like Italy, where many public functions are located in the buildings of the past, for the excellent location (often in the center of the city) and the socio-cultural value that have taken over in the centuries. These are buildings (sometimes entire blocks or parts of town) that have become benchmarks not only for the community living in them daily, but also of the entire Italian population and, in some cases, their reputation has been beyond national borders.
Considering that approximately 40 % of the artistic and architectural heritage of the world is in Italy , it is easy to understand that the requalification and reuse of this heritage is a challenge but also an opportunity for substantial growth . The challenge is the need to work in buildings and urban spaces of conscious and respectful of its history and identity , in order not only to preserve the image quality, but also to improve it. The opportunity for its development is given by the great "demand" of the culture that exists in today's society, where the possibilities of travel have increased in the past and said "cultural tourism" motivates thousands people (including students) to exhibitions, events and places that produce culture, motivated by the desire to share and learn and the desire to close the gap between him and the object of culture. The identity of Italian culture, at this time in search of survival and recovery, see precisely in the new forms of relationships between heritage and users new opportunities for development.



Fig. 1: Orthophoto of Collegio Cairoli.

From this awareness, the research group of the University of Pavia (coordinated by prof. Alessandro Greco) conducts researches on requalification and reuse of historical and architectural heritage, with special attention to the historic buildings used by university students, such as student residences managed by EDiSU (Organization for the Right to University Study).
Pavia is a small town (about 65,000 inhabitants) in northern Italy whose the University has a history of over 650 years; the life of the city is so closely linked to that of the University, attended by over 22.000 students, many of whom come from other regions and from other States. To this demand for temporary residentiality, the EDiSU responds by offering around 1,400 beds in 10 student residences located in the city, some of them in the centre of the city and others in more suburban areas. Among these student residences some have historical origin, such as Collegio Castiglioni (1429), Collegio Cairoli (1783) and Collegio Fraccaro (1800), that result to be inadequate under the typological, technical and energetic aspects.
This paper presents the theoretical foundations and the methodology used in the research phase for the requalification of an historic university student residence of Pavia: the Collegio Cairoli.

2. Energy improvement of historical and architectural heritage

The historic buildings now play a greater significance to the community compared to what happened in the past when it was hard to identify their importance. Such constructions in fact, beyond their beauty and the recognition of their value, are essential as bearers of our historical identity, testimony of the period in which they were built.
Although, sometimes, the legislation allows invasive interventions not recognizing the building in question enough important to make it the subject of protection, however appropriate, considering the historical value that covers, subjecting it to a real restoration.
In the restoration, as is known, does not lie the solution more economic or practical, but the one most appropriate to the quality and value the object, by definition unique, unrepeatable and unrecoverable once it is been irreversibly damaged.
The category of so-called historic buildings, including both buildings defined cultural heritage, both worthy of being passed down to their historical-documentary or artistic value, contains a comprehensive set of buildings and consequently, a considerable variety of characteristics, values and constraints.

The amplitude of the topic makes it difficult to establish interventions operationally valid, for the inability to govern such variety in a limited time. In order to establish a practical way to proceed, it is therefore necessary to define the scope of investigation, focusing on a specific area, which allows to restrict the variables.
The limitation of this research to student residences in Pavia, a field of investigation limited by the geographical point of view to a region with own legislation on the subject, and limited from the point of view of the type of building to historic buildings typical of the area, allows to assess in detail the operations that are compatible.
The interest for these buildings, beyond the variety of characteristics they have, comes from the fact that today are often subjected to transformation operations, in order to make them appropriate to the needs of the present.
At present can not be ignored the carefully evaluate to energy aspects of the restoration project, though, for the analysis of the regulatory framework at international, national and regional level, this type is excluded from the scope.
The restoration intervention will not be so transformed, but only enriched by a component necessary today that, when integrated with other aspects of restoration, not be more invasive but placed evenly throughout.
In the first place there must be compatibility between the intended use and building; result essential verify that the selected function does not require a reversal of the physical substance and form of the building to be restored, not only in terms of loads, but also what are the facilities and microclimate conditions necessary for the establishment of such a function.
Reasoning to the scale of the building it is possible to evaluate every single technological element, every system and every bioclimatic device, in order to propose interventions that are compatible with the possibility to modify parts of the building object of intervention.
It follows that, analyze the characteristics of the building and taking into account the regulations, you will have to assess whether and which interventions are practicable.
In this sense it is important to understand where to stop: it is not always possible to find a meeting point between conservation and energy upgrading.

3. Typological and technical improvement of historical university

To achieve a good design on the intervention of the typological and technical improvement of a university residence is essential to understand what are the current needs of users: university students.
To do this it was necessary a temporal analysis of various university residences, taking into account both the Italian and European experiences.
To allow a comparison between the different entities, has been prepared a card - type which have been identified the particular characteristics of the university residence buildings. For each project are explained the technical data, space-time, quantitative and qualitative data based on the development of some parameters.
These are:
- Place. The geographical parameter reveals the residential tradition established in different countries and makes it recognizable the cultural and projectual matrix.
- Time. The historical data is important to understand the pattern of spatial organization in relation to economical and political trends of the society that has produced the space.
- Characters morpho-typological. The compositional and formal indicator is closely linked to the previous two, because it’s determined by the building traditions of a place or of a given period.
- Quantitative data. The dimensional aspect is a fundamental parameter on both the quantitative and qualitative terms of the project. It is also able to determine the level of socialization of users and their interaction with the environment.
- Localization in the area. The university residence requires a high degree of integration with the environment, such as to establish three types of relationships at three different scales: relations with the region, relations with the structure of the city and relations with the university.
- Qualitative characters of the building. Through the reading of elements such as the provision of services and facilities you can determine the degree of attractiveness of the residence.
- Qualitative characters of residential spaces. The data for the model of organization of the group, the type of group rooms and their approval, allow to identify the size and modes of socialization.

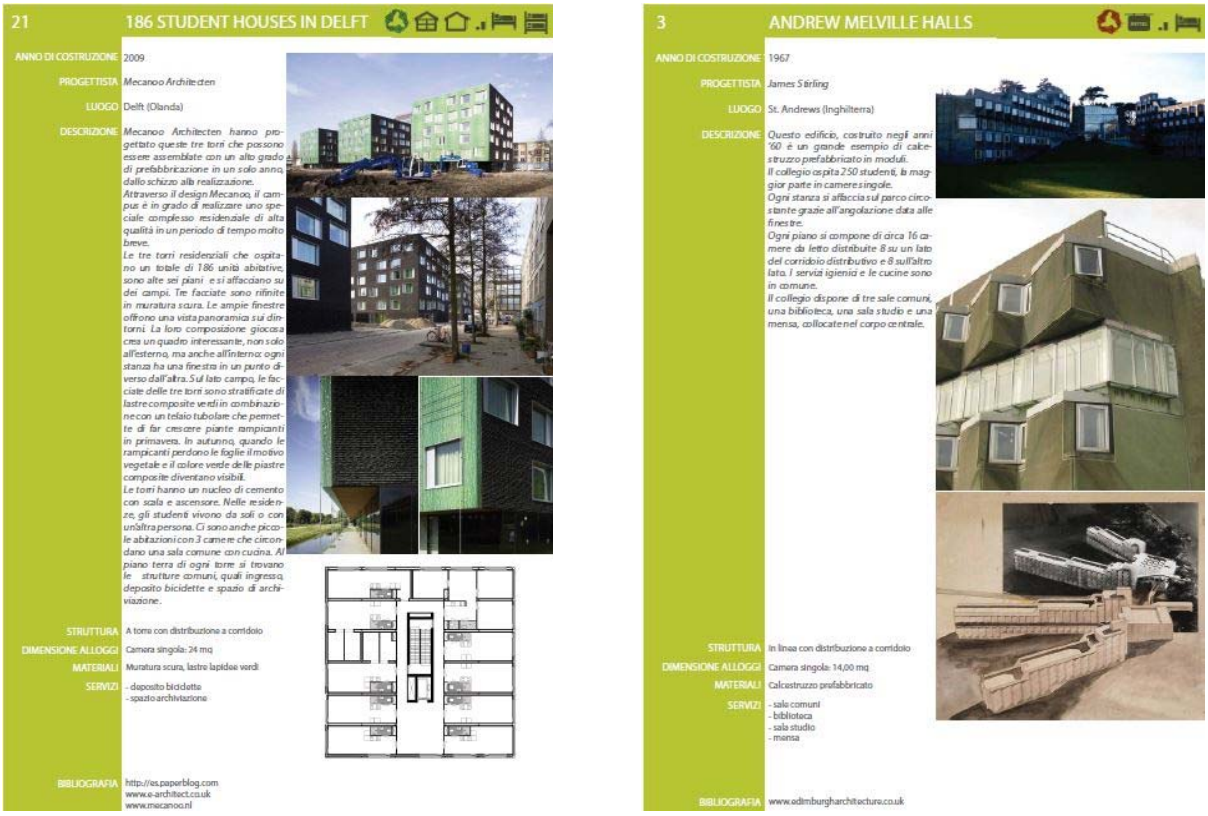

Fig. 2: Card – Type of university student residences.

To the model of student no more massified, with different needs even within the same environmental and social context, corresponds the analysis of international projects, even more recent, of university residence from which it is deduced as compared to the types identified even in the most updated manuals on the subject, the reality present a multiplicity of formal and organizational solutions very rich and varied.
The traditional and simple organization to hotel remains in a smaller number of cases, but with different joints ranging from the case where each room is equipped with bath those where every bathroom is attributable to two or more users.
Alongside this classical solution appear most complex joints such as those of integrated core (rooms that share a number of services, including kitchen/living room) or studio flat (complete and autonomous residential units for the presence of bathroom, kitchen and living room).
Unlike the organization as a hotel, the integrated core and studio flat record more spatial and functional articulations able to realize life environments less uniform, more stimulating from the point of view of perception and appropriation space.
These types also adapt well to different distribution organizations of the building, are them a corridor or central core and allow the design of residential unit size variable (from two to four rooms).
The organizational models of integrated core and studio flat, in some aspects, are the negation of collegiate life by increasing the maximum privacy, while reducing to the minimum the opportunities for socialization that arise from the sharing of activities to carry out in the common areas.
As regards the number of beds per room the majority of the residential units includes single rooms; double rooms are in Italian and American student residences, while in England and Germany these cases are negligible.
The living room, TV room, games room, study room with adjoining eventual library and laundry are the collective services most widespread and mainly located on the ground floor and distributed to the floors.
The kitchen as a centralized service and unique for the entire structure or even for multiple neighboring facilities and managed by staff (canteen) tends to become widespread service available to a contained number of students taking mostly the configuration of the kitchen at floor in order to allow the self-management of meals at least once a day to users that even with respect to this function follows different and individual rhythms of life.

Bars, cafes, restaurants and shops, which are present in a number of student residences, are nearly always expected open to the neighborhood and designed to avoid phenomena of spatial segregation and social marginalization resulting from strictly monofunctional territorial planning.
Exceptional and only in some foreign residences there are nurseries for child custody of students and chapels managed by religious communities for students of the theological faculties.

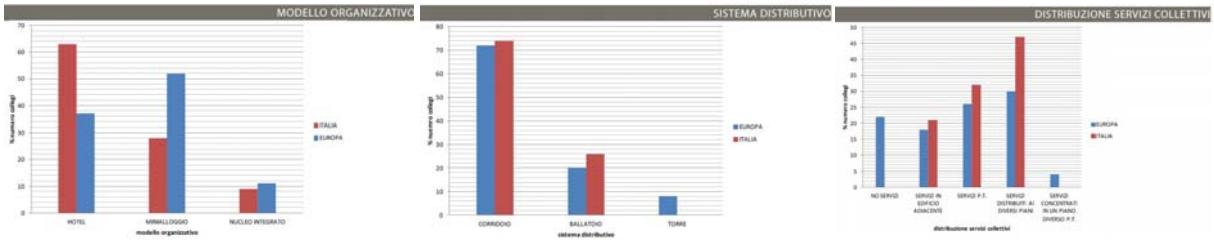

Fig. 3 : Graphical comparison of organization model, distribution system and collective facilities distribution in Italian and European student residences.

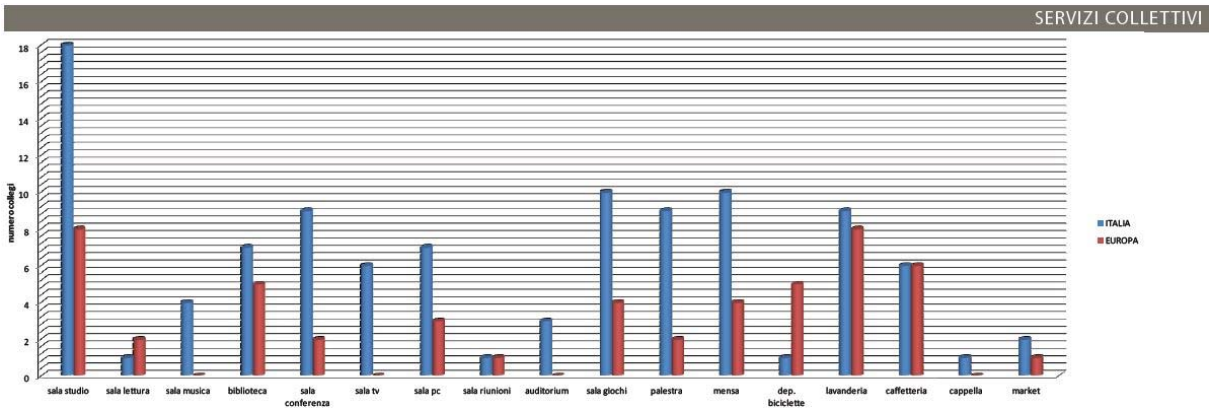

Fig. 4: Graphical comparison of collective facilities in Italian and European student residences.

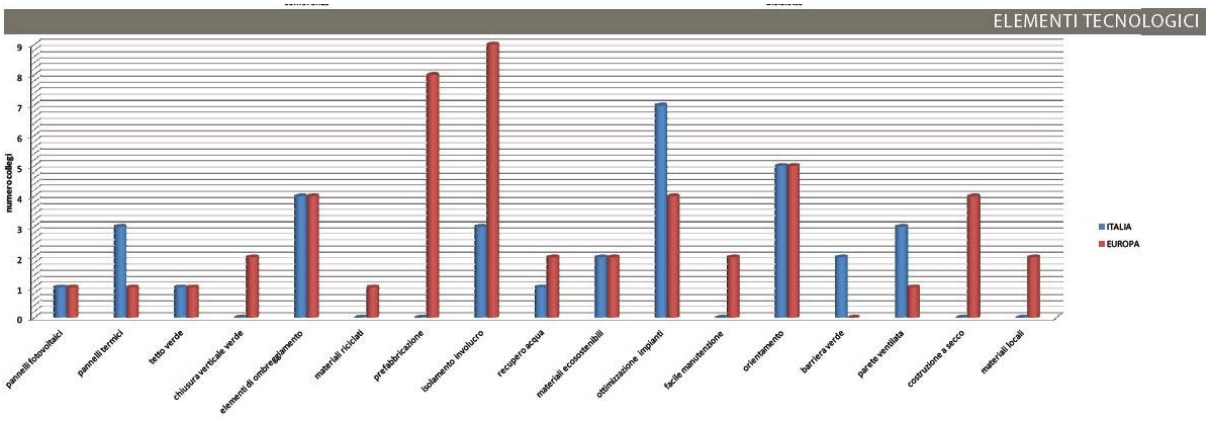

Fig. 5: Graphical comparison of technological elements in Italian and European student residences.

4. APUR-tool: Assessment Performance University Residence

The inadequacy of the technical-typological aspects is found in the different parts that compose a student residence (accommodations and rooms, communal services and building distribution) and in construction systems, typical of historic buildings (bearing walls poorly flexible and adaptable, shortages of plant equipment, ecc…). From the point of view of energy saving, the historic building usually presents problems related to the absence of building components (thermal insulation) or the absence of a programmed maintenance of the casing.

The aim of this work of research is the definition of a useful tool to assessing the conditions on the state of the art of a collective student residence based on objective parameters through which define the possible actions on the building to improve the energetic, typological and technical aspects.

APUR tool (Assessment Performance University Residence) is organized in 5 thematic areas (Site quality, Comfort and well-being, Accessibility, Functionality and Safety), 15 requirements and 45 indicators to which are assigned different weights depending on the different incidence.

For each thematic area are identified the requirements that must be met, and its system of indicators, which are associated the scores; the tool returns an overall score, determined by the sum of the partial scores for each thematic area. The different scores can determine the strategies and action priorities for the improvement of functional and energy performance of the building.

The purpose of the indicator assessment tool is to illustrate the overall performance of a student residence evaluated in structured way. The calculations are made possible by the Excel tool.

The user of the tool needs first of all to fill, in the phase 1, a general information sheet of the building which is dedicated to the collection of general information regarding the building under analysis; this information is used to provide a syhntetic description of the building, with an indication of the dimension, the activities performed and the number of users.

Indicator evaluations are done in the phase 2 with an assessment sheet.

Each indicator is assessed by defining a level from A to E. This is done by using the letter “x”.

The Exce tool computes values that describe the quality of the performance as an overall APUR score. The APUR score is a value between 0 and 100 representing the performance of a student residence in respect of the APUR framework.

The indicators are divided into five main thematic areas:

- Site quality.
  This category assess the location of the residence in the city, the closeness to public transports and the security of the area.
- Comfort and well-being.
  This category includes the evaluation of the parameters related to the healthieness of the indoor environment and the comfort of people living in the building or simply visiting it.
- Accessibility.
  This category includes the indicators related to the easiness in using the building by people and the easiness of movement inside the building.
- Functionality.
  This category is related at the adaptability of the spaces, at the maintenance of the building and at the quality of the facilities.
- Feeling of safety.
  The last category is mainly related to the building structures and equipments that could improve the security and safety perception of people and object inside the building.

4.1 Site quality

This section contains the indicators identified to assess the level of site quality of the student residence. Three performance indicators have been identified in this thematic area:

1. Location. The location is related to the insertion in the urban context of the city and at the closeness of the Universities.

2. Transport. Transport refers to the closeness of public transportation, of car and bike sharing point and the presence of bicycle racks, parking area and cycle paths to city center and to universities.

3. Secutity. This indicator assess the presence of personal and material security in the building and in the external area and the distance of crosswalks from the entrance of the student residence.

4.2 Comfort and well-being

This section contains the indicators identified to assess the level of health and comfort for the indoor environments. Eight performance indicators have been identified in this category:

1. Thermal Comfort External Wall. Thermal comfort is related to the thermal conditions of an external wall, based on the transmittance and thermal lag values.

2. Thermal Comfort Roof. Thermal comfort is related to the thermal conditions of the roof, based on the transmittance and thermal lag values.

3. Thermal Comfort Ground Floor. Thermal comfort is related to the thermal conditions of the ground floor, based on the transmittance and thermal lag values.
4. Thermal Comfort Windows. Thermal comfort is related to the thermal conditions of the windows, based on the transmittance value and type of glass.
5. Indoor Air Quality. Indoor Air Quality is related to the quality of the indoor environment in terms of temperature and relative humidity and the presence of mould growth risk and air polluting substances in the indoor microclimate that could be a hazard for human health.
6. Water Quality. Water quality refers to the availability of water and the presence in it of chemical or biological pollutants. The indicator evaluation includes the presence and the quality of system for water re-use.
7. Visual Comfort. Visual comfort assess both the illumination of common spaces and private spaces. The presence of light in a room also has a positive effect, psychologically and biologically, upon human weel-being.
8. Acoustic Comfort. Acoustic comfort is related to provide acoustic conditions in a building that facilitate clear communication of speech between the users of the building, and silence whenever needed.

4.3 Accessibility
This section contains the indicators that play an important role in the evaluation of the easiness of use of the indoor environment of a building for people living. One performance indicator has been identified in this category:
1. Usability. Usability, is concerning the quality of use for a building meaning that it is efficient in use (use of resources, productivity, effectiveness, rationality) and that offers the desired effect in use (increasing the value). Usability mainly focuses on accessibility and the easiness of movement inside the building.

4.4 Functionality
This section contains the indicators identified to assess the level of functionality in use. Two performance indicators have been identified in this category:
1. Adaptability. The adaptability of student residences could be defined as their ability to be changed or modified to make suitable for a particular purpose. Adaptability includes aspects of flexibility and convertibility. Good adaptability of a student residence should assure its functionality over time and during changes in user demands and needs, and new ways of using the building.
2. Service and maintenance. Service and maintenance is related to the quality of the collective and private services of the student residence and to the level of planned maintenance.

4.5 Safety
This section contains the indicator identified to evaluate the building structure from the point of view of safety, considering the building, the people working or living in it, the visitors and the valuable objects inside it. One performance indicator has been identified in this category:
1. Safety. Safety is related to the evaluation of the possible risks that could pose a menace to people and the objects in the building. This indicator considers the presence of adequate escape routes and the compliancy to national regulations in terms of safe environments.

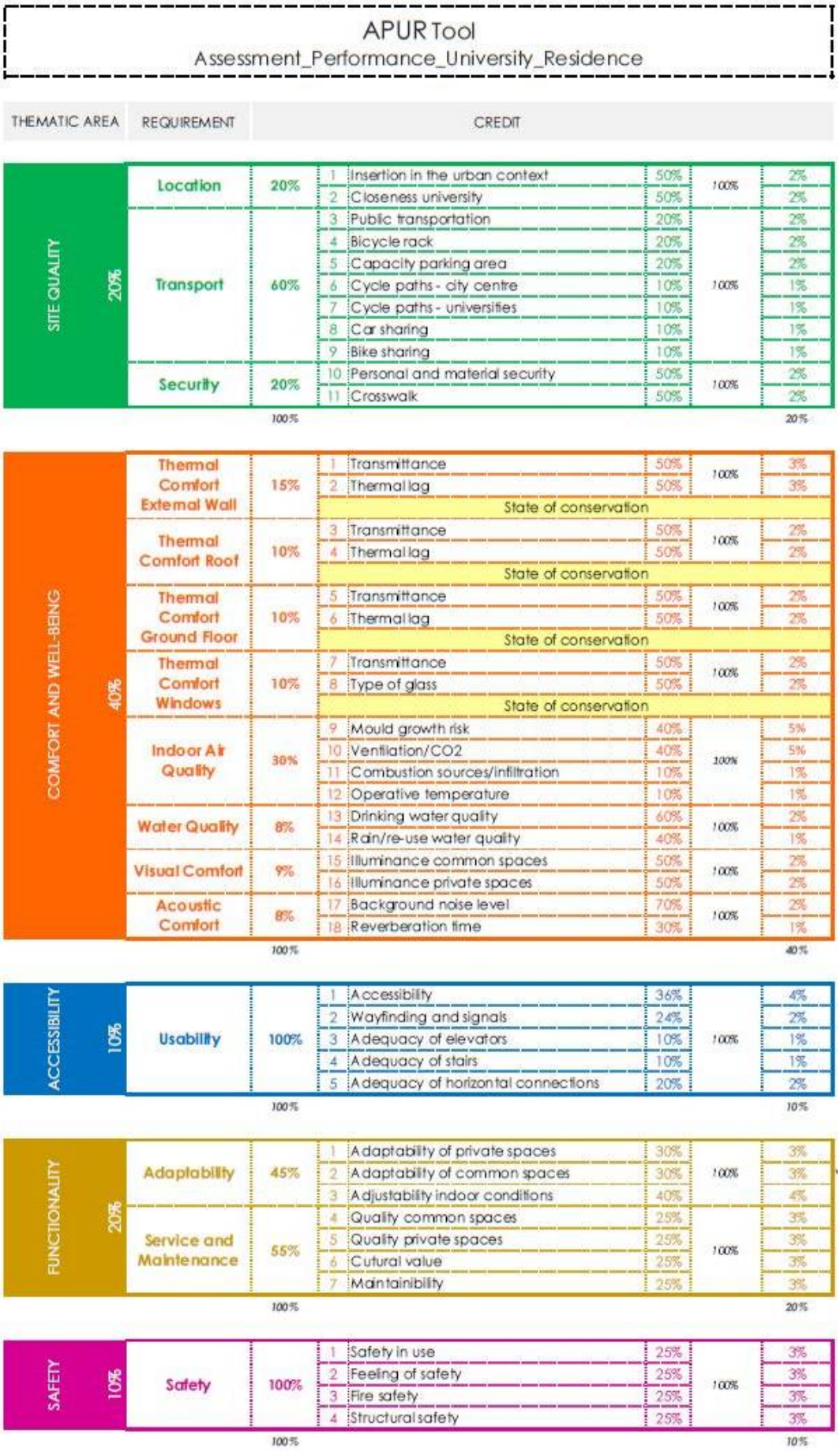

Fig. 6: APUR-tool: thematic area, indicators and weights.

5. Application of APUR-tool: the case of Collegio Cairoli

In this phase of the research we want to show which are the first results, applying the APUR-tool to a student residence of Pavia.
This student residence is one of the most ancient of the city: it was constructed in 1781.
Has a usable area of 7418 mq and can accommodate up to 110 students.
After the compilation of the first sheet of general information of the building we have started with the assessment of the first thematic area of the APUR-tool regarding the site quality.
At the thematic area of site quality corresponds a weight percentage of 20% of the total assessment.
We proceed to assess each indicator by putting an "x" in the correct column value (from A to E) using the instruction manual for the compilation of the Excel tool.
If we consider the first indicator that assess the "insertion in the urban context" we have to put an "x" in the column of A value, because the distance between the student residence and Piazza della Vittoria of Pavia is < 500 meters.
If we proceed in the same way for each indicator of this thematic area the tool return to us different results: one referring to the total of the thematic area, one referring to each requirement and another one referring to each indicator.
In this way it is possible to establish a priority for interventions based on the total score of the thematic area or based on a single indicator.
The result of the assessment of the site quality of the Collegio Cairoli is 11%/20%.

									A	B	C	D	E		
SITE QUALITY	20%	Location	20%	1	Insertion in the urban context	50%	100%	2%	x					100%	2%
				2	Closeness university	50%		2%			x			60%	1%
		Transport	60%	3	Public transportation	20%	100%	2%		x				80%	2%
				4	Bicycle rack	20%		2%				x		40%	1%
				5	Capacity parking area	20%		2%					x	0%	0%
				6	Cycle paths - city centre	10%		1%					x	0%	0%
				7	Cycle paths - universities	10%		1%					x	0%	0%
				8	Car sharing	10%		1%			x			60%	1%
				9	Bike sharing	10%		1%		x				80%	1%
		Security	20%	10	Personal and material security	50%	100%	2%			x			60%	1%
				11	Crosswalk	50%		2%		x				80%	2%
			100%					20%							11%

11 / 20 %

Fig. 7: Application of APUR-tool to the Collegio Cairoli: Site quality thematic area.

SITE QUALITY

Location

1 **Insertion in the urban context**

Indicator description: Evaluation of the distance between the student residence and the city center. In the case of Pavia the city center is considered Piazza dela Vittoria.

Calculation method: Measurement walking distance from the student residence to the city center.

Indicator thresholds:

o **A**	Excellent	_ distance < 500 m	100%
o **B**	Good	_ distance < 800 m	80%
o **C**	Adequate	_ distance < 1,5 km	60%
o **D**	Acceptable	_ distance < 2,5 km	40%
o **E**	Inadequate	_ distance > 2,5 km	0%

References: MERCANDINO, Augusto. Urbanistica tecnica. Pianificazione generale. Milano, Il Sole 24ORE spa, 2006.

Fig. 8: Extract of the instruction manual for the compilation of APUR-tool.

Bibliographical References

[1] BELFORTE, S., *Students for students. Dal confronto tra normative ed esperienze dirette. 10 progetti per il futuro delle residenze universitarie a Torino*. Torino: Celid, 2008.

[2] BELFORTE, S., *Collegi universitari, esempi e progetti a confront.* Torino: Celid, 1996.

[3] BELFORTE, S., *Abitare i collegi. Attività e spazi di relazione nelle residenze universitarie*. Milano: Franco Angeli s.r.l., 1991.

[4] BOARIN, P., *Edilizia scolastica. Riqualificazione energetica e ambientale*. Montefalcone: Edicom Edizioni, 2010.

[5] BOGONI, B., *Altre abitazioni. Case per l'altra metà di no.*, Mantova: Tre Lune Edizioni, 2003.

[6] BOGONI, B., *Abitare da studenti. Progetti per l'età della transizione*. Mantova: Tre Lune Edizioni, 2001.

[7] CAROTTI, A., *Guida alla progettazione integrata edificio/impianti*. Santarcangelo di Romagna Maggioli Editore, 2009.

[8] CHIARANTONI, C., *La residenza temporanea per studenti. Atlante italiano*. Firenze: Alinea Editrice, 2008.

[9] CORNOLDI, A., Viola, F., *Nuove forme dell'abitare*. Napoli: Clean Edizioni, 1999.

[10] DALL'OLIO, L., *Residenze Universitarie*, M.E. Roma: Architectural Book and Review srl, 2012.

[11] FABBRI, K., *Risparmio energetico in edilizia*. Roma: DEI srl, 2012.

[12] FACONTI, D., PIARDI, S., *La qualità ambientale degli edifici*. Rimini: Maggioli Editore, 1998.

[13] FRANCESE, D., *Architettura bioclimatica. Risparmio energetico e qualità della vita nelle costruzion*i. Torino: UTET, 1996.

[14] GASPARI, J., *Trasformare l'involucro: la strategia dell'addizione nel progetto di recupero.* Montefalcone: Edicom Edizioni, 2012.

[15] GAUZIN - MULLER, D., *Architettura sostenibile*. Milano: Edizioni Ambiente, 2003.

[16] GRECCHI, M., MALIGHETTI, L.E., *Ripensare il costruito: il progetto di recupero e rifunzionalizzazione degli edifici*. Repubblica di San Marino: Maggioli Editore, 2008.

[17] IMPERADORI, M., *La meccanica dell'architettura. La progettazione con tecnologia stratificata a secco*. Milano: Gruppo 24 Ore, 2010.

[18] MONTI, C., RONZONI, M.R., RODA, R., BARATTA, A., BIONDO, G., LUCCHINI, A., TrIPPA, G., *Low cost*| *Low energy* | *Quality architecture* | *Una nuova stagione per l'housing*. Bologna: BE.MA Editrice, 2009.

[19] PAGLIERO, M., *Risanamento energetico. Sviluppo economico e sociale e risanamento ambientale*. Rimini: Maggioli Editore, 2011.

[20] RIZZO, A*., Abitare nella città moderna:la casa temporanea per studenti. Ideologie, tipologie, aggregazioni*. Palermo: Grafill srl, 2003.

[21] SCIUTO, G., *Modelli progettuali per la sostenibilità edilizia*. Roma: Anabiblo Edizioni, 2010.

[22] TONI, M., *Interventi, materiali e strumenti per l'isolamento acustico degli edifici*. Rimini: Maggioli Editore, 1997.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The management of vulnerabilities in cultural heritage: a possible model to parametrize the intervention priorities

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Abstract
Preserving our cultural heritage, particularly when the economic resources are lacking, is not only a matter of techniques, but, first of all, a matter of priorities. Defining these priorities is not an easy task and it is subjected to social pressures and to subjective judgments. This paper proposes an analytical model aimed at parameterizing the intervention priorities through objective criteria, in order to obtain a uniform picture of the vulnerabilities in a defined territory. The final product is an ordered list of both architectural and artistic-cultural assets, which need urgent actions for their conservation and for which the time factor is crucial.
The proposed algorithm is able to quantify the level of urgency of a possible conservative intervention, evaluating simultaneously different parameters on the level of decay, on the risk conditions and on the touristic and cultural potential of the single asset. It represents therefore a fundamental instrument to optimize the available resources, concentrating the interventions where there is correspondence between maximum risk and highest efficacy in stopping the decay.
The model was applied factually to the area of the Parma province, obtaining the hierarchical identification of the urgent interventions to be carried out for the safeguard of its cultural heritage.

Keywords: vulnerability, cultural heritage, intervention priorities, economic planning, preservation management

1. Introduction
In a period of crisis, the substantial reduction of the economical supplies forces any organization aimed at the conservation and enhancement of cultural heritage to optimize the interventions, with a specific strategic attention. Which scientific criteria, rigorous and shared, can be adopted to choose the destination of the limited resources available? Is it possible to spot with homogeneous criteria the cases in which the time factor is crucial to allow the transmission of our cultural heritage to the future generations?
In order to elaborate rational and sustainable intervention strategies in this field, the Fondazione Cariparma, a bank foundation operating on the Italian province of Parma, has developed a strategic research project in co-operation with the Department of Civil, Territory, Environment Engineering and Architecture of the University of Parma.
As for most parts of Italy, Parma and its province boast a huge historical, artistic and cultural heritage. Fondazione Cariparma, in its decades of activity, has given a great contribution to preserve and promote this wealth. The study presented in this paper, carried out from 2011 to 2012, was aimed at identifying which cultural assets (settlements, monuments, artefacts etc.), among those liable to

funding by the Foundation, were threatened by impending dangers. The results of the research were then summarized in a Catalogue of vulnerabilities of the Cultural Heritage of the Parma province.

2. Existing methods for priority lists related to different risk typologies

The issue of defining priority lists for the interventions on the cultural heritage is not a novelty: the very large quantity and high quality of the architectural, artistic and cultural assets prevents any private or public organization from facing the whole of the necessities for the conservation and recovery of the cultural heritage it owns or has competence upon [1].
From a theoretical point of view, the largest problem faced by whoever has to take these decisions is the correct definition and quantification of the risk level, in order to evaluate as objectively as possible the priorities in intervention and conservation. Already in 1984, the Varnes and IAEG report for UNESCO [2] defined an equation for the risk level which later found a quite large diffusion. Although it was originally defined for the hydro-geological risk, in order to define landslide hazard zonation, this equation can be adapted to other situations and it was chosen as a basis for the present study. It is based upon the distinction of the concepts of hazard, vulnerability, exposition and risk:
- Natural hazard is the probability of occurrence within a specific period and within a given area of a potentially damaging phenomenon.
- Vulnerability means instead is the degree of loss expected from the occurrence of a natural phenomenon of a given magnitude.
- Exposition is the value (economic or social) exposed to the hazard.
- Risk is the expected degree of loss due to a particular natural phenomenon and it is obtained multiplying hazard, vulnerability and exposition.

Other ways to obtain a priority list were elaborated for other types of risk [3, 4, 5]. Recently, in Italy, the law for the reduction of the seismic risk [6] on cultural heritage [7] has introduced a new model to define the vulnerability at a territorial scale. This model, limited to the architectural heritage and based on a typological subdivision of the built heritage seismic behavior, has shown some limits in the application [8].
These few examples show how difficult it is to find a valid, efficient and shared solution for a single typology (listed architectural assets) and for a single risk typology (the seismic one). Therefore, it is even more difficult to define a comparable and objective criterion as the scope of application widens (to architectural, artistic, archeological, archive assets) and the possible damage sources considered increase.

3. An instrument and its first application

In the proposed model, the wide set of the cultural heritage was considered as an integrating part of the economic, social and historic context [9, 10, 11]. It was then divided in two categories: the architectural assets and the historical-artistic assets (artworks, relics, archeological remains, books, documents, etc.). For each category, a suitable file card, detailed in a specific paragraph, was developed in order to identify the asset and to collect information on the preservation status, the risk evaluation, the perspectives for its use and enhancement. All these parameters were then considered in order to define an index of the appropriateness of the intervention.
It is important to underline that this research is based on the fundamental concepts of conservation, restoration and development, in a modern conception of preservation of cultural heritage [12]. This requires not only the single asset to be protected, but also to be integrated synergistically with the needs of society, making a good use of it, also with an economic and social value. In this integrated vision, all the interdisciplinary competences available in the Parma University Departments charged with this study (DICATeA and LASS) were applied, looking for the collaboration of all the stakeholders involved.

3.1 Structure and parameters of the file cards

The file cards are divided in two parts. In the first one, the asset is identified through its name, date of execution, author, client, execution technique, dimensions, transformations or changes; then, it is analyzed from a historical-artistic point of view through a brief comment based on the bibliography reported in the footnote; some pictures and (if meaningful) graphic representation complete the first part. The second part takes into consideration the aspects that affect more directly the urgency level (U) of the intervention. These quantities were evaluated through direct surveys, interviews with the stakeholders, consultation of technical documents, specific bibliography. The preservation status (S) considered both the structural stability of the building and the aspects related to the image conservation of the artistic assets, with a qualitative assessment of the decay phenomena. The final judgment on the preservation status was then modified in consideration of the actual possibility to use safely the container building. For example, in case of roof damage with water leaks, the parameter S becomes very high, indicating a great urgency for the intervention, given the very fast decay produced by the presence of water inside the building.

The risk assessment (parameter R) considers the external phenomena which can jeopardize the preservation status of the asset. They are divided in two typologies: environmental risks (floods, landslides, earthquakes or pollution) and criminal offences (quantified through the number of vandalism, theft, breaking and entering in the past opposed to the presence of alarm systems or surveillance. At last, also the possible risks induced by the asset itself on public safety are taken into account. Without entering into difficult technical assessments, these risk levels were deduced from existing specific maps, e.g. seismic or hydro-geological zoning.
The enhancement and potentiality parameter (V) summarizes in a single value the expectations and the abilities to promote the asset, i.e. its re-launch potential. This is an important parameter, rarely considered, to understand the intervention impact on the cultural life of a community. The intervention to preserve a specific asset, if seen from a territorial point of view, has more effects if the asset has a strong historical, artistic and architectural value. At the same time, it will be more efficient if it is not a white elephant, but it is already included in a network of enhancement activities and touristic development. Therefore, the parameters taken into account are the cultural value, the touristic potential and the enhancement activities ongoing. Another parameter considers the potential increase in cultural value that a building can have based upon the goods it contains: an architecture which is also a treasure chest should have a higher urgency level, in order to preserve both. This is particularly relevant when immovable artworks, like plasters or frescoes, are concerned, as the removal (even for conservation purposes) of artwork conceived for that specific container involves a general loss in cultural value.

3.2 The "urgency algorithm"

The large variety of damages and risks encountered during the fieldwork has suggested considering in a critical situation all the assets whose static integrity or material existence was threatened to a point that the aspect is modified or the functions are limited or obstructed. The appearance is thus considered as the main feature of the artwork, together with the possibility for the future generations to benefit from it. The fieldwork has allowed to evaluate the real conditions of the assets and to define the parameters useful to quantify the level of urgency. On the base of these data, the following step was to compile a priority list for the conservation and enhancement interventions.
To this aim, a number was assigned to each input data (preservation status S, risk assessment R, enhancement potential V), even when these were qualitative rather than quantitative.
A specific algorithm was then elaborated, in order to supply a synthetic index (urgency level U) able to compare cultural assets with very different characteristics. The synthetic index is aimed at quantifying how opportune a possible funding would be: a high level of U corresponds to a high level of urgency, to the presence of risks and to the benefit for the community. Thus, a sort of Emergency List can be obtained, useful to evaluate the possible funding requests for conservation and enhancement interventions, concentrating them on the ones with higher priorities.
For the quantification of the urgency level, the previously described UNESCO equation [2] for hydro-geological risks was adopted as a reference. In that equation, the total risk was obtained multiplying the vulnerability with the hazard and the exposure. Arising from this model, a modified algorithm was then elaborated taking into consideration the probability of occurrence of a damaging event (risk assessment), the vulnerability of the assets (related to the conservation status) and the possible loss for the community (quantified in cultural value and enhancement potential).
As aforesaid, this computation system was applied separately to two different fields: architectures on one side and other cultural assets on the other side. This partition corresponds to the Italian partition of the different government departments responsible for cultural heritage and helps to reduce, within each field, the heterogeneity of the characteristics to be considered and of the possible decay phenomena. Of course, this entails two different priority lists, but this is also coherent with the large difference in the economic resources required to make interventions on a building or on an object.
The two file cards exposed in Figures 1 and 2 report the highest urgencies for the two different categories. On the architectural side, the XVIII-XIX century Casino dei Boschi, with its collapsed roofs, diffused decay, induced risks for public safety, high cultural value of the content and of the container, needs an immediate intervention to prevent the total loss. On the artistic side, the late XVII century frescoes in a baroque oratory, partly stained and detached, risk to loose their readability if not promptly restored, together with their container.
Besides taking a synchronic picture of the situations encountered on the analyzed territory, the model also allows, thanks to the use of a worksheet, to update easily the single files and also to add new cases or to cancel the ones that have been solved. Each change in the input data automatically modifies the U values and the ranking in the Catalogue Emergency List.

Casino dei Boschi

Proprietà	Patrimonio	Tipologia	Stato d'uso	Estremi catastali (H682)
Ente di gestione per i Parchi e la Biodiversità		rustico	parzialmente non in uso	F. 3 p. 11-14

Sala Baganza, loc. Casino dei Boschi

Epoca
1819-1826
(impianto d'origine 1775-1789)

Autore
Nicolò Bettoli
(impianto d'origine E.A. Petitot)

Aggiunte
casa in pietra, prolunga

Restauri/Trasformazioni

Dipendenze
ghiacciaie, prolunga, casa in pietra, boschi



Breve descrizione:

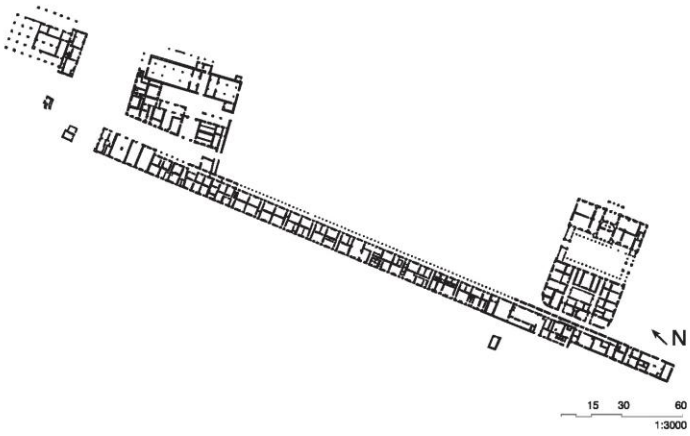
"La villa [petitottiana] venne alzata [...], ingrandita ai lati [...] da Nicola Bettoli".
da Gapr2, p. 314

"Fu edificato [...] un lunghissimo colonnato (chiamato la Prolunga) con solo piano terreno che dava accesso a numerosi locali [...]. Al centro [...] fu eretto un fabbricato elevato di un solo piano, a 7 finestre, culminante con una mansarda, munita di orologio al centro e una torretta campanaria al culmine"
da Gambara 1966, p. 267



Riferimenti bibliografici:

Dallaturca 1979; **Bernini 1996**; **Fontana 2011**;
Gambara 1966, pp. 263-276;
Gapr2, pp. 312-314; *Itpr2, pp. 37*



Riferimenti: Ing. **Angelo Vanini**
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VINCOLO SOPRINTENDENZA PER I BENI ARCHITETTONICI E PAESAGGISTICI: ***decreto ministeriale del 17 giugno 1963***

RIFERIMENTO NEGLI STRUMENTI DI PIANIFICAZIONE TERRITORIALE: PSC: *edificio di valore storico-architettonico*
PTCP: *residenza ducale 122*

STATO DI CONSERVAZIONE

CLASSE DI AGIBILITÀ DICHIARATA-DESUNTA **C** Esito verifica in data 20 gennaio 2012 ai fini della presente ricerca

DEGRADO GENERALE ESTERNO	assente	scarso	modesto	**elevato**
DEGRADO GENERALE INTERNO	assente	scarso	modesto	**elevato**
CONDIZIONI SUPERFICI DECORATE	buone	**discrete**	mediocri	gravi
UMIDITÀ DI RISALITA	**assente**	scarsa	modesta	elevata
SUPERFICI DI RIVESTIMENTO	localmente degratate	**diffusamente degratate**	localmente distaccate	**diffusamente distaccate**
ULTIMO INTERVENTO CONSERVATIVO	**negli ultimi 5 anni**	da 20 a 5 anni	da 40 a 20 anni	oltre 40 anni

2008-2012 - Recupero dell'ex teatrino (casinetto sede dell'ente parco)

QUADRO FESSURATIVO	assente	lieve	modesto	**grave**
OPERE PROVVISIONALI DI SOSTEGNO	assenti	sostegno non strutturale	puntuali	**diffuse**
INFILTRAZIONI D'ACQUA	assenti	lievi	modeste	**gravi**
STATO DELLA COPERTURA	in buone condizioni	dissesti al manto	struttura in marcescenza	**ceduta**
ULTIMO INTERVENTO STRUTTURALE	**negli ultimi 5 anni**	da 20 a 5 anni	da 40 a 20 anni	oltre 40 anni

La *prolunga* presenta numerosi solai, anche di copertura, già crollati. Numerose campate sono in pericolo di crollo. È privata di qualunque tipo di opera manutentiva. Condizioni strutturali simili anche alla *casa di pietra* anche se apparentemente i solai sono ancora in posizione.

VALUTAZIONE DEI RISCHI

IDRAULICO (PTCP 1.6)	**nessuno**	fascia C	fascia B	fascia A
IDROGEOLOGICO/MORFOLOGICO 199070	nessuno	**moderato**	elevato	molto elevato
SISMICO	(OPCM n. 3274 del 20 marzo 2003) ZONA 3	(DEL. REG. 112 DEL 2 MAGGIO 2007) $a_{ref\,g}$ 0,156		
ATTIVITÀ ANTROPICHE	Comune dichiarato ad elevato grado di crisi ambientale	vicinanza alle "aree di danno"	**vicinanza ai principali siti contaminati**	attività di discarica non controllata
ATTIVITÀ ILLECITE RISCONTRATE	furti	vandalismi	occupazione indebita	incendi dolosi
SISTEMI DI ALLARME	videosorveglianza	**antintrusione**	nessuno	
VIGILANZA	bene custodito	centro abitato	**posizione isolata**	
INCOLUMITÀ PUBBLICA	garantita	possibile rischio	a rischio	**altamente a rischio**

VALORIZZAZIONE CULTURALE E PROGETTUALITÀ

VALORE CULTURALE	A	B	C	D	E	F	G	custodisce beni mobili	custodisce beni inamovibili

FACILITÀ DI FRUZIONE	chiuso al turismo	scarsa	modesta	**elevata**
RETE TURISTICA	Parchi regionali Emilia Romagna			

EVENTUALI PROPOSTE E PROGETTI: Recupero del complesso monumentale del Casino dei Boschi, studio di fattibilita, studio associato Trends, stima 19,5 milioni di € [2006].
Tale studio prevede l'acquisto anche della villa. I proprietari privati sono favorevoli alla cessione.

FINANZIAMENTI

STRUMENTI URBANISTICI

RUE in elaborazione
PSC adottato con del. CC. n. 5 del 28 marzo 2011

TIPO DI INTERVENTO		
DESTINAZIONE URBANISTICA		
CLASSIFICAZIONE DEL TERRITORIO	PSC TAV. 2	*rurale*
TUTELA PAESAGGISTICO AMBIENTALE	PSC TITOLO VII	*siti "Rete Natura 2000"; sistema forestale e boschivo*

20 gennaio 2012

Fig. 1: Example of a file card for architectural assets.

Decorazione interna

San Secodno parmense, loc. Villa baroni strada provinciale per Fontanellato

Proprietà: Parrocchia di S. Secondo (Diocesi di Pr)

Struttura ospitante: Oratorio del Santo Nome di Maria detto della Madonna del Serraglio

Stato d'uso:

Epoca
1685-1687

Autore
Ferdinando Galli Bibiena (1657; 1743); Sebastiano Ricci (1659; 1734)

Committente
l'ipotesi più probabile è che il lavoro sia stato commissionato su mandato di Scipione I de Rossi, attraverso il suo agente Gio Pietro Barosi

Supporto e tecnica
affresco

Dimensioni
decorazione ad aula

Trasformazioni/modifiche subite



Breve descrizione:

Nella complessa decorazione del Serraglio si ripropose il binomio, già sperimentato in ambito bolognese, del connubio tra figurista e quadraturista: le ricercate soluzioni prospettiche di Ferdinando Galli Bibiena si alternano sulle pareti dell'Oratorio con l'estro da frescante di razza del Ricci.
Le soluzioni proposte dal Ricci circa il complicato allegorismo mariano, tema su cui si innesta tutta l'iconografia decorativa dell'Oratorio, sono il tentativo di rielaborare in chiave personale le esperienze luministiche di ambito veneto, soprattutto del Veronese, mediandole con i fermenti più vivi e eloquenti del linguaggio emiliano del Correggio, dei Carracci, del Cignani e dell'Anselmi. Su un edificio a pianta centrale, con alternanza di absidi poligonali e semicircolari, la decorazione del Ricci si sviluppa su tutte le pareti e le volte: nella principale, raffigurò una scenografica Assunzione, di evocazione barocca, in cui la Vergine è sorretta al di sopra delle nuvole da un vivace nugolo di angeli visti, nelle pose più svariate, di sottinsù mentre ne agevolano l'ascesa al cielo. La posizione della Vergine, con le braccia aperte e viso rivolto verso il Figlio, la spazialità dilatata e la luminosità dorata, oltre che gli arditi scorci, sono un richiamo sentito alla cupola affrescata del Duomo di Parma mentre la plasticità e la cromia delle vesti, nella varietà dei rossi e degli azzurri e la facilità del colorire non ignorano la maniera dell'Anselmi. Nei quattro angoli della navata, alternate a paraste a candelabre monocrome la *Modestia*, la *Semplicità*, la *Castità* e l' *Umiltà* scorciate di sotto in sù secondo i canoni individuati dal Ripa nella sua *Iconologia* appartengono alla complessa simbologia decorativa che si ipotizza ideata dal Prevosto don Cristoforo Cornacchia. Le paraste a candelabre, in voga nell'ambito quadraturistico felsineo, circondano le allegorie del Ricci interrompendole all'altezza delle absidi laterali per aprirvi nuovi scorci architettonici in cui, il Bibiena, sperimenta l'innovativa visione per angolo a due fuochi. L'illusoria apertura sulla nicchia est è costituita da due portici sorretti da colonne binate, distaccate per poter permettere di traguardare negli interstizi, con ai lati due brevi rampe di scale, appena scorciate sul fondo. Il colonnato sorregge una balaustra, decorata con inserto vegetale, in basso, e con vaso di fiori in alto. La compatta solidità della parete è alleggerita dalle strutture portanti di cui è difficile definire l'appartenenza ad un interno o ad un esterno. L'uso precoce, e per di più in ambito sacro, della visione per angolo superando quella con punto di fuga su asse centrale dell'epoca barocca costituirà il vero elemento innovatore. Del Bibiena sono anche gli scudi con gli emblemi mariani nei pennacchi del cupolino.

Riferimenti bibliografici:

Ghidiglia Quintavalle 1956-57, pp. 395 - 415; Summer 1976, pp. 99; Ricci 1989, p. 102; Matteucci Stanzani 1991, p. 56; Lanzi, Bertini 2000, p. 87; Fadda 2000, pp. 101-112; Fava 2000, pp. 27-54; Mambriani 2000, pp. 55-68; Scarpa 2006, p. 134

STATO DI CONSERVAZIONE

DEGRADO GENERALE	assente	scarso	modesto	elevato
DISTACCO SUPERFICI	assente	scarso	modesto	elevato
PERDITA COMPONENTI	assente	scarso	modesto	elevato
MACCHIE	assenti	scarse	modeste	elevate
ATTACCO DI INSETTI	assente	scarso	modesto	elevato
STATO DEL COLORE	buono	discreto	mediocre	cattivo
COMPROMISSIONE LETTURA OPERA	nessuna	scarsa	moderata	grave
ULTIMO RESTAURO CONSERVATIVO	ignoto	da 5 a 10 anni	da 5 a 30 anni	oltre 30 anni

Durante il sopralluogo è stato possibile verificare la presenza di numerose infiltrazioni di acqua sulla superficie muraria. Nella cupola, in uno degli angeli al di sotto della Vergine, si è registrata la perdita di alcune parti di intonaco. Altro distaccamento piuttosto esteso si rileva in uno dei telamoni. Il custode, laddove possibile, ha prontamente conservato tutte le parti distaccate.

VALUTAZIONE DEI RISCHI

IDRICO (PTCP 1.2)	nessuno	fascia C	fascia B	fascia A
IDROGEOLOGICO/MORFOLOGICO	nessuno	moderato	elevato	molto elevato
SISMICO	(OPCM n. 3274 del 20 marzo 2003) ZONA 3	(DEL. REG. 112 DEL 2 MAGGIO 2007) $a_{ref\,g}$ 0,118		
ATTIVITÀ ANTROPICHE	Comune dichiarato ad elevato grado di crisi ambientale	vicinanza alle "aree di danno"	vicinanza ai principali siti contaminati	attività di discarica non controllata
ATTIVITÀ ILLECITE RISCONTRATE	furti	vandalismi	occupazione indebita	incendi dolosi
SISTEMI DI ALLARME	videosorveglianza	antintrusione	nessuno	
VIGILANZA	bene custodito	centro abitato	posizione isolata	
INCOLUMITÀ PUBBLICA	garantita	possibile rischio	a rischio	altamente a rischio

VALORIZZAZIONE CULTURALE E PROGETTUALITÀ

EPOCA	XII-XV sec.	XVI-XVII sec.	XVIII-XIX sec.	XX sec.
VALORE STORICO/ARTISTICO	eccellente	buono	discreto	mediocre
UBICAZIONE ORIGINARIA	verificata		non verificata	
FACILITÀ DI FRUZIONE	chiuso al turismo	scarsa	modesta	elevata
RETI TURISTICHE				
PROPOSTE E PROGETTI				
PROGETTI APPROVATI	Esiste un progetto, già approvato dalla Soprintendenza, per il recupero dell'Oratorio.			

NOTE:

La grave situazione in cui si trova l'oratorio del Serraglio, raro esempio di architettura barocca, rende necessario un intervento urgente teso a proteggere l'integrità degli affreschi per inserirli nel circuito turistico culturale di S. Secondo e Fontanellato.

Fig. 2: Example of a file card for artistic and cultural assets.

4. Work phases and stakeholders

The research was articulated in phases and lasted overall twenty months. The analysis of the province territory started with the interlocution with the stakeholders which could possibly receive funding by a bank foundation (thus excluding the private bodies). The width of the examined area suggested a partition in macro-areas. Within each macro-area, the Municipalities and the Dioceses were identified as the first privileged contacts. After a first letter presenting methods and aims of the research, the stakeholders were requested to supply the lists of the architectural and historic-artistic assets they owned and possibly the spokespersons to be contacted for the on-site surveys. These first lists were the starting point of the work, then compared with other sources, like art, history and tourist guides. Based on these lists, the identification of the most urgent cases could be done, analyzing each case with bibliographical in depth analyses, cartographic studies, archive documents and direct surveys.

The meetings with the local authorities, both civil and religious, revealed different approaches from the interlocutors: it was quite easy to obtain detailed lists of architectural assets, thanks to their fame, but it was far more complicated for the artistic-cultural ones, often neglected. For all the cultural and artistic assets which had not been pointed out by the Municipalities, the direct surveys were fundamental. The several meetings with the people in charge of the different objects, helped to obtain the minimum amount of information required.

After the survey, combined by a photographic reportage to increase the documentation available, a work phase was carried out aimed at deciding whether to insert the asset in the catalogue or not, considering its cultural value and its present state. From an operative point of view, the peripheral areas were faced first, leaving the more dense city of Parma for a following phase. This operating choice was caused by the lower level of knowledge and acquaintance with the farther areas, normally less considered by historians and also by conservative attentions. The inspection on the city of Parma and its surroundings was left for the final phase also because the city was under compulsory administration until May 2012, causing long delays in the acquisition of the documentation, notwithstanding the numerous requests to the offices concerned with the art collections and the historic buildings. In the absence of notices from the owners, direct surveys were carried out to verify the conditions of the assets.

The same kind of requests were made also to the four dioceses of the analyzed territory, in order to obtain lists of endangered assets and the authorizations needed to access to the worship buildings and to all the wide artistic and cultural heritage owned by the church. After the first requests, a dialogue was started with the cultural representatives of the dioceses, who signaled some particularly urgent cases. The most efficient method was found to be the direct survey, as some interlocutors were not very willing to fill out detailed questionnaires on the management of monuments and artworks. Some general information supplied by the diocesan administration helped to fill in the gaps and widen the research horizon: in particular, the highlights given by the Parma diocese on the critical situations encountered during the latest seismic events – many churches damaged by the December 2008 earthquake are still impracticable – allowed an efficient planning of the surveys. It was instead more difficult to overcome the limited willingness encountered during the information gathering on artistic and cultural assets: the assessments on architectures can be carried out also with limited accesses to the buildings, while it is impossible to assess objects and ornaments, often stored in non-accessible spaces. The attention was focused on the artistic assets stored in severely deteriorated buildings, as in these cases the possible heritage loss is multiplied: the damage can hit both the container and the content.

Besides the Municipalities and the dioceses, also the Province Administration and the several religious or private Foundations of the area were relevant stakeholders contacted during the on-site research.

The different areas showed different levels of criticality: a higher concentration of urgencies was found in the areas close to the city. Possibly due to the gradual decline of the relations and of the traditions of the rural world, the farmland disrobed in favour of the city, turning the surrounding plane into a dormitory-satellite of the urban centre. In this way, lands rich in history and millennial customs ended up losing their roots and the awareness of its own vast architectural, anthropological and artistic heritage. On the other side, an opposite tendency has been observed in the mountain areas, which for logistic reasons are less subjected to the daily commuting towards the urban area. The preservation practices of the common historic memory of these communities looked more fruitful, often reaching a real promotion of the cultural heritage for the re-launch, mainly touristic, of the territory [13, 14].

5. The instrument's potentials

The proposed method for the filing and assessment of the cultural heritage at risk can be potentially applied to any context. The highest synergies, at a national level, could be obtained involving also the Department for Cultural Heritage, the Universities of the territories involved, other bank foundations and other patrons, in order to make an emergency list of the cultural heritage based on transparent criteria and certified by the local government departments responsible for monuments and other treasures. This constantly evolving catalogue should be available on-line and be intended as an

instrument to inform and raise awareness for whoever, with different roles and means, would like to support salvage, preservation and restoration interventions on cultural assets [15]. From local authorities to bank foundations, from lending institutions to businessmen, from voluntary associations to private citizens, everybody could consult the priority list and adopt an asset or chose to contribute to the intervention costs, working in full sight to expunge the chosen asset from the “black list” of the most serious urgencies [16].
Optimizing the resources induces incalculable benefits in terms of time, exactly in those cases where the highest risk corresponds to the highest efficiency in stopping the decay, preventing more serious losses of parts or of the whole of the cultural asset to safeguard, with clear economies for the subsequent phases of recovery and enhancement. This model, at last, would also bring advantages on the side of scientific research and of job levels in the field of cultural heritage cataloguing, of territorial management, of touristic promotion and of the connected service sector, not to mention the meaningful cultural repercussions in terms of social awareness and of consolidation of cultural and identity values of a territory.

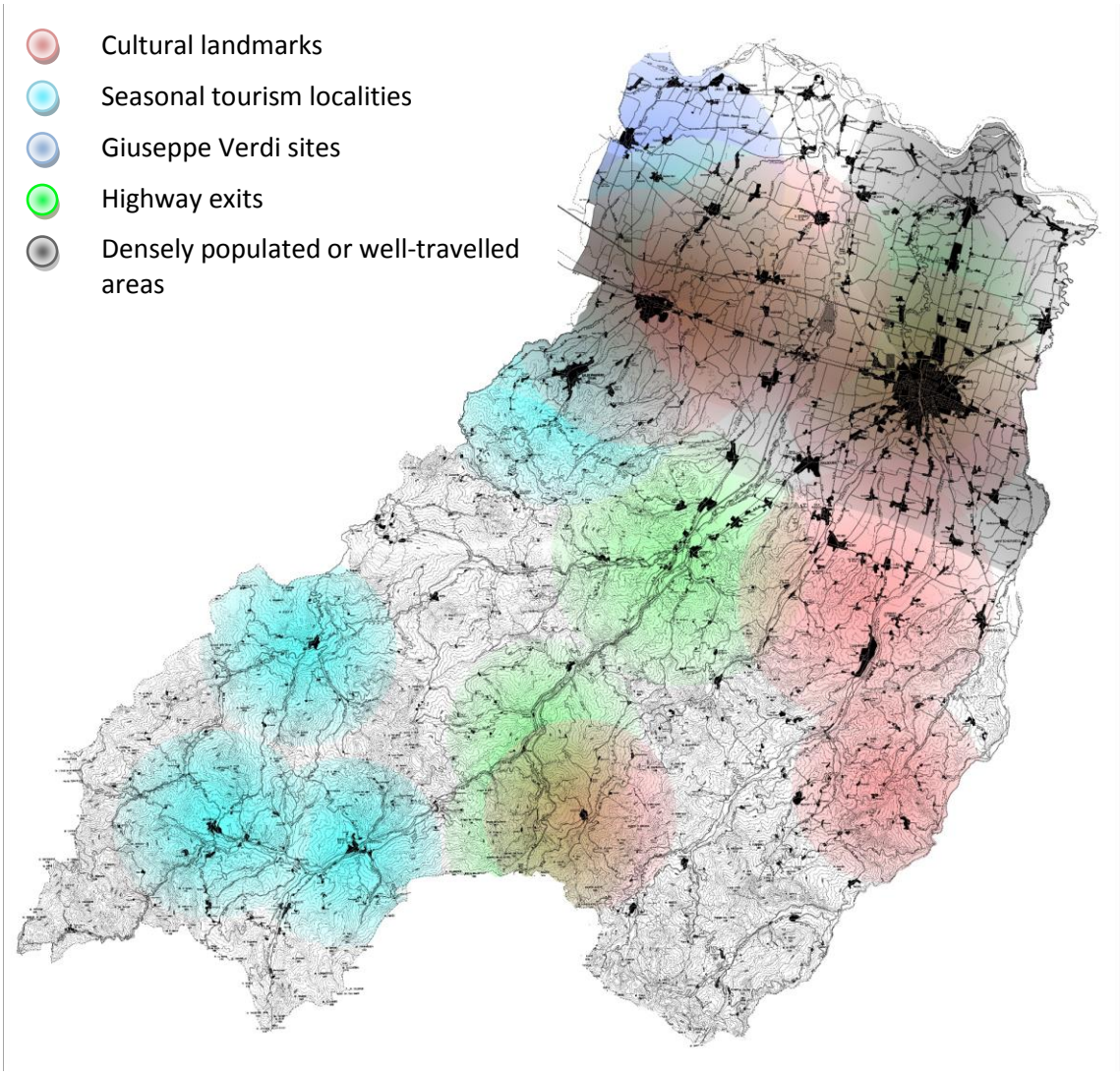

Fig. 3: Map of the touristic and attractive areas of the considered territory.

6. Acknowledgements

First of all the authors want to remember Prof. Carlo Gabbi, former President of Fondazione Cariparma, whose heartfelt interest in his territory cultural identity was the spark for this research and will long be missed.
The authors are also grateful to Prof. Ivo Iori and Carlo Blasi, scientific supervisors of the project, for the fruitful advices given during the work.
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Bibliographical References

[1] BILANCIA Paola (ed.). *La valorizzazione dei beni culturali tra pubblico e privato*. Milano: Franco Angeli, 2005.

[2] VARNES David & IAEG Commission. *Landslide hazard zonation: a review of principles and practice*. Paris: UNESCO, 1984.

[3] BINDA Luigia, CARDANI Giuliana, SAISI Antonella, VALLUZZI Maria Rosa, MUNARI Marco, MODENA Claudio. Multilevel approach to the vulnerability analysis of historic buildings in seismic areas. In *Restoration of Buildings and Monuments*, 2007, vol. 313 (6), pp. 413-442.

[4] CARVELLI Silvia, PODESTÀ Stefano, SPADARO Ilenia. Tutela del Patrimonio Monumentale dal Rischio Sismico: Individuazione delle Priorità di Intervento, in *Proceedings ANIDIS*, Bari: 2011.

[5] GIOVINAZZI Sonia, LAGOMARSINO Sergio. Una metodologia per l'analisi di vulnerabilità sismica del costruito. In AA.VV. *Proceedings of X Congresso Nazionale L'ingegneria sismica in Italia.* (Potenza-Matera, 9-13 September 2001), Matera: 2001.

[6] AA.VV. Ordinanza del Presidente del Consiglio dei Ministri n. 3274, *Primi elementi in materia di criteri generali per la classificazione sismica del territorio nazionale e di normative tecniche per le costruzioni in zona sismica*, 2003.

[7] AA.VV. Direttiva del Presidente del Consiglio dei Ministri, *Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme Tecniche per le Costruzioni di cui al D.M. 14/01/2008*, 2011.

[8] COÏSSON Eva, OTTONI Federica. The problem of large scale evaluation of masonry buildings seismic risk in defining intervention priorities. In AA.VV. *Proccedings of Structural Analysis of Historical Constructions*, ed. by J. Jasieńko, Wroklaw (Poland), 2012, pp. 1449-1456.

[9] ARCELLA Stefano, *La Gestione dei beni culturali. Fruizione, valorizzazione e promozione del patrimonio culturale italiano*. Napoli: Simone, 2000.

[10] BIASIN Enrico, CANCI Raffaella, PERULLI Stefano. *I nuovi sentieri dei beni culturali in Italia: tra storia, economia, legislazione*. Udine: Forum, 2003.

[11] BOTTARI Francesca, PIZZICANELLA Fabio, *L'Italia dei tesori. Legislazione dei beni culturali, museologia, catalogazione e tutela del patrimonio artistico*, Milano: Zanichelli, 2002.

[12] SETTIS Salvatore. *Commentario al Codice dei Beni Culturali e del Paesaggio*. Padova: Cedam, 2006.

[13] AA.VV. *La valorizzazione del patrimonio culturale per lo sviluppo locale. Primo Rapporto Annuale Federculture*, s.l., TCI (Collana Touring University Press), 2002-

[14] DE VARINE Hugues, *Le radici del futuro. Il patrimonio culturale al servizio dello sviluppo locale*. Bologna: CLUEB, 2005.

[15] URBANI Giovanni. *Il tesoro degli italiani. Colloqui sui beni e le attività culturali*. Milano: Mondadori, 2002.

[16] MAMBRIANI Carlo, COISSON Eva, FADDA Elisabetta. Le vulnerabilità del patrimonio culturale: una gerarchia delle urgenze. In AA.VV. *Strategie e Programmazione della Conservazione e Trasmissibilità del Patrimonio Culturale*. Roma: Edizioni Scientifiche Fidei Signa, 2013.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Green Road Project: Promoting Art, Food, Mobility and Energy.

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Green Road Project: Promoting Art, Food, Mobility and Energy.
The Green Road project is a tool to promote local heritage of a Territorial System, focused on the principles of Green Economy, Sustainable and Wise Tourism, which covers the rural areas of the Hundred Country Houses in the Ionic Arc in Puglia (Italy), including 11 municipalities for a total area of 415 Km^2.
The main distinguishing features of the project are: territory (enhancement and integration of rural areas), aggregation (creation of local coalitions to build an eco-sustainable territorial system), inclusion (development of an inclusive model focused on community and solidarity economy), internationalization (starting from the local to conquer the global), innovation (creation of social capital based on research, professionalism and competence), sustainability (green design + design for all).
The creation of the identity reflects the guiding principles of the Green Road: the sign chosen to synthesize "the value" of the Project has, in terms of meaning, the prolific stretch of the biological element, in order to reduce the social imaginary to the current guidelines of policy in the field of landscape, culture, environment and technological innovation. The functional elements along the route (signage system, benches, recharging points, waste container….) are designed according to the values of efficiency, authenticity, complexity and safety of the project.

Keywords: Territorial identification, Food, Art, Movement, Energy.

Green Road Project: Promoting Art, Food, Mobility and Energy.

One of the main objectives of the territorial realities is to reach unitary identification, that is to say the identification and contextualization of all attractive, both tangible and intangible, within an extended area which goes beyond the concept of Municipality or Region. The territorial identification allows to redefine geographical and political boundaries in favor of a more representative grouping which is aware of its own territorial identity, that is a territory composed of economic actors, institutions and citizens who consider themselves united by traditions, gastronomy, natural endowment or simply united by common goals of development or preservation.
The territorial identification and the concept of destination have many scientific implications of observation, especially in relation to a tourist point of view. To date, the audience of tourists is absorbing all the profound changes in the global economic system, radically re-formulating its own demand. Among the changes which materialized within the sphere of the preferences the emotional and experiential implication offered by the destination seems to have become a distinctive aspect to the tourist. Therefore, it is essential to segment the supply by customizing and specifying which attractive is available within a particular destination. For this purpose, through the territorial identification a concrete organization of available resources becomes possible, by the identification of a management policy which allows to structure a modern and focused product supply.

All this also becomes possible thanks to the Destination Marketing, such as the discipline which deals with the strategic link between destinations and markets, establishing relationships with tourists, outgoing organizations (tours operators, transports, agencies) and new media.
The activity of the Destination Marketing consists in publicizing the image and awareness of the destination in the target market, with the aim of facilitating the marketing and improve the appeal of the supply. It is clear that this discipline cuts through various territories which are synergic and complementary to each other, however, a real market strategy is still to be developed, since in the set of markets which is being taken into account within the destination it is difficult to talk about competitive positioning.
The combination of cognitive evolution of the territory, the new concept which is associated with Destination Marketing, but mostly the study of new tourist developments, therefore the modification of the demand in favour of the desire to know the place, to capture the essence of uses and local customs, and to live a very personalized experience (sport, culture, gastronomy), ensures the opportunity to refer to the destination as the organized and managerial translation of a rural territorial identity endowed with peculiar characteristic attractions. By analyzing the core-activities of the Destination Marketing (information, reception and tourist entertainment) we can observe that this discipline has as its main role that of structuring the territory in order to inform, accommodate and to ensure the territory itself to be visited also as a way of promotion.
So far it has been possible to observe the most theoretical essence of the birth of the destination and of its structuring. The European Union, through the article 62 of the EC Regulation n.1698/2005, predicted the birth of Local Action Groups (GAL) that essentially consist of an organization of operators belonging to different functional ranks who decide, after having been provided with an organizational structure, to pursue a common goal through the use of structured policies and actions in harmony with each other, buildings synergies between the public and the private sector. The whole area has an endowment of natural attractions extremely varied, which go from the surrounding Mediterranean “Maquis Shrubland” to the excellent and internationally award-winning gastronomy, with wine, extra virgin olive oil and typical products.
The territory is also rich of attractions with regard to architecture, due to the presence of the so-called “Trulli” in the area, but also of country houses, ancient farms and sites of agricultural production. GAL Ionian Hills’ activity includes the territory of the “Hundred Country Houses”, that is the aggregation of some rural buildings dating back to 15th to 19th century, some of which are also walled with protective rock and endowed with rocky churches. The whole area is witnessing more than twenty-five hundred years of history, having been a crossroads of cultures over time leading to a mix of nature, art, history, tradition and a well-known hospitality that make it accessible in any season of the year: worthy of attention is also the local handicraft, Grottaglie being an artisan centre for ceramic.
The GAL Ionian Hills is divided into two main themes, such as the creation of new productive activities in non-agricultural sectors and the development of existing services, and the improvement of the quality of life through the provision of local services (Local Developmet Plan, GAL Ionian Hills).
On the other side, the objectives which characterize the GAL are: the diversification of agricultural activities, the development of extra-agricultural micro enterprises, the promotion of services for experiential rural tourism and the conservation and requalification of the rural heritage of the destination-area through its preservation. The action strategy, instead, involves together agricultural, tourist, craft and commercial sectors; it also tries to combine productive human and natural resources of the territory to the needs of an environmentally sustainable development; lastly it favours the rural-territorial identity with innovative projects.
The fundamental assumption which guides every action of this Group is to think and act “green”, that is everything has to take into account the respect for the environment according to the concepts of eco-sustainability that the Group itself promotes through the use of renewable energy, biomass and electric cars. Among other tasks, there is that of managing available funds and make them efficient through the strengthening of territorial visibility and the use of new information technologies and media, being aware that ravines, woods, olive groves and crops become resources to be safeguarded and enhanced through an active, but also respectful management.
Other important elements are: the partnership, the cross-action, the agglomeration and the opportunity for citizens to actively cooperate in the development of the area; moreover the complementarity of agriculture, tourism, handicraft and services which are together leading to the development of a strip of agricultural territory around the city, through: allotment gardens, sub-urban parks, educational farms, pet therapy and also multifunctional agricultural parks, walking and cycling paths and bridleways in order to connect the environmental resources to the historical and cultural ones.
The Local Action Group has as its base value the identification of the individual in a territorial context that he considers his own, thus leading all subjects belonging to it to do their best in the safeguard of the environment and of its cultural heritage, and consequently to commit in its organization, development and/or marketing promotion. In this field, the GAL is tool that allows to coordinate and promote the ideas of aggregation whether they are economic or cultural.

The Green Road project is a representative tourist product of a Territorial System, focused on the principles of the Green Economy, of Sustainable and Wise Tourism, which covers the rural areas of the Hundred Country Houses in the Ionic Arc in Puglia (Italy), characterized by the significant presence of old houses, country houses, handicraft workshops, art places and natural resources.
Green Road represents a new tourist philosophy focused on the geographical factor and on the aggregation both of the internal stakeholders, who represent the short network of endogenous development, and the external operators, who represent the extensive network of stakeholders and exogenous investments.
The rural area and seaside in the province of Taranto, on which the strategic project planning is focused, is aimed at creating a tourist product that could trigger a systemic development which, having as its reference area the whole Region of Puglia, potentially extends to the neighbor Region of Basilicata.
Green Road will promote a new rural tourism linked to the traditional seaside one, to agricultural production and gastronomy, to local handicraft, according to a perspective based on a new "model" of green territorial productive reconversion, which could be exportable and replicable, where possible, to international level.
The road, which is 17 km long, covers a 200-beds accommodation offer, which soon will be joined by other 200 beds, thanks to the refurbishment of country houses and historic houses and represents a strategic project of 11 Municipalities of the Ionic Arc – Taranto area (Puglia) that, having as its starting point the territory of the "Murgia dei Trulli", extends in a landscape configuration of amphitheatre.
The Green Road develops between agritourisms, bed & breakfast and 4-5 stars country houses, old houses, rocky settlements, caves and woods, Mediterranean "Maquis Shrubland" and lush green countryside, along which the wines and foods of the area can be tasted, and where the peasant civilization and the legacy of Magna Graecia can be admired.
The main distinguishing features of the project are: territory (enhancement and integration of rural areas, both seaside and urban characterized by artificial intelligence dynamics), aggregation (creation of local coalitions to build an eco-sustainable territorial system), inclusion (development of an inclusive model focused on community and solidarity economy), internationalization (starting from the local to conquer the global), innovation (creation of social capital based on research, professionalism and competence), sustainability (to restore the centrality of the quality of life: "New Green Life Style").
Through the recovery and reuse of the typical environmental heritage of Puglia from a "Green" perspective, old houses and country houses, from being places of remembrance have become multi-purpose companies (such as agricultural, zoo technical, rural and educational country houses); a new tourist accommodation where it was possible to build a strategic guideline never had before, from which to develop a form of rural tourism.
Adopting Green philosophy, it has made it possible to qualify the territory from a tourist point of view, diversifying agricultural activities, creating new activities and improving the quality of life, expanding the attractive of the area, and all this with the aim of encouraging an eco-sustainable economy and a development of the artistic, cultural and gastronomic heritage of the territory.
The guideline on which the Green Road project is developed aims at acting on the existing as well as on those structures which are already organized to participate actively in the tourist supply, both through the restoration and enhancement of the architectural structures that can help to create harmonious relationships in the rural world.
A tourist demand focused on the search for environmental richness, eco-sustainability, cultural traditions in order to support local companies in the process of transition towards sustainable development models, to motivate and support the rural tourism industry in adopting new production paradigms in the name of quality and sustainable development.
Using the advantages of the aggregation, the Green Road is able to present the tourist supply of the country houses both at a level of "product" (location, natural resources) and of "services" (booking, brand), integrating the different activities of the production chain found in the reference environment (hospitality, catering, wellness, local typical products), in the spirit of the destination community model.
Last but not least, a resource of particular importance is represented by the "brand equity", determined by the ability of the destination management to enhance the local identity and to create an image sought by the customer.
The creation of the visual identity reflects the guiding principles of the Green Road Project: the sign chosen to synthesize "the value" of the Project has, in terms of meaning, the prolific stretch of the biological element, in order to reduce the social imaginary to the current guidelines of policy in the field of landscape, culture, environment, sustainability and technological innovation. A meaning and aesthetics search which locates in the elementary botanic form of the "leaf", giving back recognition and communicative immediacy both to the territory and to Green Road through a simple iconographic mode, clear, readable and above all more flexible than the different uses expected.
The brand image has been identified through a complex series of actions such as: the brand of destination (Green Road), signage system, fidelity cards, smart box, web and mobile applications,

editorial publication, artistic and hand-made gadgets, thematic fashion brand, co-branding operations. Green Road becomes an implementing tool for strategy that makes of change its backbone, in particular, through the implementation of infrastructural, economic, cultural and innovative environmental interventions, it aims at achieving a transformation of the territory, together with an enhancement of his vocation and his identity.
Green Road will be developed according to this philosophy and it will become in the next few years the “destination” of an increasingly articulated and attractive tourist supply system, considering the fragmentation of companies and the small size of the facilities, which will thereby get more support by being uploaded to the web but also by being connected to the other operators in the area. Even small-sized structures will be given the opportunity to enjoy communication and marketing tools which would otherwise be complex to acquire, as well as they will come in contact with buyers who ground their demand on dimensional requirements too.
The rural tourist destination “Green Road” is an example of excellence by virtue of the factors of attractiveness and natural landscape. It shows clearly how some attractors such as landscape and natural beauty, typical architecture, the relax and tranquility, the climate, reaches, on average, very high values.
The motivation for the achievement of these values lies mainly in the absolute and total respect, protection and enhancement of the natural resources of the territory. In this context, the local community is actively involved in making the above factors increasingly homogeneous harmonizing and allowing that they can interact with each other.
We are dealing with a form of aggregation, arose spontaneously and ungoverned, but over time is gaining greater awareness, confidence, strong aptitude for collaboration between local actors of the destination, such as rural communities, country houses, public institutions; in thus it aims to enhance the tourism system consists of attractors, material resources and intangible resources to the competitiveness of the destination in order to offer multi-stakeholder systems.
The tools that give shape to the better enjoyment of the rural tourist destination are undoubtedly the GAL – Local Action Groups, deeply rooted in the territory and reached the highest expression of the union between public institutions and private entities, in a common perspective of sustainability.
The Green Road represents an innovative philosophy of sustainable tourism, combining material factors, such as old country houses or trulli, dry stone walls, unimaginable in other destinations, with intangible elements such as a green perspective, the total use of the territory, the variety and complementary of new services.

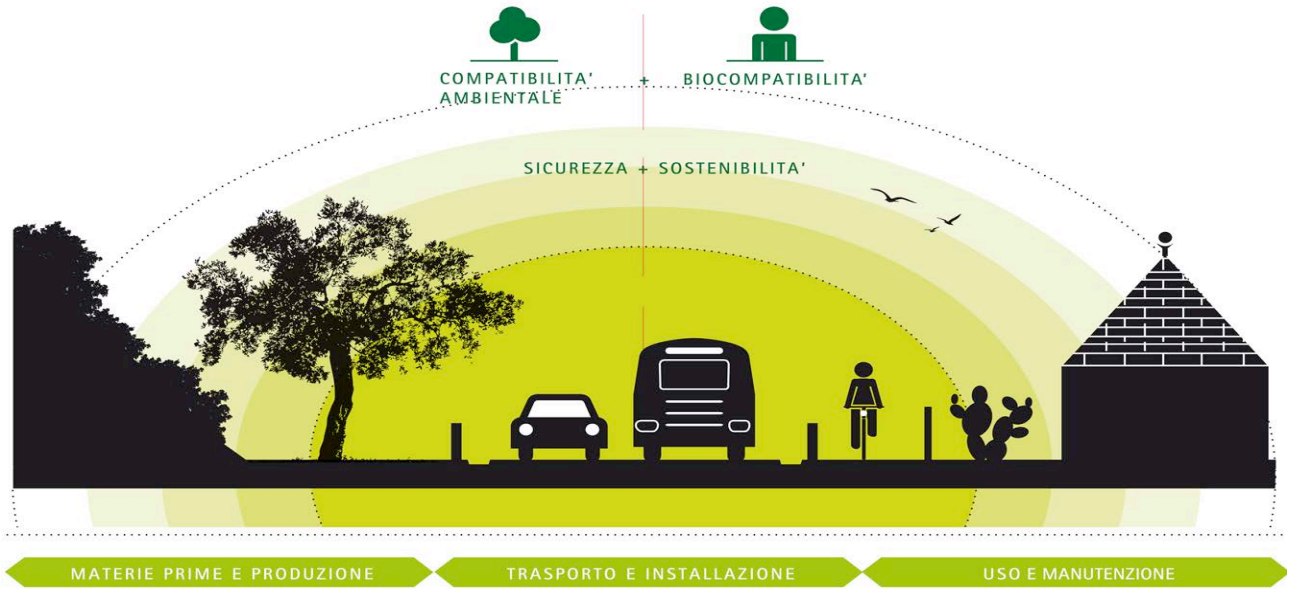

Fig. 1: Concept



Fig. 2: Synergy system

Green Road Manual

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Earthen Architecture: the ancient experiences as basis for the development of contemporary architecture

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Timeless Architecture

Earthen constructions have always been deeply influenced by economics, social life and local traditions. This has produced numerous architectural languages different from each other, but all characterized by formal richness and technical cleverness. The Great Wall of China and the fortifications of Marrakesh are just some ancient records of earthen buildings, which deny the widespread cliché that ascribes the earth architecture to the poorest countries of the planet. These ancient experiences should be the basis for the development of modern architecture: the local tradition can merge with new technical and constructive methods. For the optimal achievement of the new buildings, both the contributions of traditions and the new technologies are required. Furthermore, raw earth has a huge potential in the field of ecologically sustainable materials, because of remarkable availability, excellent thermal insulation and it is an absolutely non-toxic and transpiring element. Construction methods most commonly used are adobe, a mud brick built with a mixture of earth and straw, and pisè, that is rammed earth compressed layer by layer in a framework of the size of the wall to build. Earthen buildings are often considered a symbol of backwardness and poverty, due to a social prejudice; on the contrary, they could represent a sustainable resource for construction practices in developing countries from an environmental and an economic point of view.

Keywords: sustainability, earth, tradition, development

1. Building with earth

Next to issues of conservation and management of cultural heritage, today we find always the question of environmental and social sustainability of interventions that should characterize the design method in all its aspects . In this way of thinking architecture are placed earthen buildings. Building with earth means to actualize an ancient technology to answer current needs of sustainability, both in the field of construction and restoration. In the history of architecture there is the existence of important examples of earthen buildings dating back thousands of years ago; just think of Babylon, Jericho, the Great Wall of China. Signs of ancient and majestic civilizations that have used the loam to create fortifications and monumental buildings. Egypt, Perù, Morocco, Tunisia. They are only a few countries which present landscape strongly characterized by different applications of the same material, evenly spread across the planet.
The considerable technical and expressive potential that provides the raw earth as construction material, is the reason why today we have such a wide range of experience, profoundly different one from the other. Unfortunately, we often come across with the cliché that earthen buildings are intended for the poorest countries and inappropriate to European culture. But there are many different opportunities of research and experimentation for contemporary architects.
The first one is architecture for development, that encourages the construction of housing, health care facilities, educational and social structures in Third Countries, in order to allow a growth adequate to their culture and taking advantage of a cheap and readily available material. Experiments of this kind, have already been done by some Italian architects as Emilio Caravatti or Arcò Group from Milan, which have realized schools, libraries and residences, mainly in Africa, using local materials, mainly

raw earth. But one of the most important contemporary architect working with earthen buildings is Diébédo Francis Kéré. Born in Gando, a small village in Burkina Faso, today Kéré lives in Berlin and he is an expert in preserving and developing traditional clay technologies and architectural heritage. Since the beginning of 2013 he teaches at the Academy of Architecture in Mendrisio and despite this, he still finds time to go back to his community in Gando, and to take his projects forward.
Over this possibility of research, many considerations on sustainability have focused right on constructing with earth, which is an eco-friendly material, easy to dispose of and with excellent insulating properties, features that satisfy the new requirements of the building. One of the first countries to open up to these new architectures is New Zealand, which included earthen building in its local strategic plan because of their considerable earthquake resistant properties. And other contemporary experiences are also present in Great Britain, Switzerland and Germany.
Another field of experimentation with this material is the architectural restoration, in fact the rammed earth is useful for both interventions of consolidation and as ingredient for earth-based plasters. Few, but meaningful were the operations already done with loam on existing buildings. In Italy there have been just small interventions, but the restoration of the Tower Bofilla Betera (Valencia, Spain) is certainly of international importance.
This variety of use is allowed from the infinite forms and techniques experienced during the course of the centuries. Clay is a material with which the populations of the world have produced an extraordinary range of architectural styles, each has highlighted the cultural characteristics of the people who used them. The spirit of place and community is fully expressed in these buildings that are adapted to specific socio-economic, geographic and climatic environments. The technologies and methods used in earthen construction are the most varied, many date back to the origins of the architecture and are continually refined and improved. Construction methods most commonly used are *adobe*, a mud brick built with a mixture of earth and straw, and *pisè*, that is rammed earth compressed layer by layer in a framework of the size of the wall to build.

1.1 Working with earthen blocks

Blocks of earth produced manually by throwing wet earth into a formwork are called “adobes” or “mud bricks”. Adobes are made either by filling moulds with a pasty loam mixture or by throwing moist lumps of earth into them. There are several techniques for the production of bricks, but the most widespread provides that a sandy loam is mixed with water, and cut straw is usually added and the whole formed into a paste that is thrown into wooden moulds. The greater the force with which the loam is thrown, the better its compaction and dry strength. The surface then is smoothed either by hand or by a timber piece, trowel or wire. Adobe bricks are only sun-dried, not kiln-fired. When used for construction they are laid up into a wall using an earth mortar. Before drying out, the finished walls are smoothed down. Often a clay plaster is applied as a surface coating.
Today adobe construction has been partially adapted to economic, social and technical changes. There has been a lot of research on this technique with the result, that rational engineering solutions can now be applied to structures in Adobe bricks. In countries with a big demand, adobes are produced mechanically in commercial brick making yards or there is the option of hiring a brick making machine to make adobes on site.

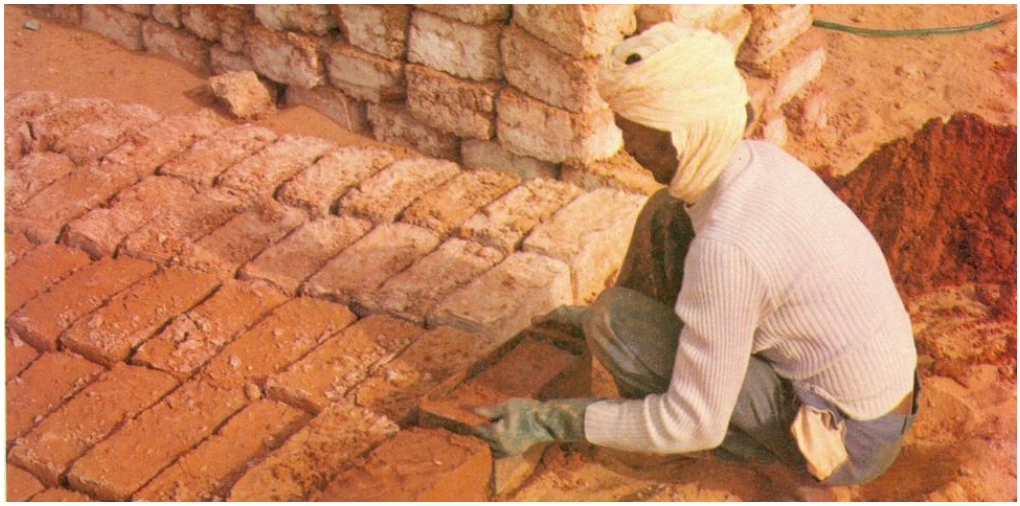

Fig. 1: Adobe bricks left to dry in the sun, Algeria (Ph. Gérard Degeorges)

Construction using adobe bricks is sustainable as no natural resources are abused and therefore guarantees a low carbon footprint. Adobe walls are also good sound insulators. Step into a room made of adobe bricks and you will feel a soothing quietness and calm that blankets you from loud noises outside. Their thermal mass stores heat during the day, thus keeping the room cool. Throughout the evening and night, they slowly release the heat. With adequate protection for exposed areas and simple maintenance, adobe structures can last a long time.



Fig. 2: School Extension, Gando, Burkina Faso (Kéré Architecture)

1.2 Rammed earth

On all five continents, rammed earth has been well-known for centuries as a traditional wall construction technique. In fact, rammed earth foundations have been found in Assyria dating as far as 5000 BC. With rammed earth techniques, clay is poured into a formwork in layers, and then compacted by ramming. The formwork usually consists of two parallel walls separated and interconnected by spacers. This technique is called *pisé de terre* or *terre pisé* in French and this is the name by which it is best known.

Pisè walls were traditionally made by hand, without the use of formwork and after every rainy season the buildings needed to be repaired. But over time the technique has been refined and structures have become more resistant. In nearly all traditional rammed earth techniques, the formwork is removed and re-erected horizontally step by step. This means that earth is rammed in layers from 50 to 80 cm high, forming courses of that height before the formwork is moved. When one layer is complete, the next course that is rammed has more moister than the one already in place, which is partially dried out; therefore, there is a higher shrinkage in the upper course than in the lower. This method can be dangerous, since capillary water can enter this joint and remain, causing swelling and disintegration. So with the French pisé technique, this problem was solved by using a layer of lime mortar above each course before laying a new one.

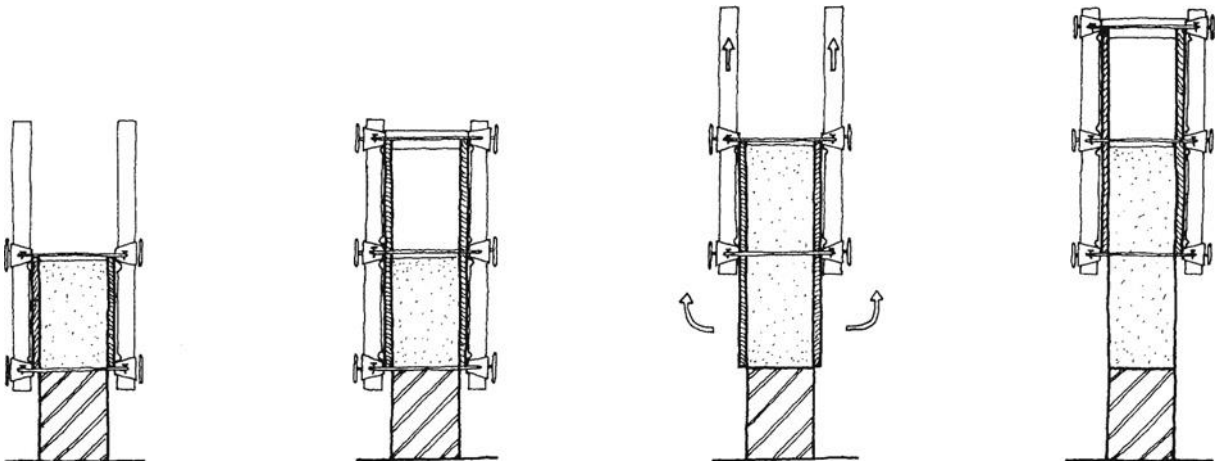

Fig. 3: Climbing formwork (Building Research Laboratory - Minke,1984)

1.3 Chapel of Reconciliation, Berlin Germany

In 1894, the Church of Reconciliation, an imposing neo-gothic building, was erected in Berlin. With the division of Berlin into occupation zones the community of the church found itself divided: the church was located in the Soviet area, most of the members of the community lived instead in the near French sector. When the Berlin Wall was built in 1961, it passed directly in front of the church and from that moment, it was no more accessible. So the church fell into disrepair until demolition in 1985 when the Church was blown up. The empty lot on which it was at this time was covered with grass and bushes. While the main concern was to remove traces of division as quickly as possible, the community of Reconciliation looked for a way to behave appropriately to save this site and its history. Locals decided to build a new chapel on the foundations of the old church, with the simplest tools and materials. A modern building that would do justice to present needs and protect the traces of the past, without rebuilding what had been lost. The proposal of the project was composed of two oval parts of the building, placed one inside the other, but with the axes rotated in opposite directions to one another. The oval exterior was made of wooden slats and took the orientation of the old Church, instead the inside oval was rammed in earth and took the orientation west-east, usual in churches. The earthen structure was built under the direction of the Austrian builder Martin Rauch, specialized in clay works. The earth still wet was placed in a formwork to form layers of 30 cm, compressed one at a time. On 9th November 2000, for the eleventh anniversary celebrating the fall of the Berlin Wall, the Chapel of Reconciliation was inaugurated. This is the first official public earthen building for over a hundred and fifty years in Germany and at the same time, it is the first German church in raw earth.



Fig. 4: Chapel of Reconciliation, external and internal

2. Social sustainability

Talking about social sustainability in architecture means to deal with social, cultural and environmental commitment of construction, urbanism, conservation and environmental design. This includes to support vulnerable and disadvantaged communities, to promote an architectural culture based on appropriateness (ethical attitudes, technologies and respect for environmental and local identity values) and to develop knowledge exchange, joint projects and processes underlining the educational potential in raising awareness on social issues. There are some architectural offices in Italy engaged in this sense. For examples Arcò, from Milan, deals with social projects in Palestine, to provide important services to the population, with particular attention to educational facilities. This attitude is really meaningful because it reveals a deep human contribution that architects can give, in response to political and social difficulties of certain territories. In the photo, the “earth-bags” school in the desert in Gaza strip. This children’s center has teamed up with MCA Mario Cucinella Architects. It is a combination of the technique of earth-bags, made with the local community, an iron covering system that is ventilated and sloped to ensure recovery of water and the integration of solar panel. The technique used is based on filling with earth long bags, to ensure building stability and insulating performance.




Fig. 5-6: Earth-bags School, Gaza Strip (Arcò Group)

2.1 Kèrè's experience

In Europe, one of the most committed architects is Diébédo Francis Kéré. He lives in Germany now, but he is from Africa and, despite the distance, he never forgets his origin and his home. So most of his projects have been realized in his country, using new techniques perfectly in line with the tradition and local culture. Kéré planned his first school in Burkina Faso in 1998, in his home village of Gando. The project was realized with loam three years later, with the help of villagers. Until then many had looked down on his work with condescension. But the clay building was standing after the first rainy season and further buildings followed: a school extension, a residential building for teachers and an infirmary. A chain of people helped to build the outer walls of the school, in fact for Kéré is important teaching the people of his country concepts and techniques which later can use autonomously. The Burkina-born architect had always built his buildings using bricks made from local clay and this is the technique chosen for the primary and secondary schools, but for the houses for teachers he has changed his construction method. He treats earth as concrete cast on the spot. The clay doesn't have to be sieved anymore either, just add gravel, sand and lime to the earth that comes out of the pit. This makes it more compact and saves working steps thanks to a simple process.

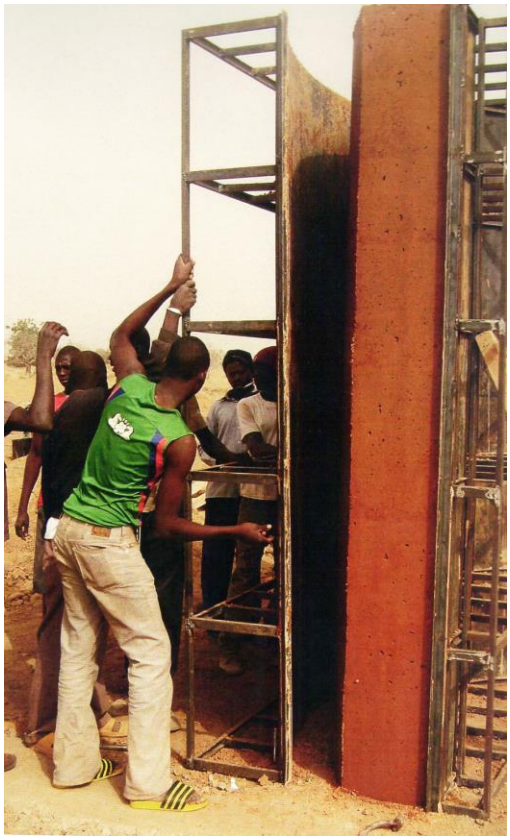
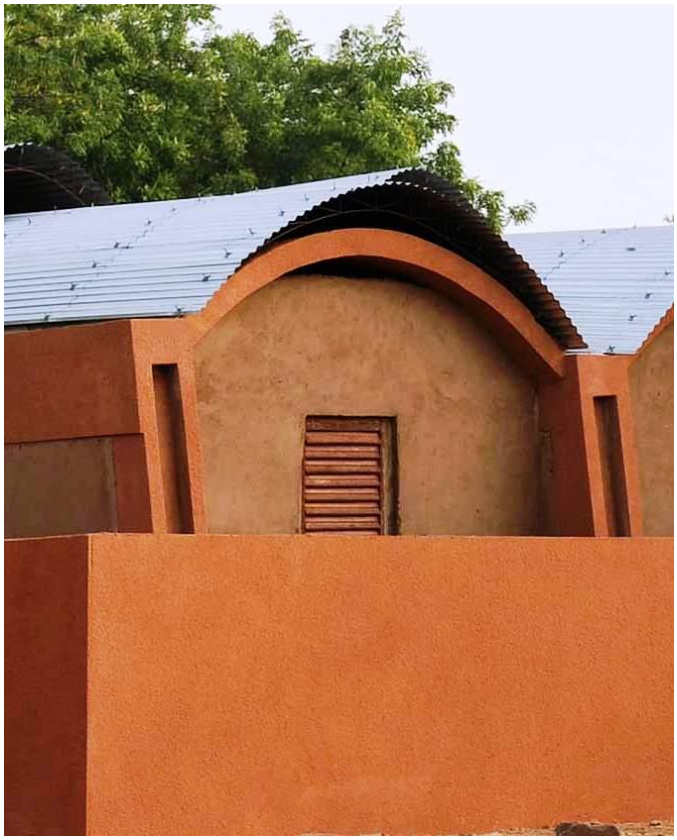

Fig. 7-8: Teacher Housing, Gando, Burkina Faso (Kéré Architecture)

Kéré said that at the end of the construction, he didn't have to indicate the wall thickness on the plans, because the local people knew exactly what had to be done. All the people involved in the project management were native to the village, and the skills learned here will be applied to further initiatives in the village and elsewhere. The way the community organized itself has set an example for two neighbouring villages, which subsequently built their own schools as a cooperative effort. The local authorities have also recognized the project's worth: not only have they provided and paid for the teaching staff, but they have also endeavoured to employ the young people trained there in the town's public projects, using the same techniques.
The village of Gando has changed a lot in the past ten years: the school has become the region's educational and examination center. Kéré is currently building a further project set away from the schools: a women's centre. Here the intention is for women to meet and talk while learning to read and write. The architect is particularly proud of this project because it is not so obvious in Africa to devote an entire structure to women.



Fig. 9: Primary school, Gando, Burkina Faso (Kéré Architecture)

3. Raw earth as a material for architectural restoration

There are many buildings ex novo in raw earth and it would be appropriate to extend its use in restoration projects for the large number of material characteristics such as good insulating properties, wide availability, low cost and absence of risks to health in disposal. Raw earth in restoration, in fact, is useful for both interventions of consolidation as an ingredient for earth-based plasters.
The restoration of rammed earth walls, whatever their type and materiality, represents a technical and conceptual problem that is hard to solve. In the first place, the amount of mass missing from the walls tends to determine the type of intervention in most cases. If the loss of mass is limited to the external surfaces and adopts the form of a patina or superficial erosion, the structure will not be compromised and the restoration can leave these surfaces as they are so as to emphasize the age of the wall. On the other hand, if the loss of mass involves serious erosion or a lack of volume and particularly if this occurs in the lower part of the construction, the structure may be compromised to such an extent that the restoration works cannot ignore its presence and must take steps to guarantee the survival of the building. A fairly common example of the latter situation is the loss of volume in the coping of the building, which does not usually affect the structure directly because it is at the top, although it may lead to the progressive degradation of the rest of the building, so it is necessary to deal with it in some way. Behind the intention to alleviate this degradation, there is often a desire to replace the missing volume of the building, using solutions that involve restoring old forms and crowns that attempt to satisfy both requirements at the same time. The use of the original building methods in the restoration

(but not necessarily the reconstruction) of a historic building is always commendable and predictable, but not at the expense of contrast or an increase of distinguishability. Indeed restoration does not imply volumetric restitution or reconstruction of the building, but rather repairs at certain places, where the original techniques may and at times should be used in order to guarantee physical, chemical, structural, construction, and other kinds of compatibility.
Nevertheless, on the one hand, this procedure is impossible in the restoration of rammed earth walls because it cannot be applied in a lateral direction and, on the other hand, it is feasible but produces many aesthetic side effects. So the first precaution would be not to fill in missing parts of the rammed earth wall unless it is absolutely essential to ensure its structural conservation. Given that it is not possible to reproduce the same techniques in the restoration of rammed earth walls, specific intervention methods must be created to guarantee compatibility between the historic wall and the added parts. A significant example of this is the restoration is Bofilla Tower, in Valencia, restored by Mileto and Vegas architects.

3.1 Bofilla Tower: from defensive fortress to a yard of knowledge

Gold winners section works for the International Award Domus Restoration and Conservation 2011 Mileto and Vegas architects, are the protagonists of a symbolic restoration of a rammed earth Islamic tower, monument representative of Muslim Spain.
The architects were aware of the request to preserve the historic and symbolic value of the tower, so they chose to maintain the historical patina, minimizing interventions and maximizing results in terms of elimination of the degradation and structural instability. Intervention work became a real construction site of knowledge, providing evidence that the raw earth, so humble and simple, but at the same time, economic and sustainable, could become a powerful tool for the restoration. The choice of using such material, as well as for its known intrinsic characteristics, was given by the compatibility with the existing material and respecting the dogma of restoration.
Bofilla Tower is an Islamic watchtower that was erected in a hurry at the beginning of the 13th century, when the inhabitants of the area were aware of the advance of the Christians in the Reconquista, which ended in 1238 with the conquest of the town and the nearby city of Valencia. Its construction was rather hasty because home-made formwork, connected by means of nailed posts, were used to build it. The planks available were insufficient to cover the whole perimeter of the tower, so that the tower was built with a “U” shaped formwork that was moved after the earth had been compacted to complete the perimeter, thus avoiding any joints at the corners that might weaken them. The joints at the middle of the tower had weakened the whole structure, so they took the precaution of alternating the joints in the successive courses so that the entire ensemble would look well bonded, not only at the corners, but all over.





Fig. 10: Building system used alternating the available “U”shaped formwork (Vegas & Mileto)
Fig. 11: State of the tower before the intervention (Vegas & Mileto)

Before the restoration, the state of conservation of tower's walls was relatively good, despite the loss of the roof and floors and the neglect to which the tower was condemned for some five centuries. The wooden floors had disappeared completely, probably due to a fire, of which traces could be seen. The restoration was urgently required mainly for two reasons: the ruin of the stone of the double arch at the entrance, causing the partial collapse of the interior surface over it and the hole at the entrance to the tower at the southwest corner, leaving it suspended in the air instead of resting on the ground.
The first intervention was superficial. In fact the surfaces of the tower in a good state of repair were hand-cleaned with brushes, without attempting to leave the surface immaculate, since that would have involved unnecessary erosion of the historic surfaces. These well-conserved walls did not need further interventions, due to their healthy appearance after no fewer than eight centuries.
The real problems were the gaps in the rammed earth mass, which required repairs and reintegration. The gaps at the southwest corner and the hole inside the north façade were filled with stone masonry

bonded with mortar comprising of earth, gravel and hydraulic lime. As much local earth and gravel as possible were used, and were collected and sieved at the foot of the tower, so that the resulting mixture would not suffer from using gravel from a different place. It was deemed necessary, corrugated fiberglass rods were introduced to act as connectors. Perforations were drilled with the utmost care to avoid percussion, because several areas were found to be in danger of immediate collapse. The stones that had fallen from the tower were used again, placed inside the wall. Several possibilities were considered, at the crown, in order to secure the surfaces in danger of immediate collapse and in the north side and in the east and west sides whose merlons had lost stability due to erosion at the base.



Fig. 12: Bofilla Tower before and after the intervention (Vegas & Mileto)



Fig. 13: Details of the restoration, facade and interior (Vegas & Mileto)

Finally, it was decided to use the same procedure to fill in the gaps. The intention was not to restore the tower to its original shape, so these gaps were filled and the degraded top was respected in the areas where material did not need to be added in order to secure or stabilize the fabric. The architects gave a central role of the intervention to the contextual integration, performed on the exterior, that sought to harmonize the degree of degradation, patina and colour of the pre-existing adjacent areas and guaranteed a better integration of the parts added to the building.

4. Conclusion

The aim of this paper is to show how tradition can form the basis for a new growth, in full accordance with cultural and environmental heritage. An ancient technique as the earthen construction brings an enormous potential in itself, with a wide range of applications, both in new construction and restoration. Kéré's experience shows us his continuous research in the experimentation of new application possibilities, always having in mind the necessity to use a poor and readily available material. Different is the case of the Chapel of Reconciliation, where the choice of materials serves as a testimony to the history of the site and as a test using the combination of different materials to optimize both needs. These experiences, so different for places and formal languages, are virtuous examples that give value to the architectural heritage of landscape and environment. They will represent a valuable reference for future generations, not only for the choice of natural materials at the expense of almost uncontrolled industrialization, but as a method and approach to architecture. An ancient tradition, able to adapt to different places and languages, reveals an interesting key to understand contemporary needs and allows the combination of remote experiences in building with new requirements of sustainability.

Bibliographical References

[1] GALDIERI E. Le meraviglie dell'architettura in terra cruda. Bari, 1982

[2] SARACCO M. *Architettura in terra cruda.* Firenze, 2006

[3] CRUCIANI G. *Architettura in terra. Il caso delle Marche.* Firenze, 2002

[4] MINKE G. *Earth Construction Handbook.* Boston, 2000

[5] MINKE G. *Building with Earth - Design and Technology of a Sustainable Architecture.* Berlin, 2006

[6] DETHIER J. *Down To Earth: Adobe Architecture - An Old Idea, A New Future.* New York, 1983

[7] MILETO C., VEGAS F. & LÓPEZ O. *Criteria and intervention techniques in rammed earth structures. The restoration of Bofilla Tower at Bétera.* London, 2011

[8] *Domus n.962.* Milan, October 2012

[9] *Boundaries - Free Architecture n.7.* Rome, January-March 2013

[10] *Boundaries - Architecture and Utopia n.8.* Rome, April-June 2013

[11] http://www.kerearchitecture.com/

[12] http://www.ar-co.org/

[13] http://www.dab.uts.edu.au/ebrf/conferences/modern_earth_2002.html

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Constructive technology and climate adaptation in Modern Architecture of Yucatan

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Abstract
The goal of this paper is to show the process of adaptation and technological innovation and environment adaptation made between the 1940´s to 1970´s, whose results are observable in spatiality, volumetric and climate adaptation which characterize Yucatan modern architecture. In first place it shows the background technology and thermal performance of pre-modern architectures in which predominate the envelopes thick and heavy and with a predominance of the massif on the vain. Followed by the discussion about the introduction of the ideas of modernity in Mexico and Yucatan considering that initially only architectural forms were taken without considering the social and environmental conditions of each region and how it tried to reconcile both aspects. A characterization of constructive technology of modern architecture through a chronological journey is made from the years 40´s up to the 70´s, pointing out the building systems used in residential architecture and architecture of equipment. Then sets the transit between the architecture of large thermal mass to architecture that changes the articulation of spaces and lighter thermal mass through the dominance of the vain on the massif. And finally the Yucatan modern architecture that manages to combine the architectural and technological solutions with the climatic conditions is exemplified.

Keywords: Modern architecture, constructive technology, thermal adaptation

1. Technology and thermal performance previous to functionalism in Yucatan
Rapoport [1] raised, referring to housing, considered here applies to a vast production of architecture in general, its shape not only responds to factors such as climate, materials and technology, which gives the status of secondary or modifying factors, but is the result of a whole range of socio-cultural factors seen in their broadest terms
This is exemplified with the architecture developed so far in Yucatan, where the consequences of secondary value that is given to the choice of technology and climatic conditions has resulted in buildings that not respond adequately to the need to provide a comfortable environment. So most of the population, which does not have sufficient financial resources, must suffer thermal discomfort, those who do have them recourse to energy-intensive appliances to ensure their thermal comfort, diminishing their capital, using non-renewable resources and harms the environment.
The hypothesis that is handled in this paper is the architecture that has been practiced to date in the region comes from imported models, made on other sites with different climates. Such is the case with architecture that was made from the Spanish colonization. Models that work well in home sites, which achieve an interesting syncretism with local technology was imported, but with very different climatic conditions to Yucatan. From the Diaz period of Mexico due to the economic boom based on this peninsula henequen industry will be a major transformation of architectural forms and even building technology [2]; but the reasons for change are of aesthetic sense and not because heat better environmental performance is sought; models exemplifying emerged in France and Italy, it is the historicist architecture and Eclectic. This architecture will be present in two ways in the region, first stylistic elements will coat the old buildings and on the other, new buildings will create. In the first

case, of course, the changes have no effect on the internal environmental conditions in the second case, yes there is a drastic change in the forms and architectural technology, but the envelopes are still thick, heavy and solid predominantly on vain. When buildings are separated from the front and side boundaries are better ventilated also the spaces of public roads will be improved, because there will be greater permeability between the wooded backyards and unpaved public roads, plus it will stop urban canyons formed [3]; however the internal thermal conditions will not change substantially.
After the Mexican Revolution, we can distinguish two stages architectural features that are being analyzed. A first post-revolutionary period, characterized by the need to reaffirm the revolutionary ideals and, above all, of the new political class. This architecture results in works of social care benefit, such as housing, health and education, and in search of architecture that symbolize the nationalist character of the revolution. In this period remain in effect the use of technologies that emerged during General Porfirio Diaz period, masonry materials and reinforced concrete roofs, as well as forms of eclecticism, although in the last years the first half of the century will begin using the materials most used in the second period, precast concrete: the block, the beam and slab, so, interior thermal conditions are not substantially different from previous periods.

2. Introduction of the ideas of modernity

The introduction of the ideas of modernity in Mexico represented a profusion of works that repeated forms of modern architectural promoted mainly by great architects as Gropius, Mies Van der Rohe and Le Corbusier. In many works were not taken into account, in general, contextual, conditions of climate and appropriation. In 1956, Gropius himself complained of this formal and indiscriminately copy by architects who did not take into account the intellectual process that made possible a new spatial vision, so he said that: "..." *the outer forms of modern architecture are not whim of a few architects eager for innovation, but product and inevitable consequence of the intellectual, social and technical conditions of our time"* [4].
In that sense, Waismann says that initially the modern in Latin America was a fallacy because not realizing the socio-economic conditions in which was born the modern movement original, not an organic development of the movement it led. Thus, original ideas, to be transmitted in an environment not ready to receive them, lose its richness and its complex controversial character, to be understood only in the less subtle features. One speaks then of concepts such as functionality, new techniques and materials and a clean and bare, expression than out of context and not part of a cultural movement, established as dogma.
On the other hand, Cosco recognizes, in 1953, that Mexican functionalism has expressed something more than what could be expected from simply translating national internationalist movement and is located in the presence of a true, own, original and authentic, architectural language expressed in works of high quality in a period of more than thirty years of development and maturity [5]. However this author does not present the way in which this architecture took into account the context and the specific climatic conditions of each region.
At the beginning of the 1960s, Henriquez said that Mexican architecture has been developed in two aspects, the Rationalist based on the classics, Le Corbusier, Mies, Gropius and Neutra, who in general have bright but obvious achievements in terms of the origin of the forms; the second which is less abundant so far, but is richer in depth and future, *".. .intend to achieve the assimilation of forms and modern principles to the expressive demands of Mexican contemporary life and its tradition"*; This aspect has been its main promoters in Barragán and Del Moral who have produced works of quality and solid interest, result of a synthesis process deep of the principles of modern architecture with the principles of the past [6]. In that sense, Villagrán declares that this modern and regional position pursued with much work, the solution of the problems local, regional or national in accordance with the conditions and limitations own. By your local target, understood and sometimes not appreciated locally, is ideology rarely achieves success with their works, to the strength of international critics pressed by the internationalist current. However, when in the field regional, originality is fed with real talent goes beyond local boundaries, to project itself internationally; in expert hands and creative minds produces authentic architecture that is at once modern and regional and joins the universal [7].
Achieve the combination of modern architecture with the particular conditions of each region in terms of the natural environment and climate became a challenge that was not easy to accept by the architects. Toca says that part of the errors of modern architecture was the inability of certain architects who uncritically in applying the recipes of modernity, designed buildings that were almost impossible to inhabit by errors of operation and inadequate climate [8]. For his part, Acosta suggested, in the 1970s, that modern architecture should open the housing of the man and put him in communication and continuity with nature, and that it should represent a perfectible instrument, whose function consists of enabling a good adaptation of man to the landscape and the climate [9].
Another important aspect is related to the construction technology used in the realization of modern architecture and which involved, according to López García, on the one hand the incorporation may not of generalized form of materials and local construction systems of each region and, on the other

hand the process of adaptation experienced technologies external to the conditions of each geographical area and the social and economic circumstances of the country [10].
In Yucatán, with the dissemination of the ideas of the modern movement reflected in new technological and architectural canons was aside everything that represents the traditional architecture. In this regard, Carlos Castillo said in 1946 that tradition did not necessarily imply an inability to change or adjust to new building techniques or new social forms. It also ensured that the traditional heritage is very rich and modern style is not in conflict with many of the traditional trends. He didn't see anything antagonistic to the horizontal lines, flat roofs, functional distributions, or large windows; although he recommended that the large glass surfaces should be reset, for being impractical to sunlight and Yucatecan climate and that should attenuate with shutters and blinds. Likewise, Castillo raised some principles of a "living architecture", some of them coming from the international style as shapes, materials and methods based on biological and technical canons adopted around the world; the expression of the light of some modern materials, the introduction of the use of glass products; delete the idea of the Chargers walls; the raw material has shaped as a structural material [11].
For the decades of the 1950s and 1960s some architects had the interest of achieving formal, functional and technical solutions to the canons of modern architecture, sunlight and ventilation conditions, as well as private construction systems of the region.

3. Construction technology of modern architecture

In the early 1950s, construction technology and structural knowledge already had a degree of maturity that enabled architects to achieve modern architectural forms based on structural and constructive solutions with the volumes and spatiality required by modern housing architecture and architecture of equipment, among other architectural genres. In this architecture, the structural form is consistent with the architectural form in the sense that raises Charleson, where both are not integrated or opposed, but there is among them a clear and proper relationship, likewise, the versatility of the architectural form allows that different structural systems coexist [12].
In this sense, the use of the technological components and systems and existing building materials in Yucatan, allowed that residential modern architecture could be configured, in general, by prismatic volumes juxtaposed with horizontal or sloping porches. In this way, the architectural form of the residential housing is formed by two constructive systems: load-bearing walls and structure of columns and beams or girders, together in a mixed structural system that characterizes it. In the interiors there is a clear distinction in formal and structural resolution thus, in social areas predominates the domain of the vain on the massif, consisting of columns, girders and corbels or overhangs, while in services and private areas predominantly the domain of the massif on the vain configured for load-bearing walls and enclosures.
These modern architectural forms also permeated in the socio-economic level medium expressed in volumes and planes with a lower hierarchy than the residential scale. The popular housing remained the sobriety of the simple game of volumes overlooking the massif on the opening through the system of load-bearing walls.
On the other hand, the buildings of equipment were constructed, mostly, with structures composed of columns, beams and slabs of reinforced concrete, and architectural forms were generated based on the juxtaposition of rectangular prisms.

3.1. Construction system of load-bearing walls

The system is configured for load-bearing walls with two proprietary construction variants of housing architecture: a) block walls and slabs of reinforced concrete load-bearing walls; and, b) load-bearing walls of block, metal columns, columns, beams and slabs of reinforced concrete. Below and describe examples of both variants.
Towards 1947, colony Miguel Aleman is built with thousand houses for workers with all the hygienic advances including collective sanitary drainage, being the first colony of the city to have it [13]. In order to ensure the supply of materials to the colony was installed a factory block solid concrete and mosaic of paste [14]. Design assembly and the architectural scheme correspond, according to González Canto, the theoretical and technical principles of the gestation of architectural modernity. The plant consists of two bays, in the first; living room and the dining room are placed, while in the second, bedroom and bathroom were. In the construction of dwellings were used foundations of stone masonry; load-bearing walls are solid concrete block; windows reinforced concrete beams are integrated into the slab; slabs are reinforced concrete and reinforced with reverse beams of the same material. This was the first time that they were employees systems and building materials industrialized in horizontal supports and slabs in homes in series, using the stone as a regional material for foundations only.
For the decade of the fifties already seen solutions of functionalist type in the management of the horizontal planes and volumes set, as in several homes in the Miguel Aleman colony, which were

expanded or modified, in which the portico of the garage and the main entrance consists of a slab of reinforced concrete with parapet of block, which continues lengthwise as an overhang at the front of the volume and ending in a block, supported by a cantilever lower wall. The porch slab is supported on one end, into the wall charger the volume, to the center, in a metal column and, at the other end, in the support column and plinth block.



Fig. 1: Garage of the dwelling projected by Fernando García Ponce at colony México. Image: Arturo Román.

Solutions similar but with best quality formal and constructive, arise in residential architecture designed by architects trained in the functionalist in universities in the center of the country or from abroad. Such is the case of housed in the colony Garcia Ginerés, designed by the architect Alberto García Bolio, a graduate of the University of Notre Dame, in Chicago. The architectural plant presents a scheme "L", located to the north and front of the House, are the social areas and services, while the intimate area is located on the cost side to the east, corresponding to the best orientation by sunlight and ventilation. The residence is set by the slab of the portico of the main terrace linearly coupled with the glazing volume of the social area, the slab is reinforced concrete, supported at one end by a slender metal column in scissor, whose top opening occupies almost the entire width of the slab; the center, in a metal column embedded in the windows of the volume and, on the other, by a wall charger block. The garage is attached to the west of the social area and exhibits a slab "V" sustained at one end by the charger block wall and on the other a set of metal columns; form which was used with different formal and constructive qualities in homes in colonies of the city of Merida, like Miguel Aleman and Mexico.

The decade of the sixties, housing architecture presents a higher quality and complexity of formal, structural and constructive solutions that in the previous decades. Most of the residences were designed and built by architecture and engineering professionals and are located in some colonies and residential developments in the north of the city, as the colonies Mexico and Buenavista and the Campestre neighborhood. In a few cases, horizontal cover and support elements will have a predominantly formal and structural participation and, in others, the volumes are the most important determinants of architectural and structural forms.

Example of this is seen in a residence built in 1964 in the Mexico Colony, designed by the architect Fernando García Ponce, a graduate of the National Autonomous University of Mexico with the collaboration of the engineers Álvaro Ponce Peón and Ulises González (See fig. 1). Architectural diagram is linear in "I" deprecated in two parts, in the first, garage and the bedrooms are located, these are looking eastward which is best facing climate; social and service areas were located in the second body. The portico of the garage is configured by a slab of reinforced concrete with parapet perimeter of block or concrete; the slab is supported by a series of inverted girders of reinforced concrete that waged a 10 m clear and are based on longitudinal bearing walls; in front of the last beam, slab excels in overhang more than one meter; on the left side, the girders continued toward one end forming a series of “pergolas”. Side volume of the bedrooms hangs a cantilever compound by a slab of reinforced concrete tops, in the end, with a series of “pergolas” of the same material, which serve as protection to the sunlight.

3.2. Construction system of reinforced concrete structures

The system is formed by structures of reinforced concrete with a constructive variant used primarily in equipment buildings and commercial: structure with columns, beams and slabs of reinforced concrete; and dividing walls of block or masonry.



Fig. 2: Main façade of Faculty of Medicine of the University of Yucatán. Image: Felipe Báez.

In the year of 1945 builds the Center School Felipe Carrillo Puerto who was one of the most notable examples of the functionalist in Yucatan. The whole school was set by modules in three plants distributed orthogonally generating different courtyards [15]. Salons were oriented towards the north with clear short in doors and windows, overlooking the massif on the vain; while the hallways looked to the South overlooking clear over the massif, denoting a clear intention of the architects Amábilis, father and son, protect the halls of southern sunlight with halls and privilege for the lighting of these north-facing with this. The building was met with a structure composed of foundations, columns, beams and slabs of reinforced concrete; the stone masonry was used only for the dividing walls and closing.

The Faculty of Medicine of the University of Yucatán was completed in 1952 and presents a symmetrical composition scheme on the ground in the form of "E". Displays two levels, the body to the front is home to the lobby, the vertical circulations and the academic and administrative offices. The three remaining bodies contain classrooms and other educational and services spaces are oriented from north to south; the main façade is oriented westward, and dominates the massif on the vain. The structure of the building is resolved with columns, beams and slabs of reinforced concrete, the walls of masonry as a closing of the spans of the porticoes were used (See fig. 2).

The building of the General Treasury of the State was built by engineer Mario Duarte at the end of the 1950s and consists of three levels and a basement. The architectural form is a plain rectangular parallelepiped with horizontal openings and solid perimeter bands alternated; the longitudinal façade orientation is west, the short at North, and do not present any kind of climate protection in the structure. The structure's foundations, columns and beams of reinforced concrete supporting slabs of beams and blocks; the dividing walls are concrete block.

The Library Carlos R. Menéndez was designed and built in 1964 by architect Leopoldo Tommasi, graduated in the University of Seville, Spain. In this building, Tommasi *"... used all codes of modern architecture: open plan, spatial fluidity, accomplished by the large windows, large eaves supported by slender columns of iron, as well as a pronounced horizontal in its volume"* [16]. The plant presents a scheme of inverted "T" and following a compositional diagonal axis with respect to the orthogonally of the terrain. The main body of the two plants has a south-west orientation; on the ground floor a Hall front perimeter set up by a thin slab of reinforced concrete supported by thin metal columns it displays, and serves as a protection from the sunlight to the space occupied by the reading room; the first floor exhibits a large window surrounded by a cantilever short perimeter that very little serves as protection to the sunlight to the offices.

4. Technology and thermal performance of the Yucatan functionalist architecture

The second period after the revolution, covering 1950, when the post-revolutionary political system has established, to 1973 which is the date the emergence of the first school of architecture in Yucatan. It is the period in which the practice of architecture derived from the modernist movement was consolidated discussed below.

In addition to the assumptions established for previous periods, which is also valid for this, about the lack of compatibility of imported architectural models in relation to local climatic conditions, should be mentioned as explanatory data the lack of adaptation of buildings to weather conditions, the architecture that served as a model in this region was conducted by architects, engineers and builders trained abroad [17] not necessarily with any previous link to Yucatan. Although theoretically in training who performed the works that served as an example for the local architecture being questioned the importance of taking into account the climate, the practice based on typologies, which prevailed even before the advent of the modern movement, had an area of successful limited applicability to what extent the technology used in the period 1950 to 1973, full affiliation to the modern movement, responds to climatic Yucatan conditions?

A constant in the Yucatan architecture from the colonial period to the practice of the modern movement is the use of heavy construction systems, of much thermal mass. The effect of the thermal mass is to reduce the oscillation of the internal temperatures and the extreme delay. When the thermal mass is greater, the sensible heat tends to remain constant and equal to the average of the outer. The extreme example is the interior of the caves.

For Yucatán, the effect of thermal mass buildings is very convenient reduction of the maximum temperatures that are very uncomfortable, but maintains high temperatures at night and in the early mornings when it is cooler outside. The studies we have done comparing exterior and interior spaces of a residence of colonial period called the "House of the Young" clearly show that fact. In this case the oscillation of the outside temperature is 14.4 degrees and the interiors are 1.0, 1.8 and 3.0 degrees.

Yucatán is one state that is located on the peninsula of the same name, which is part of the Mexican Republic. It is a region where the Mayan culture settled. It is a region that has two types of climate, rain Tropical (A), specifically Aw sub humid with summer rains covering by far the greater part of the peninsula, and Dry (B), which occupies a small strip of coast [18]; this strip is dry when you take into account the rate of rain, but the humidity is very high, due to the sea and surrounding wetlands. His bioclimatic conditions are hot uncomfortable for most of the year. Using temperatures capital as representative of the rest of the state, they are very similar, having no conditions that make change, except for the proximity to the coast, the average temperature is 26.3 ° C, the average maximum 34.2 °, the maximum annual temperatures often reach or even exceed 41 ° C. The average minimum temperature is 18.4 ° C, but can be downloaded annually to 10 ° C. Because of these conditions, one of the most difficult challenges of architecture in this region is to provide comfortable environments.

The approaches of the modern movement in Merida are consolidated from the 50s of last century, according to González [19], which is attributable to two conditions: the first is concerned with the widespread promotion of public works through government policies modernization implemented in the country since the 40s and the second, with the construction of private architecture, mainly housing, promoting a group of new professionals in the region, all trained at the center of the republic and the abroad. As mentioned, the first school in Yucatan architecture will open in 1973, within the Autonomous University of Yucatán.

The architecture of this period does present significant changes that impact their thermal behavior and will be studied in more detail in subsequent work. Changes shape as the spaces are connected and decreasing the thermal mass of the envelope, which is the determinant of the internal environmental condition of the previous architecture. More specifically, changes the ratio between the massive relative to the openings in walls, which become thinner and less mass per square meter when the precast concrete hollow block appears.

In the envelopes of the architecture endures functionalist using stone materials but increases the percentage of vain. Beams, bricks slabs, and concrete cast on site: As construction system precast blocks predominate. The windows were first made of wood or steel and glass, and currently, mainly aluminum and glass. The windows are used with simple glass, as the weak regulations governing the envelopes in the use of energy (ENER NOM 08 and NOM 020 ENER for non-residential buildings and residential buildings, respectively) are not respected. During the period analyzed much front and rear porches covered with roofs supported by columns or cantilevered sometimes protected insolation windows were used, although the profuse use of cloth or plastic curtains show the need for sun protection in many cases.

It can be considered that modern architecture, to put aside how to design based on established typologies within the academic repertoire and raise a methodology that can and should consider all features to be covered by architecture, in addition to a wider range of resources for solution requirements; enables search architecture more consistent with the environment.

But the failure of the architecture of the modern movement to propose appropriate solutions to the requirements of comfort came to the fore, even in their places of origin, to present oil crisis in 1973, as the reliance on the use of air conditioning became apparent to achieving comfort inside buildings. This situation led to the impetus of the statements made by Olgyay brothers, who in 1963 established the basis for the practice of architecture according to the weather by passive means, bioclimatic design,

which does not permeate the entire architecture. The bioclimatic design today, day after day is enriched by the contributions of researchers and designers who build this discipline.

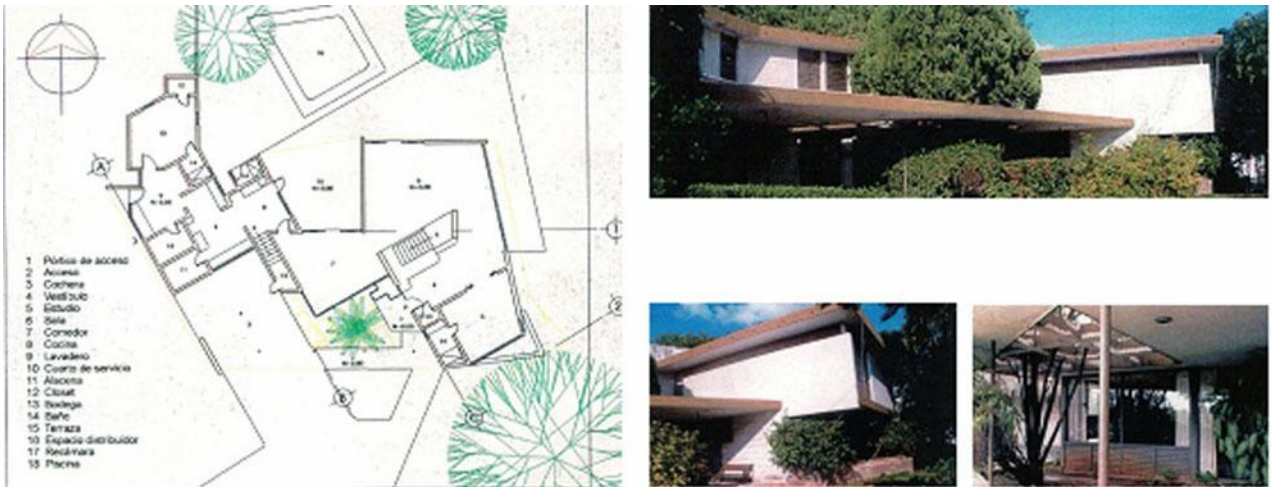

Fig. 3: Dwelling projected by Félix Mier y Terán at colony México. Image: Elvia González.

Examples of Yucatecan architecture that constitute as models for distributing the modern movement are mainly residential homes, where air conditioning use is also made what is a disadvantage that does not encourage the search for better solutions to achieve conditions environmental liability means, since there are no strict rules that restrict irresponsible use of energy. Thus there is inconsistency between reduced electricity rates by weather conditions and the lack of standards for care use.
The first buildings originally developed and became example of functionalist architecture does not clearly respond to regional bioclimatic requirements. Most seem to obey formal, functional intentions, which provide comfortable environments.
The operation of the building envelope made with technology of this age is not very different from the colonial period or Diaz. On the one hand, modern buildings due to the greater freedom for the arrangement of windows can have better ventilation, but on the other hand, negligence in controlling the entry of the sun counteracts that advantage.

5. Examples of Yucatecan architecture in consistent with the modern movement

Examples of architecture in keeping with the modern movement, dominated examples where prevailing formalistic type considerations at the expense of environmental. In general it is clear the modern language of architecture based on the use of technology, which constitutes leading expressive element, which is part of the bold handling of reinforced concrete and steel beams and columns used in supports and roofs cantilever, whereby large areas are achieved, what the use of glass in large windows adds to achieve transparency connecting the indoors with the outdoors.

5.1 Positive examples of functionalist Yucatan architecture

Among the most distinguished and prolific architects of this period is Felix Mier y Terán, a native of Yucatan, who trained as an architect at the Rensselaer Polytechnic Institute in Troy, Neva York, supported by a scholarship from the Carnegie Foundation Hall (1940 - 1943). During his early years he practiced in Cali, Colombia, Mexico City and later in Mérida, Yucatán, where he did most of his career [20]. In many of his works effort in caring for protection against the sun sign, but is neglected in some others.
This architect was very prolific and his work includes various genres such as banks, shops, factories, offices, temples, residences and many others. All that work is fully ascribed to the modern movement, one of the main drivers of this current in Mérida, especially the organic trend in the decades of the 50s and 60s of last century.
Especially in the work of Felix Mier y Terán, among exponents of the Modern Movement in Merida, the handling of form away from the rigid composition of the academic architecture, it tends more to the organic architecture of Wright, the far the straight lines of the schemes available, symmetry and simple juxtaposition (See fig. 3). Use the stone, wood, vegetation and detail similar to that pioneered the way organics. Also in the space is the Wright management influence, for example in the fluidity between interior and exterior achieved through transparency and continuity that accentuate the ruffles, joists, and vegetation. The gardens play a very important to emphasize the relationship between internal and external role, but also constitute an element of thermal conditioning.



Fig. 4: Main façade of Library Carlos R. Menéndez. Image: Arturo Román.

Technology also plays an important role in the work of this architect. The steel, concrete and glass are part of their formal language, but also the medium that allows the achievement of the other functions of architecture, such as finding a comfortable atmosphere. Su manejo es novedoso, para el período analizado de la historia de Yucatán, de la forma, el espacio, la tecnología y la vegetación hacen suponer que sus diseños conllevan un funcionamiento térmico diferente al de la arquitectura precedente, que resulta importante conocer, comprender y valorar. En el análisis de sus obras se puede apreciar el cuidado de la elección del emplazamiento, de la orientación, de la ubicación de la vegetación, del uso de terrazas, volados y todo tipo de protecciones de los vanos que muestran su clara preocupación por atender las condicionantes climáticas del lugar. These reflections are the justification for the quantitative analysis of this work by means of thermal simulation, corresponding to a next phase.

5.2 The negative functionalist of Yucatan architecture

In contrast to the work of Felix Mier y Terán there is another version of the modern movement. One with a less comprehensive consideration of architecture that does use elements of formal language of the current as well as the handling of space and functionality, but it neglects the constraints of environmental outcomes, that is, the location, orientation for protection against sunlight and to achieve good ventilation, handling outside to create outdoor indoor conditions favoring, among others; maybe this position is related to the confidence of having the artificial arrangement which elsewhere put in crisis the modern movement got momentum and stronger every day. The Carlos R. Menéndez Library which uses modern language but ignores one of the basic principles of architecture which is to provide a comfortable environment. This piece of open plan and glass facade is oriented towards the south west, one of the worst guidance for Yucatan. As a result a large protective curtain is used. (See fig. 4)
Architecture held in Yucatán from the Spanish colonization emerged and developed in Spain and responds appropriately to the weather conditions in that country, but not to the Yucatan in accordance with the analysis performed using bioclimatic chart Givoni. That is because they are structures built from materials with high thermal mass and its compositional system is based on the simple juxtaposition of spaces between which the air flow is difficult, as well as with the outside. In Yucatan the effect of thermal mass buildings is very convenient reduction of the maximum temperature, they are very uncomfortable, but also maintain high temperatures in the evenings and early mornings when on the outside are pleasant or less hot. On the other hand, the lack of wind flow is not conducive to reduce the sensation of heat from users. Although in the later stages, even before the period analyzed, technological, formal and spatial innovations occur, thermal conditions change little.
During the reporting period there is already almost complete innovation of construction technologies. In this period prevails using thinner walls than masonry used in the previous period; is first built with solid concrete blocks and then with hollow blocks. The roofs were initially solid concrete, hollow block then supported by reinforced concrete beams and cast-in-place, then pre stressed joist and hollow concrete slabs.

Conclusions

Architecture held in Yucatán from the Spanish colonization emerged and developed in Spain and responds appropriately to the weather conditions in that country, but not to the Yucatan in accordance with the analysis performed using bioclimatic chart Givoni. That is because they are structures built from materials with high thermal mass and its compositional system is based on the simple juxtaposition of spaces between which the air flow is difficult, as well as with the outside. In Yucatan the effect of thermal mass buildings is very convenient reduction of the maximum temperature, they are very uncomfortable, but also maintain high temperatures in the evenings and early mornings when on the outside are pleasant or less hot. On the other hand, the lack of wind flow is not conducive to reduce the sensation of heat from users. Although in the later stages, even before the period analyzed, technological, formal and spatial innovations occur, thermal conditions change little.

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As a positive example of Yucatan architecture developed during the first and subsequent years of functionalist period has analyzed the work of Felix Mier y Terán interesting because of its response to climate issues in the region. Overall their show careful exposure to insolation, the placement of windows that allow air flow and relationships between interior and exterior landscaped including air flow is encouraged. The analysis performed is qualitative but are being monitored and analyzed through simulation software. Among preliminary results found reduced swing, offset temperature extremes and easy to achieve ventilation. There is no difference in the oscillation and internal thermal lag relative to the previous architecture, but more likely wind flow

Moreover, the analysis of multiple works in which all elements of the language that is associated with functionalism is present was made, but which illustrates the lack of criteria for achieving adequate indoor climate conditions, especially sun exposure , demonstrated more with the profuse use of curtains used to remedy the mistakes made

The paper being done clearly shows that deficiencies of Yucatecan architecture of the period analyzed, like the preceding periods is not the most suitable for the Yucatan region. A complete rethinking of the architecture is urgent to address the challenge of creating comfortable architecture for Yucatan.

Bibliographical References

[1] RAPOPORT, Amos. *Vivienda y Cultura*, Barcelona: Gustavo Gili, 1972. 217 p.

.

[2] VEGA, GONZÁLEZ, Rubén Antonio. *La industria de la construcción en Yucatán y su repercusión en la arquitectura de las Hacienda.* Paredes Guerrero, Blanca (dir.).Tesis de Maestría en Arquitectura, Universidad Autónoma de Yucatán, Facultad de Arquitectura, Mérida, 1996, 335 p.

[3] CANTO, CETINA. Raúl Ernesto, *Evaluación de las Diferencias, Características y Alteraciones por Factores Urbanos de las Condiciones Térmicas de una Ciudad de Clima Cálido y Húmedo. La Ciudad de Mérida como Caso de Estudio*, Armando Alcántara Lomelí (dir.). Tesis de doctorado, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, 2008, 170 p.

[4] GROPIUS, Walter. *Alcances de la arquitectura integral*. 4ª ed. Buenos Aires: La Isla, 1959. 197 p.

[5] COSCO, Giovanni M. Espacialidad y estructura en la Arquitectura Moderna y obra de Pier Luigi Nervi. *Arquitectura México,* diciembre de 1953, 44. p. 197-220.

[6] HENRÍQUEZ, Raúl. La arquitectura moderna en México. *Arquitectura México,* junio de 1963, 82. p. 73-79.

[7] VILLAGRÁN GARCÍA, José. Ideas regentes en la arquitectura actual. *Arquitectura México*, diciembre de 1954, 48. p. 194-201.

[8] TOCA FERNÁNDEZ, Antonio. *Arquitectura en México. Diversas modernidades*. México: Instituto Politécnico Nacional, 1996. 136 p.

[9] ACOSTA, Vladimiro. *Vivienda y clima*. Buenos Aires: Nueva Visión, 1976. 144 p.

[10] LÓPEZ GARCIA, J. Jesús y SIFUENTES SOLÍS, M. Alejandro. Transferencia y apropiación de conceptos en la recepción mexicana de la arquitectura del siglo XX. Una contribución al debate de la situación de la historiografía actual. In ETTINGER, Catherine R. *Situación actual de la historiografía*

de la arquitectura mexicana. Morelia: Universidad Michoacana de San Nicolás de Hidalgo, Universidad Nacional Autónoma de México, 2008, p. 191-200.

[11] CASTILLO, C. M. Tradición contra modernismo. *Diario de Yucatán*, 5 de enero de 1946, pp. 3- 5.

[12] CHARLESON, A. *La estructura como arquitectura. Formas, detalles y simbolismo.* Barcelona: Reverté, 2007. 259 p.

[13] TORRES PÉREZ, María Elena. Rescate de experiencias urbanas. Transformación y adecuación de la colonia Miguel Alemán. *Cuadernos de Arquitectura de Yucatán*, 18, 2005, p. 44-69.

[14] TORRES PÉREZ, María Elena. Para una historiografía de una memoria reciente: los primeros fraccionamientos de vivienda social construida en serie en Mérida, Yucatán. In PAREDES GUERRERO, Blanca [ed.] *Memorias II. Anuario de Investigación sobre Conservación, Historia y Crítica del patrimonio Arquitectónico y Urbano*. Mérida: Universidad Autónoma de Yucatán, Facultad de Arquitectura, 2006, p. 313-318.

[15] URZAIZ LARES, Enrique. *Arquitectura en tránsito. Patrimonio arquitectónico de la primera mitad del siglo xx en la ciudad de Mérida, Yucatán*. Mérida: Universidad Autónoma de Yucatán, 1997. 162 p.

[16] GONZÁLEZ CANTO, Elvia María. *Arquitectura residencial moderna en Mérida (1950-1970)*. Bolio Arceo, Edgardo (dir.). Tesis de maestría, Universidad Autónoma de Yucatán, Facultad de Arquitectura, Mérida, Yucatán, 1998.

[17]. CHICO PONCE DE LEÓN, Pablo, Los arquitectos, Ingenieros y constructores extranjeros en Yucatán, *Cuadernos de* Arquitectura de Yucatán, 2013, (26), p. 10- 41.

[18]. CANTO, CETINA. Raúl Ernesto, Determinación de las características arquitectónicas de la vivienda yucateca, in TELLO PEÓN, Lucía, *Definiendo la Vivienda Sustentable,* Mérida: Universidad Autónoma de Yucatán, CONACYT, CONAVI, 2008, p. 125-146.

[19] GONZÁLEZ CANTO, Elvia María. *Arquitectura residencial moderna en Mérida (1950-1970)*. Bolio Arceo, Edgardo (dir.). Tesis de maestría, Universidad Autónoma de Yucatán, Facultad de Arquitectura, Mérida, Yucatán, 1998.

[20] ANCONA RIESTRA, Roberto and BOLIO ARCEO, Edgardo. Félix Mier y Terán Lejeune, Semblanza de su Obra, C*uadernos de Arquitectura de Yucatán*, 1996, (9), p.62-68.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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An Advanced Model to Represent and Manage Knowledge in Cultural Heritage

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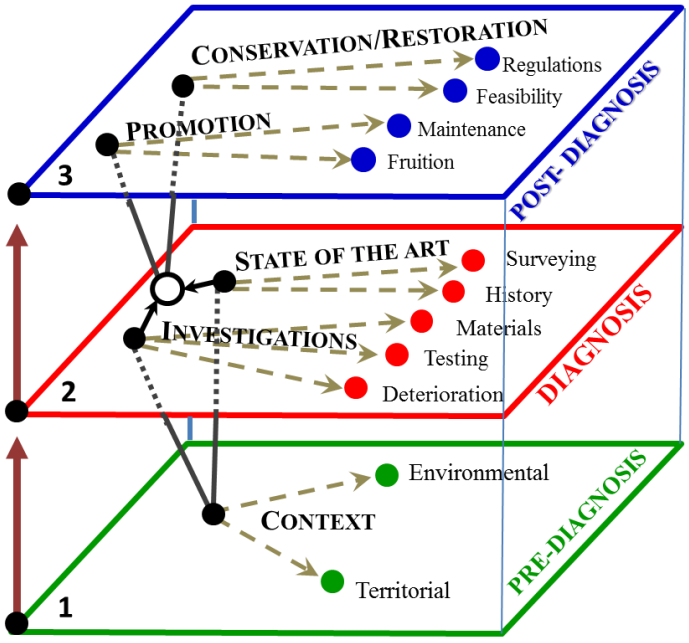
Abstract
For the delicate and complex process of knowledge acquisition in cultural heritage to be controlled and managed, it is necessary to plan and properly guide actions considering monuments from a holistic perspective. Thus, data and information should not be simply collected but they should be processed in order to highlight possible connections and implications and to define a correct knowledge base.
This paper proposes and illustrates an innovative and original method that can be referred to with the acronym CMK (Coordination, Management, Knowledge). The method includes interconnected and multidisciplinary phases and aims at defining in detail the operational procedures which lead to the definition of the knowledge base and to the consequent identification of adequate and responsible proposals for actions.



The method can be adapted to the level of detail or to the specific information required as well as to the needs emerged during its application.
The main phase of the method, which is devoted to build the knowledge base also through the creation of an interactive and digital case sheet, is introduced by a preliminary phase, during which the monument is first approached in its broadest context. In its turn, it also supports a final more proactive phase devoted to the definition of the conservation and restoration actions to propose.
Finally, an application to a real case is presented in order to clearly illustrate the proposed method.

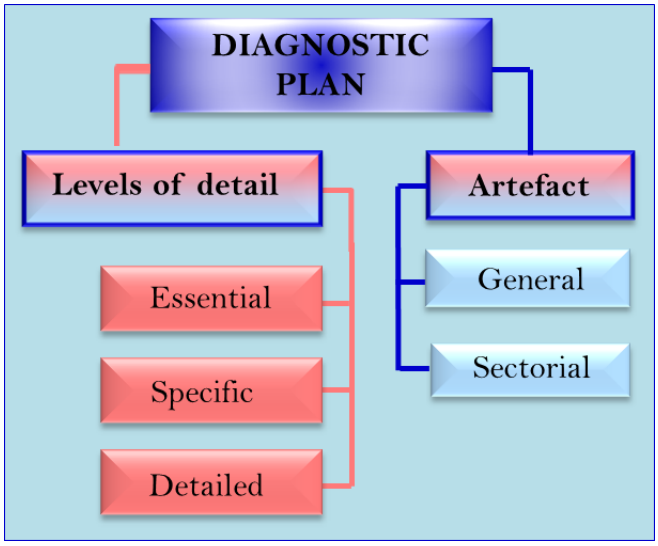
Keywords: Knowledge, Cultural heritage, advanced methodology

1. Introduction
The rapid development of all cultural sectors has allowed an exponential growth of knowledge. On the other hand, it has highlighted the need for the various fields of knowledge to be better coordinated and to interface with each other blurring the boundaries between disciplines in favour of a recognized and effective action of collaboration.
This trend is even clearer when dealing with cultural heritage conservation and restoration, where the interaction between the professionals concerned has always been considered indispensable to enable

the construction of knowledge meant as a precondition to define and plan correct and adequate actions [1,2].
Therefore, it is of the utmost importance to outline an effective methodological approach that allows identifying the most suitable procedure to knowledge, which entails the coordination of a considerable amount of heterogeneous information from varied and interacting competences in each of its development phases [3,4].

2. The methodological procedure

Knowledge acquisition and management are basic actions in the study of historic and architectural assets, above all if this is aimed at restoration or conservation actions.
Owing to the typical complexity of historic and architectural monuments, in order to obtain knowledge, it is necessary to refer to a rational methodological procedure which is carried on through analyses and syntheses and relies on the synergic collaboration of complementary and interacting competences. The objective is to favour the understanding of problems and to implement control systems to identify and filter possible errors coming from the single parts so that corrective measures can be taken [5].
A useful tool to ease and properly systematize the gathering of information during the construction of knowledge is a digital case sheet elaborated for the specific monument by means of the interesting digital systems which are the result of the latest developments in the technologies of the sector.
The proposed method, which can be referred to as CMK (Coordination, Management, Knowledge), is based on a global approach to the monument that addresses the whole procedure to knowledge with a rational attitude which coordinates and integrates the different cognitive spheres in a harmonic and intelligent manner. Such an approach organizes knowledge acquisition in hierarchical phases that allow defining actions starting from the contextualization of the monument [6].
The level and type of knowledge can depend on the materials, if the monument is considered as an envelope, or on structures, if, on the contrary, constructional and structural aspects are examined. Moreover, the method can be organized and adapted flexibly in relation to the quantity and quality of information to gather so as to obtain basic, specific or detailed information, or general or sectoral information, depending on if the monument as a whole or its specific parts are considered (Fig. 1).



If the monument is considered from a holistic perspective, it can be compared to an organism to protect, safeguard and enhance. Hence, it is crucial to understand how to treat it by developing an Anamnesis, a Diagnosis and, finally, an appropriate Therapy, as it happens in medicine. Therefore, it is necessary to follow a procedure which is repetitive, adaptable to any monument and yet specialized, according to the information that has led to the definition of the knowledge acquired through the procedure itself.

Fig. 1: types of study

3. Structure of the procedure

The proposed procedure derives from a study which has progressively evolved over several years of research and didactic activities also through comparisons with other methods that have been developed in Italy and abroad [7,8].
The above-mentioned method comprises three crucial phases: a preliminary analytical phase of pre-diagnosis, in which the monument is considered in its temporal and spatial context; a second analytical phase of diagnosis, devoted to pursue the actual knowledge of the monument in its physical, stylistic and architectural dimension by means of analytical methods for the characterization of materials, of structures and of their state of conservation [9]; finally, a proactive phase of post-diagnosis which connects data and information and uses the results obtained to identify all the possible and appropriate solutions for the restoration, conservation and enhancement of the monument, taking into account the most advanced cultural and regulatory directives.

3.1 Pre-diagnosis

Tendencies to deterioration, which allow tracing also its causes and processes, can be found in the environmental context in which the monument is located. In particular, weather conditions, environmental events (winds, rainfalls, marine aerosol…) and air pollution (due to the presence of industrial and other facilities) are detected and referred to the specific territorial context and then, going into further detail, to the various types of urban systems and settlements.

3.2 Diagnosis

This phase is devoted to the actual understanding of the conditions and of the state of conservation of the monument. As a result, it requires the synergic contribution of all the experts who can provide input in various ways.

Besides collecting and processing data, this phase should allow grasping the connections between the different parts in order to express an overall evaluation and thus define a judgment, being certain that all aspects have been examined. To that purpose, it is necessary to compile appropriate digital case sheets considering the following elements:

- *2a - anamnesis*

  The whole case history of the monument is useful to put the monument in its historical context, specifically referring to its transformations, restoration and use over time. A historical archival research based on the systematization of historical sources (annotated bibliography, land registers, archival documents, historical cartography, views, literary and travel sources, iconographies, etc…) is carried out always checking their reliability and authenticity through verification and comparison [10].

- *2b - Graphic and photographic analysis*

  Graphic and photographic documents can be developed with traditional, innovative, direct and indirect methods and are aimed at producing a dossier containing modern and historical photos as well as the field surveys needed to map the monument with a view to highlighting various kinds of data [11,12]. High-quality graphic design can be obtained by means of 3D laser scanning and autosynchronized scanning, which allow suitably processing, visually representing or modelling information through graphic representations on various dimensions. Surveys enable to disaggregate or overlap various categories of information and to concentrate it in summary maps characterized by specific themes (map of constituent materials, of the deterioration of materials and structures, of the surface treatment, of chromatic values, of the stylistic and architectural characteristics, of restoration works, etc.) [13,14].

  Furthermore, documents resulting from the stratigraphic survey are fundamental. In fact, the records of stratigraphic units of masonry allow recording and highlighting the stratigraphic relations of the building as well as graphically representing them through Harris matrix (Matrix). Through the analysis of the actions that left a trace on the masonry, i.e. adaptations, restorations or demolitions, etc., the stratigraphic reading leads to the identification, reconstruction and outline of homogeneous portions of walls and to their stratigraphic succession. The stratigraphic survey and, particularly, the identification of homogeneous areas are of the utmost importance since they allow planning the sampling of materials and degradation avoiding wrong operations which may nullify all the following instrumental analyses [15].

- *2c – Constituent materials and their degradation*

  It is crucial to know the characteristics of the constituent materials of historic buildings usually made of masonry. To that purpose, it is possible to use techniques commonly adopted to study minerals and rocks, which allow establishing their chemical, physical, mineralogical and petrographical composition. It should be considered that, owing to their heterogeneity, the minerals constituting rocks show diversified behaviours and react differently to environmental (physical, chemical, biological) actions depending on their size, crystalline form and spatial relations. Therefore, the study of the materials of a monument is closely linked to the analysis of the degradation of the external surfaces interfacing with the environment.

  Thus, in order to carry out correct investigations, it is necessary to plan an adequate on-site sampling plan that, considering the stratigraphic survey and the state of conservation of the monument, allows identifying and taking samples which, though reduced to the minimum possible, are representative of the situations and enable to analyze intact and degraded parts. To that end, it is essential to define the identifiers of degradation since the distinction of deteriorations allows not only evaluating the state of conservation but also finding possible causes and reconstructing degradation processes through the analysis of phenomena [16,17] .

  Investigations should be planned carefully and include a system to process and record samples according to the type of test to perform. If properly processed, the data obtained from tests, which

are planned depending on the type of information required, will allow formulating interpretations that can be compared to literature results and help understand the representativeness of the values acquired, also in statistical terms. Based on reference standards, this would enable to obtain reassuring confirmation [18,19].

Although the procedure can be reproduced and replicated, in the case of Cultural Heritage it does not lead to predictable results. It allows the rigorous and flexible management of knowledge and information and enables to achieve solutions which are not guided by intuition, but professional, participatory and shared (Fig. 2).

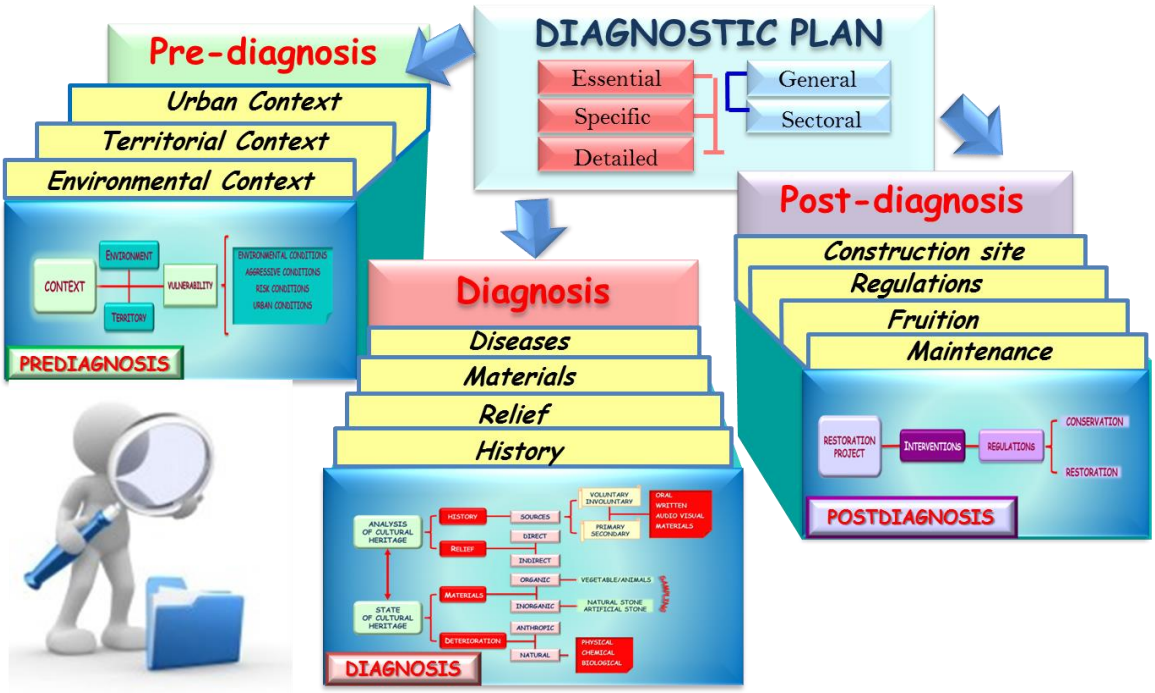


Fig.2: Diagram of the diagnostic plan – digital case sheets of the phases

3.3 Post-diagnosis

The whole procedure contains all the elements of a methodological process within which the intervention to carry out is organized and developed.

Similarly to the above-mentioned diagnostic method, three main phases are outlined: a first phase of pre-intervention, which includes the whole diagnostic process; a phase in which the intervention is actually carried out; and a final phase of post-intervention devoted to the elaboration of a project of enhancement aimed at improving fruition and creating activities, economic development and new opportunities of business around the monument. Certainly, all these actions should be characterized by a continuous control and monitoring of the asset so as to actively contribute to its adequate conservation in time.

4. A representative example: application of the diagnostic plan to Colloreto Monastery

Finally, in order to show the practical applicability of the procedure described above, the representative case study of Colloreto Monastery, whose ruins are situated in the Municipality of Morano, Calabria Region, is proposed.

During the pre-diagnosis phase, the geographical context was outlined, while, in the diagnosis phase, the anamnesis, including the graphic representation and photographic dossier, was carried out. Moreover, a representative example illustrated the types of laboratory analyses which were performed on samples of stone materials taken from the Monastery. Based on these samples, during the post-diagnosis phase, a sort of “atlas” was obtained by means of specific case sheets containing the description of each material constituting the Monastery. Such case sheets were useful not only to define actions to protect the monument, which is now in ruins, but also to provide a set of documents for its enhancement as part of tourist cultural itineraries (Fig.3).

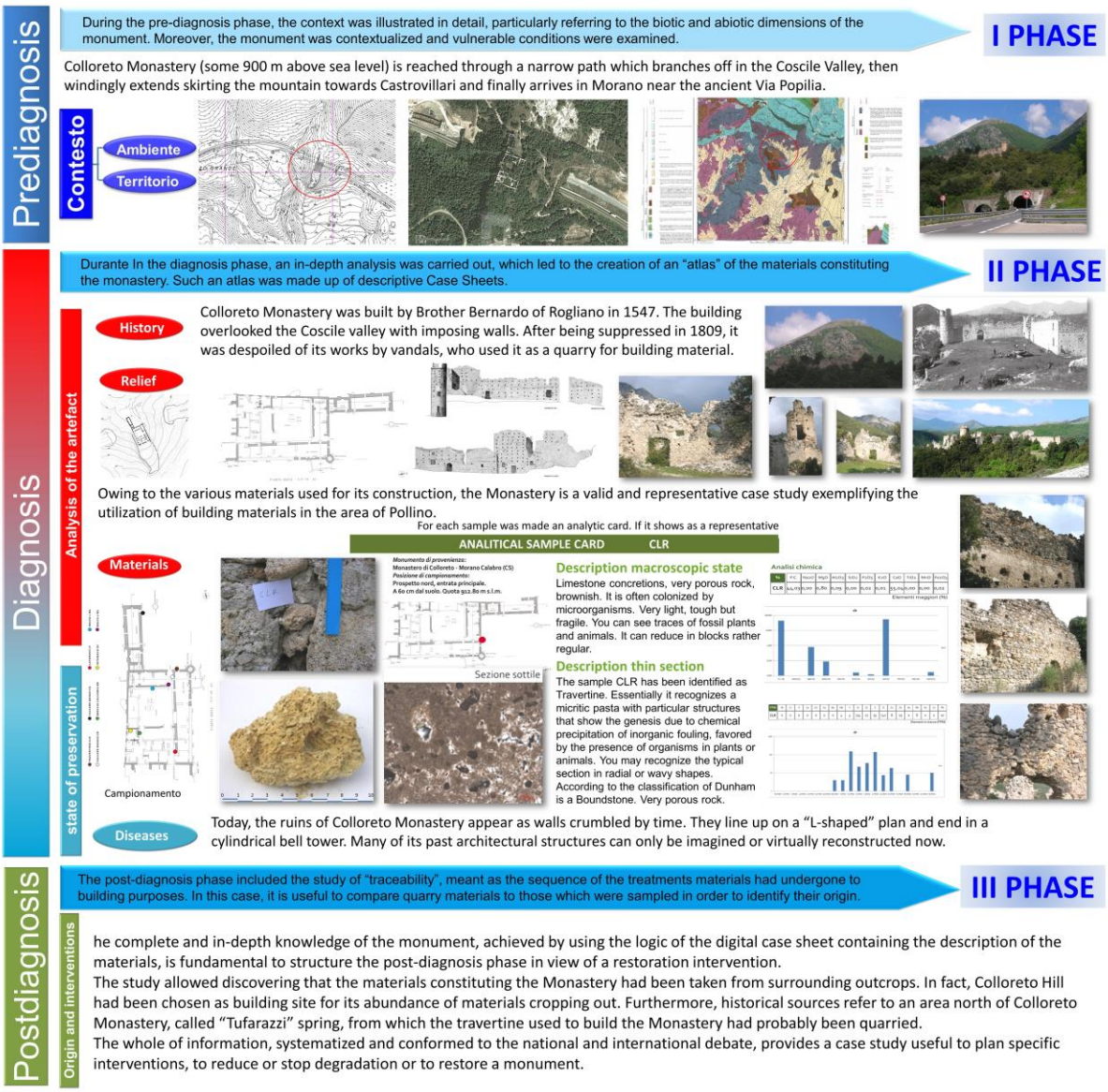


Fig. 3: The diagnostic plan applied to Colloreto Monastery

5. Conclusions

This study aimed at providing guidelines to direct and support knowledge management in the field of cultural heritage. The strong need for a multidisciplinary approach, which is peculiar of this sector, requires that varied expertise should be systematized and harmonized in order to focus all efforts on the definition of interventions which take into account the national and international debate, comply with rules and derive from an advanced diagnostic plan that may create synergy and lead to shared solutions.

Owing to the complex and considerable information to manage, it is necessary to set a protocol that allows coordinating all the aspects concerned in a flexible manner, trying to reconcile scientific components and requirements with those of humanities.

The paper proposed a comprehensive scientific research method organized in three essential phases: the first phase of contextualization outlines the pre-diagnosis conditions and introduces to the actual diagnosis, thus leading to the final definition of interventions by means of diagnostic investigations.

6. References

[1] Gattuso C. , Cozza R. , Gattuso P. , Villella F. , *La conoscenza per il restauro e la conservazione. Il Ninfeo di Vadue a Carolei e la Fontana Nuova di Lamezia Terme*, Nuova Serie di Architettura Milano: Franco Angeli, 2013

[2] Gattuso C., *Conoscere per restaurare*, Publiepa Edizioni, Febbraio 2001, Cosenza

[3] De Luzenberg, G., *Breve guida all'uso della metodologia: Europena Awareness*,

[4] Riviezzo A. - Napolitano M. R. - Maggiore G., *Acquisizioni nei settori ad alta intensita di*

conoscenza - un'analisi interpretativa basata su casi di successo, Franco Angeli Ed., 2011;
[5] Crisci G. M., Gattuso C., Miriello D., Un manuale per una diagnostica intelligente - Contributo a Convegno Arkos: la diagnostica intelligente, Rende, 12-14 Settembre 2007.
[6] Gattuso C. , *Per un approccio razionale al piano diagnostico*". Atti del convegno "IIth Convegno Internazionale AIES - Diagnosi per la Conservazione e valorizzazione del Patrimonio Culturale", Napoli, 15-16 Dicembre, 2011.
[7] Han J., Kamber M., Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers. 2000.
[8] Gattuso C. , Crisci G. M. , *Il piano diagnostico tradizionale e la procedura informatizzata DIMA*, Atti del convegno "Convegno Arkos: la diagnostica intelligente", Cosenza, 28-29 Giugno, 2007, 2008.
[9] Gattuso C., *Approccio Object Oriented nell'opera di conservazione e/o restauro di beni di pregio storico-architettonico* - atti IIIth Convegno Internazionale AIES - Diagnosi per la Conservazione e valorizzazione del Patrimonio Culturale, Ethos ed., Napoli 2012
[10] Gattuso P., Gattuso C., Crisci G.M., *La ricerca storico-architettonica nel contesto del piano diagnostico*, in Archeomatica, n.1- A&C2000 editore, 2010, Roma
[11] Marino L., Il rilievo per il restauro, Hoelpi, Milano, 1990.
[12] Fazio C., Fiani M., *Comparison between Laser Scanning and digital photogrammetry techniques used in the production of Digital Terrain Models (DTM) of landslides*. Proceedings of XIII ADM - XV INGEGRAF International Conference, Salerno, 2003.
[13] Fiorini A., *Il trattamento informatico del dato tridimensionale in archeologia: dallo scanner 3d alla modellazione vettoriale*, in Nuove frontiere dell'archeologia: il trattamento del dato tridimensionale. Atti del Seminario, Ravenna, 2004.
[14] Gaiani M., *Strategie di rappresentazione digitale: modelli per la conservazione e il restauro*, in "Quaderni 10 Centro di Ricerche Informatiche per i Beni Culturali", Scuola Normale di Pisa, n. X, 2000.
[15] Francovich R., Parenti R., *Archeologia e restauro dei monumenti*, Firenze, 1988
[16] Crisci G.M., De Francesco A.M., Gattuso C., Miriello D., U*n metodo geochimica per la determinazione della provenienza di lapidei macroscopicamente omogenei. Un esempio di applicazione sui monumenti del centro storico di Cosenza*- ARKOS -Edizioni Nardini - Anno IV - Nuova serie, Firenze 2003.
[17] Andreoli F., Scaini G., *I minerali d' Italia*, Rizzoli Editore, Milano, 1978Morbidelli L., Le rocce e i loro costituenti; Bardi Editore, Roma, 2003
[18] Peccerillo A., Perugini D., *Introduzione alla Petrografia Ottica*, Morlacchi Editore, Perugia, 2003.
[19] Mattini M., Moles A., *Scienze e restauro*, Cardini Editore, Firenze, 2003

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Cultural itineraries and slow paths. Historical and environmental resources for territorial planning

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Abstract
In recent decades, the landscape paradigm has defined a new approach to conserving and managing the cultural heritage, starting specifically with a change of scale, which now takes into account not only the single elements of cultural heritage but also the heritage in its context, i.e., territorial, social, cultural and economic.
Cultural itineraries are described in this framework—in their wide, complex meaning—as a network that connects historical structures, territorial elements, and landscapes (i.e., ancient towns, historical buildings, routes and paths, rivers and valleys, ...).
Furthermore, cultural itineraries lead to the possibility of interpreting and developing new meanings for cultural heritage, even rethinking their roles related to contemporary landscapes and contemporary values.
From these premises, cultural itineraries also become a strategic objective of urban and territorial planning, since they are linked to territorial improvement and allow for new models of governance to be experimented with and innovative scenarios of sustainable development to be defined.
This paper explores the meanings of cultural itineraries by studying the landscapes of the Lauretana pilgrimage route, a historical route that winds across central Italy through a network of paths leading from Rome to Loreto. It explores the relationship between ancient modes of travel and the contemporary way of slow walking, and it shows the relationship between cultural and territorial networks as well as ecological and environmental ones.

Keywords: cultural itineraries, environmental networks, heritage, slow paths, landscape.

1. Cultural Heritage and Cultural Itineraries
Many different requests that attest to the changeable nature of a “nomad concept” [1] are coming together today in the field of cultural heritage, evolving with the evolution of society, its values, and its rules.
Recognition of the value of heritage began on a worldwide scale with the preparation and adoption of the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972) by UNESCO. Since then, an awareness has matured, spread, and consolidated that links the cultural heritage not only to cultural objects that are well recognized and protected on the national level, but also to objects that appear on a smaller scale closer to daily life and which reflect local diversity linked to the production of culture and techniques as well as the understanding of non-material goods, i.e., the intangible heritage.
The release of the local dimension has also allowed relationships between communities and the heritage to be looked at in an ever-wider view of the heritage, as is reflected upon in The Framework Convention on the Value of Cultural Heritage for Society (The Faro Convention, 2005), which “for the

first time offers a holistic definition of cultural heritage. It expresses the principle that preserving this heritage is not an end in itself but has the aim of furthering the well-being of individuals and the wider expectations of society" [2].
This openness and evolution should also be related to confirming the landscape paradigm as expressed by the European Land Convention (ELC), which highlights its complex and changeable relationship linked not only to excellence, but also to marginality, and introduces the population's role in recognizing their own landscapes.
Starting with the notion of "landscape", rethinking the concept of "heritage" means using a perspective that moves attention from the object to the context, highlighting the relationships between elements that articulate the landscapes themselves. In this view, the heritage is no longer just a casual combination of goods or resources of various types and independent value, but becomes a complex system that is more or less coherent and is interconnected with the historical, cultural, natural, tangible, and intangible inheritance, affinities, and networks of relationships that link places and social structures [3].
Talking about the territorial heritage then seems to be the concept that best expresses inclusion of the heritage in territorial networks and confers a specific mandate on planning in the heritage area as well.
In this framework, the concept of "cultural itinerary" is a key concept in dealing with the relationship between the heritage and the landscape from a territorial point of view, identifying the relationships between history and modern day, and interpreting contemporary landscapes through plans and projects aimed at territorial transformation.
In matters of cultural itineraries, the main references in Europe are two different but somehow complementary documents that specifically confront the theme of cultural itinerary with the additional aim of trying to define it.
The Charter on Cultural Routes prepared by ICOMOS speaks about this in terms of heritage category, a complex cultural object whose components are not only the timely elements that constitute it and which represent the manifest content, but also the natural context of reference, its overall meaning, dynamic character, and geographical and territorial means contained in the itinerary. According to this vision, a cultural itinerary is not placed above other heritage categories, but becomes a tool to reading the heritage and contributes to recognizing, improving, and enriching it with meaning [4].
The second document, prepared by the Council of Europe and expressed through a specific resolution (Resolution CM/Res(2010)53), defines a cultural route "as a cultural, educational heritage and tourism co-operation project aiming at the development and promotion of an itinerary […] for the understanding and respect of common European values" [5].
In general, cultural itineraries are configured as a system of networks and relationships that develop over time and space and which represent evolutionary, interactive, and dynamic processes in human relationships linked to the specific phenomena of mobility and exchange. Their innovative character resides precisely in being composed of dynamic factors that over time take on different territorial configurations, repeatedly charging themselves with new meanings that make it a model for reading and interpreting landscapes and directing territorial transformations.
Following its path—the first characterizing element of the itinerary—the study of the via Lauretana starts by identifying the territorial configurations that have represented its landscapes over time, those territorial and social configurations that have characterized it, and which the road itself has contributed to mould.
The Via Lauretana is a historical pilgrimage route that connected and still connects Rome to Loreto. It consists of a network of paths that cross very different landscapes: the road intersects urban and rural contexts, runs along valleys, and crosses the mountainous Apennine chain; it winds through small hill towns and landscapes in the Marche region, reaching the Marian sanctuary of Loreto containing the Holy House; it finally continues towards the sea and the port of Ancona, and connects to other roads [Fig n. 1]. Over time, this road has taken on different connotations: it has been a commercial route, a pilgrimage trail, a postal route, and also a travel itinerary in the era of Grand Tours [Fig n. 2,3]. It is currently configured as a high-speed route that modern needs have made ever more functional for vehicular mobility, pushing aside the possibility of identifying the different ancient traces that intersected the towns and ran alongside rivers.
The current situation is therefore a fragmented system where the relationship between history and modern day is reflected in the landscape, where ancient forms face more modern structures. This is valid both for the architectural structures and urban centres and for the natural areas and resources.
The temporary synchrony of these landscapes makes it necessary to find new codes to interpret the traces of a history that is both recent and remote, and to reconstruct a cultural fabric that is capable of recognizing and improving the territory's history. At the same time these codes should be able to innovate and transform the landscapes to enable them to evolve while maintaining their quality and resources.
The cultural itinerary allows new forms of productivity to be elaborated for these landscapes along with forms of contemporary use, reconnecting to themes (such as tourism) that are becoming ever more

cognizant, sustainable, and widespread, and exploring strategic territorial relationships (such as the relationship between the cultural and natural heritage).
The first aspect consists of the possibility of identifying new stretches and constructing new experiential methods that allow for the landscape use through walking and slow mobility. The second aspect tends to expand the range of territorial resources and standardize them, finding new markets and serving as the driver for new models, as well as managing the landscapes themselves.
According to this planning map, a cultural itinerary is not the combination of a road or the plan for a themed route that connects points of interest. It is rather the combination of projects and transformations that cultural networks and linear systems are capable of conveying, intercepting areas in which the cultural and natural resources together are transformed within their landscapes in a dynamic vision, which is the landscape itself.

2. Cultural Network and Landscape

If investigated through the opposition of descriptive categories gleaned from the historical (ancient/modern) and urban planning (city/country, central/suburban) disciplines, there is no doubt that the territory that modern day has produced is indecipherable. Next to signs of nature and history, new types of space continue to become stratified. They are often difficult to define according to a simple relationship of proximity or through a relationship of belonging to the place. Even when observed through the lens of identifying images in the culture of the communities inhabiting the territory, the current territory returns an effect of territorial detachment. Questions of ecosystem and landscape fragmentation are added to the condition of settlement dispersion, which therefore alter the consolidated local identity.
The temporary spatial acceleration dictated by the new world order has broken apart the relationships between citizens and inhabited space, between places and production materials. If in the past it was possible to discern a tight correspondence between places, uses, and meanings, today history and nature, ruralism and urbanism are again called to propose their own values within a new cultural context and a different territorial arrangement.
The territory has become the place in which many values and meanings recognized by different territorial players are overlaid in a manner that is often not shared and not infrequently also ingrained. Its indecipherability, therefore, is strictly linked to the economical and cultural dynamics of our time. This dynamics constitutes a fact with which the strategies and actions planned for individual territories should be confronted, with the general aim of constructing conditions of local sustainable development.
One response to this complex and multi-layered territorial condition was proposed by the new landscape paradigm introduced by the ELC. The landscape, recognizable to its inhabitants from its own natural and cultural resources, both material and non-material, becomes the place for dialogue [6], common good, and the entire resource through which to imagine sustainable development perspectives for the individual European territories.
The inclusive and complex dimension of the landscape, among other things, has returned landscape dignity to all parts of the territory and has reawakened attention to some space-usage practices (the practice of walking, for example) as forms of perception and knowledge of the place.
Moreover, the ELC has reiterated the newness of the network vision of the landscape, highlighting how the vitality of different landscapes is linked to the existence of multidimensional relationships between individual territories.
Among the numerous components recognized within territorial complexity, cultural networks certainly play an important role, in particular for their capability of favouring the process of resource recognition for sustainable local development. This renewed landscape vision projects cultural networks into a systemic and relational dimension by relating them to other heterogeneous networks, and no longer imagines them only as signs of connection between more or less distant points.
It is precisely the network dimension that characterizes our time. Different types of networks (transport, technological, natural, historical) and nature (material and digital networks) cut through modern territories, thereby constructing the new geography of relational systems in which we live. In the literature, the image of “hyper-landscape” has been coined [7]. This proposal derives from the possibility of considering the landscape in its hyper-textual dimension. A landscape, like a hypertext, has a network structure, is denoted by a determined degree of complexity, is composed of heterogeneous information, both material and non-material, and is not equipped with a unique organizational centre, but rather displays multiple centres. In this vision, proposed not as univocal and absolute, but rather as a possible interpretive key of landscape complexity, the cultural networks can be better understood both in their material and non-material nature as well as in their coexistence with other networks.
Investigating cultural networks in a hypertext key favours the recognition of historical fragments, which are often catalogued as historical/cultural goods deposited in the territory not as isolated points but as

nodes pertaining to a navigational path in an interconnected and interdependent system. Even more clearly, cultural networks express their material and non-material landscape nature in the presence of traces of the old roads and in the points they connect; as such, it is possible to find them continuous and integral today. Such points are not only nodes in the cultural network, but also in the landscape hypertext. They are, in fact, the depository of a series of material and non-material informational data, whose knowledge can activate links with other nodes in the hypertext, even those not directly related to the cultural dimension. In the same way, the old roads are today overlaid by new means of travel connected to their nodes and to other meanings. These travel systems, nevertheless, pertain to the same local landscape mosaic crossed by the road. It is their consistency in different eras and different relational systems that render them distinct but necessary parts of the current landscape hypertext.

Expanding upon this metaphor, cultural networks in hyper-landscapes are configured as networks within other networks. The vitality of the single landscape is given precisely by the interdependence of the different networks. In the hypertext image, different networks can co-exist, be overlaid, intersect, and be used by the hypertext user—the individual—in their different, also ingrained, contents. Communities today have thus built their own landscapes, accepting the coexistence and conflict between traces and multiple meanings.

If this theory tends to favour an understanding of landscapes, it is not always destined to provide a strategic solution to planning. However, it may be interesting to apply the hypertext metaphor to specific ways of using the landscape, which may simulate hypertext navigation to verify possible paths for innovation.

One of these is certainly the practice of walking the landscape. It is not by chance that in precisely the era characterized by phenomena that have altered the space-time dimension and virtuality that this return to the slow dimension of landscape use is registered. The emphasis accompanying the multiplication of proposals for discovery along slow paths in some places could be interpreted as an antithetical response to the paradigm of modernity with its characteristics of speed, virtuality, and dislocation. In fact, individuals face difficulty in interpreting the places where they live and that “anxiety of reconciliation with one’s own history and with nature” arises, “which is born as a reaction to uprooting and deterritorialization processes that tend to cancel out any relationship with places and which modernity had dissolved” [8].

Travelling slowly on foot or with other light means of transport, imagined not within the specialized closed infrastructure of external relationships, but along the traces of the old road, thick with interference from other tracks and networks, becomes a tool to favouring the perception of culture by the traveller, not in an isolated way, but rather within the hyper-landscape.

On the one hand, this use/perception method can protect from the risk of separating the material and non-material cultural dimension from the rest of the territorial context. Such a condition would limit the risk of imagining conservative strategies separate from the perspective of sustainable development of the place.

On the other hand, it could stimulate the design of new forms of using the space within a larger compatible improvement of the landscape resources, and protect it from the temptation to turn the cultural object into a museum.

Developing such planning ability within the image of the hyper-landscape can facilitate the conception of cultural networks within the widest and most complex landscape system. The act of walking can therefore become a useful instrument for plans directed at stimulating the knowledge of the local culture, favouring a new, more aware interpretation of it, and place coordinated actions in the field to conserve and promote endogenous resources.

3. Cultural Heritage and Environmental Networks

The concept of “environmental network”, more commonly known as “green infrastructure”, whose principal reference is given by the concept of greenway (from the combination of green belt and parkway), appeared for the first time at the end of the 1950s in the urban plan for the city of Philadelphia. It indicated a system of green paths and parks aimed at integrating recreation with ecology, and naturally carries with it themes of “connection” and “multi-functionality” and the concept of “open space” [9].

Environmental continuity is revealed as an articulated, connected system including the ecological and landscape paradigm and involving numerous private and/or public open spaces, which are in turn marked by a wide range of functions. The multiple diverse functions that environmental continuity can undertake can be brought back within a wider definition, that of a dual function.

Environmental continuity can, in fact, undertake the role of maintaining a good degree of naturalness and therefore work as an ecological network and at the same time allow good use to be made of open spaces, especially green ones (in their relationship with urbanized spaces), functioning like a greenway network for recreational pedestrian and bicycle access. Within the dual sphere indicated

above, the different means through which environmental continuity can be expressed are synthesized in the image and meaning of multi-functionality.
Multi-functionality, in as much as it represents the relationships that are created in a territory between different places and relational networks activated between the different activities, functions, and uses of the territory, can help determine greater potential for the place, and can consequently participate in reaching environmental, economic, and social objectives. Coherent with the concept of multi-functionality and in virtue of the overall network of functions and services that the environmental infrastructure is capable of supplying—ecological, recreational, historical/cultural, and educational services aimed at both improving the quality of life of the community and guaranteeing greater sustainability—the environmental structure constitutes the representation of that connection mentioned before between different landscapes, urban, suburban, rural, and natural places, or rather the composition of a mosaic capable of providing a unitary vision starting from different elements and spaces. Such a mosaic, the expression of a connection network understood as each space acting as part of a wider system and in a functional and integrated way within the green infrastructure, is specified in many different ways according to the context and intervention scale.
The existing reciprocity and link between the theme of connection (the unique distinctive character of each environmental network) and the theme of multi-functionality highlights the “open space” as an area of reference. The environmental network, as described up to now, therefore represents a system of open, green, accessible spaces interconnected with the settlement system: a system that may have different characteristics, but which is always aimed at looking for good practices capable of refreshing and guaranteeing relationships between the natural and historical/cultural components, and increasing the integration with local communities in order to protect, use, and develop activities directed at local sustainable development.
Among the signs of environmental continuity, such as the opportunity to imagine new projects for public spaces, new connections, new relationships, new models of human/environment interaction, new relationships between natural and cultural resources, and new forms of sustainable use, important and illustrative actions appear. These may be, for example, the development of natural corridors, the realization of sustainable transport, planning green spaces that can transform cities, and improving the environmental quality of the territory. It is exactly this theme of use within the environmental network that constitutes the link, the bridge that specifies the existing connection between environmental continuity, cultural itineraries, and tourism [10]. Environmental continuity can and should interact with cultural itineraries and cooperate together to produce sustainable tourism. Cultural itineraries are approached from a natural perspective. The “natural glance” with which Geddes defined his “visual” way of getting close to reality comes to mind.
In particular, considering cultural tourism as the manifestation of attention to territorial and cultural signs as well as cities, places of art, small urban centres scattered throughout the territory, natural parks, and the traditions, gastronomy, craftsmanship, and all the other social/cultural elements that characterize a given territory, environmental continuity becomes the framework for the numerous diverse networks and/or forms of sustainable use, in particular for all those forms that refer to the so-called hereditary patrimony (ecotourism, wilderness tourism, adventure tourism, agritourism…). The concept of “heritage tourism” [11] therefore becomes relevant.

4. Cultural Network for Territorial Governance

Despite the economic crisis, the tourism trend continues to be a characteristic factor of the local economy, and one of the reasons for the resilience of cultural tourism is the fact that the range of cultural motives for travel is broad and rapidly increasing as a result of postmodern fragmentation. Instead of a ‘mass market’ for cultural tourism, one can identify a growing range of cultural tourism niches related to specific facets of culture that appeal to tourists or which are being developed by destinations.
Among the most important of these new market niches are:
– creative tourism;
– educational tourism;
– gastronomic tourism;
– religious tourism;
– spiritual and holistic tourism;
– wellness and spa tourism;
– cultural volunteer tourism;
– roots of migrant tourism.
A specific study has recently been conducted to support this. Entitled “The study on the impact of European Cultural Routes on SMEs’ innovation and competitiveness”, it was financed under the Competitiveness and Innovation Framework Programme (CIP), which aims to encourage the competitiveness of European enterprises.

This study was launched jointly by the European Commission (EC) and the Council of Europe in September 2010. Its objectives were to provide insights into the effects produced by transnational cultural routes—such as those certified by the Council of Europe—on SMEs' performance, innovation capacity, and network and cluster development; to examine the potential of cultural routes for promoting sustainable and quality tourism in Europe; and to analyze to what extent cultural route networks can benefit SMEs, especially in rural areas and lesser known destinations.
The provisional edition of the study shows that cultural tourism is an increasingly important segment of the total tourism market involving visitors and local residents, who also seem to appreciate the potential benefits of cultural tourism as it is a form of quality tourism.
The OECD report on culture and tourism (2009) indicated that the main drivers for developing culture and tourism policies are:
– improving and preserving the heritage;
– economic development and employment;
– physical and economic regeneration;
– strengthening and/or diversifying tourism;
– retaining population;
– developing cultural understanding.
The data seem to confirm that cultural itineraries represent a system and strategy that can nudge local economies and make use of the ever more widespread territory, transferring a strategy of recovery and improvement of an often fragile territorial heritage to the constant care of the territory that is also too often found in a state of fragility.
However, from the planning point of view, cultural itineraries pose new questions that go beyond tourism and local economies strictly linked to tourism. This recalls the need to confront landscape management within new and innovative planning and territorial governance actions and to convey their transformation in a contemporary key and in relation to contemporary phenomena such as reconverting agricultural systems, new production and techniques, demographic trends, and phenomena of contemporary urbanization, etc. Reading landscapes through cultural itineraries is not only an aspect of tourism, but also allows the already noted heritage and its relationships to be recognized, identifying other territorial heritage and environmental resources in relation to the contemporary examples, elaborating new meanings, and experimenting with new governance models.
In the perspective of a territorial improvement project, the concept of "territory" and "network" take on new relevance. The territory can be understood as the area of reference in the improvement process for individual goods and the landscape, while the network is the instrument with which the "complexity", the composition of the structure, and relationships between different elements can be described [12]. Not only this, the network can also become the instrument with which the reciprocal relationships between the natural and anthropic elements can be represented, as well as an instrument for systemically organizing the resources and services linked to it. The cultural itinerary enters into this network among networks, situating itself as a mediator between things and the memory of the territory closed within the traces of history. In such a way, the past can be carried into the present.
If historiography codifies signs of the landscape according to an approach that explores the relationships between heritage and context, it is in planning that the heritage is interpreted and inserted within new scenarios. The cultural itinerary is therefore the planning instrument and contributes to deepening the relationship between heritage and planning, sanctioning the ownership of the first by the second. The heritage is therefore a subject that should be confronted within planning not limited only to the landscape, but within ordinary planning, from the wide scale to municipal planning. In this sense, the ELC is very authoritative in assigning great responsibility to planning in the processes of improving the territorial and landscape heritage.
The cultural itinerary can provide a decisive contribution in the challenge open within planning of how to "make a landscape" [13], i.e., how planning can distribute the landscape to the different levels of territorial government. Very often the landscape is not concretized within activation procedures by the directives and orientations of the regional scale to choose the design of landscape on the local scale. The cultural itinerary, being a linear system, a complex network that holds together different objects, times, objectives, and all their interactions, touches the different territorial planning levels, providing indications and orientations that can be taken to the specific scale of interpretation. The cultural itinerary therefore becomes a tool to renew the planning perspective, which becomes exploratory and develops along the lines of improving the various urban components that feed it in different ways on different scales.
In this sense, the planning ability of the cultural itinerary does not merely look at recovering a historical trail, but is the combination of all the local projects conveyed by the historical and contemporary territorial heritage that the itinerary identifies and reconnects to the territorial networks. The project starts from the cultural itinerary, which becomes the tool to interpreting the complexity of the territory.

The new vision that the itinerary introduces notes that territories do not exist as isolated objects, whose life is undertaken only in the mind and following a selection and abstraction made by the human culture, but they are rather still-recognizable historical systems [14]. The diffusion of the heritage, which at first glance may seem difficult to govern, takes on a positive connotation. The elements that were first seen as dispersed and isolated in a territory it did not seem to belong to are now dispersed by their pervasive character within the decision-making choices that direct the transformation of territories and within territorial networks. They are networks that should not contemporaneously hold all the elements of history together, but be taken up one at a time from the territorial heritage based on their uniqueness, being held within the territory and improving its refreshing relationships.
The itinerary acts by identifying these relationships, which however continue to evolve, transforming the meanings of the heritage and producing additional ones. Moving attention from the object to the context, working on the signs and form of history, it is then possible to confer on the heritage a planning dimension and new role within the organization and reordering of the territory.
Therefore, the improvement of the heritage does not occur only in tourism networks, but also within transformation projects with a landscape approach. This is a vision that, starting from the historical inheritance in memories and evidence of the past, recognizes the modernity of the historical territory in its incessant contemporaneousness with the culture of the society that inhabits and produces it [15].
In such a sense, the cultural itinerary interacts with planning, broadening the concept of participation as well. In fact, by walking and travelling, the cultural itinerary creates moments to meet and talk, where participatory processes are born. The practice of walking offers many points for participatory planning of the places of daily life, in which not only tourists or outsiders, inhabitants, and citizens interact, but also interested populations that take part in choosing to manage the territory as the ELC hopes.

5. Conclusion

A fertile relationship between cultural itinerary, environmental networks, and the heritage can produce territorial development and orient land design. The cultural itinerary characterizes the different landscapes and local settlement contexts, marking the link between goods and territory, and favouring the improvement and increasing endogenous resources through the construction of super-local networks. Environmental networks (and all that comes from nature) interact with cultural paths, providing spatial anchoring or becoming the opportunity to superficially change the compromised and degraded spatial situation. The basic premise however, is to give a planning approach to the system articulated by the network in its complexity. The historical itinerary is not only the custodian and witness of a past to be protected and preserved, but also the nervous system of new sensory worlds that unfold on the territorial level, creating new landscape visions. In this sense, the touristic improvement that development of these slow paths can produce is only the first step in a process of complex and organized territorial reorganization based on a reciprocal mixing between memory and modernity.

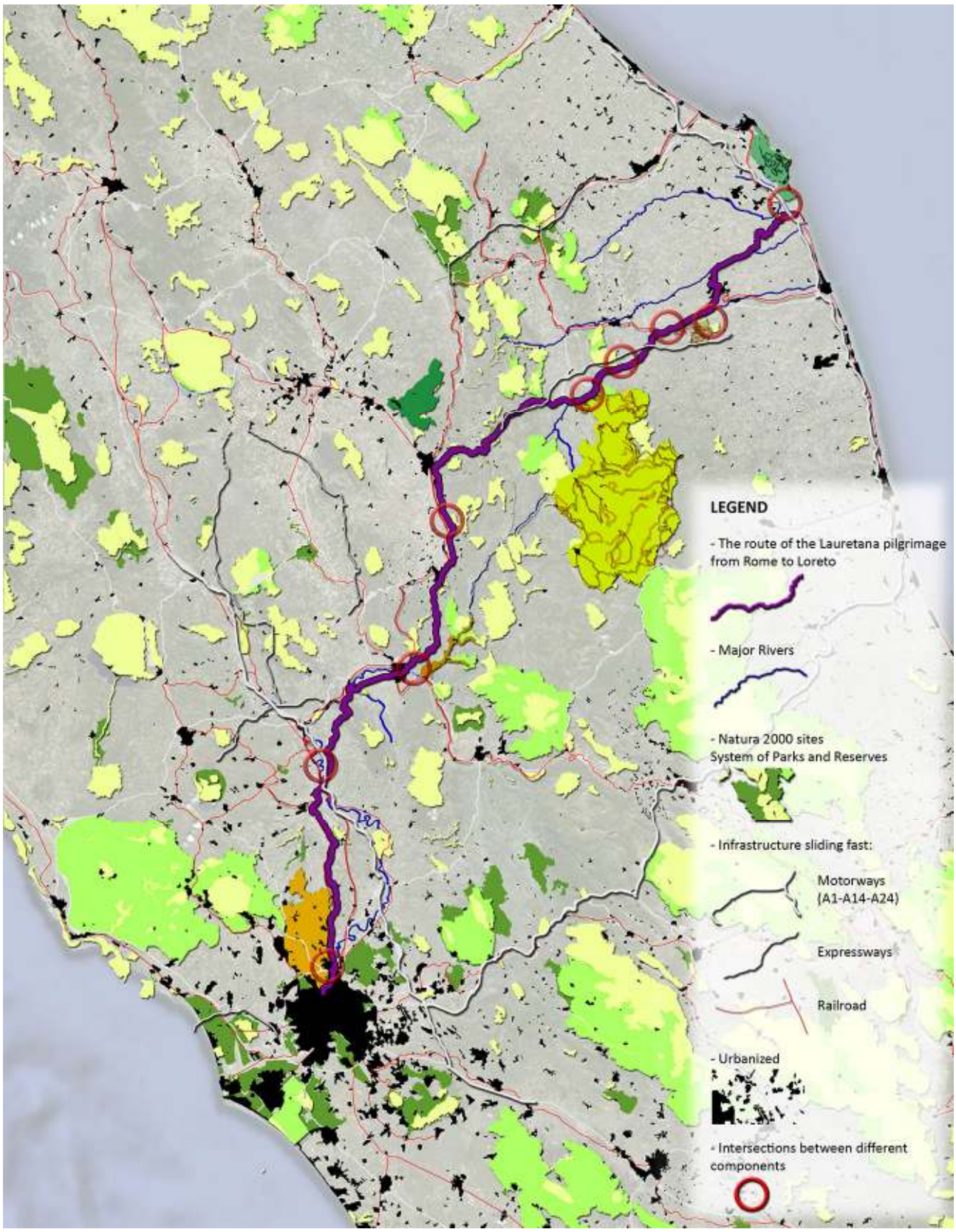

Fig. 1: The network of the Lauretana pilgrimage in relationship with the territory. Intersections, connections and contacts with the settled areas and the natural continuity. In: SARGOLINI, M. Percorsi veloci e percorsi lenti (ovvero elogio della lentezza). In: FALQUI E. (eds), C*amminare il paesaggio*, Pisa: Ets Edizioni, 2012, p. 95-108. Drawing by: CAPRODOSSI, R. GAMBERONI, C.

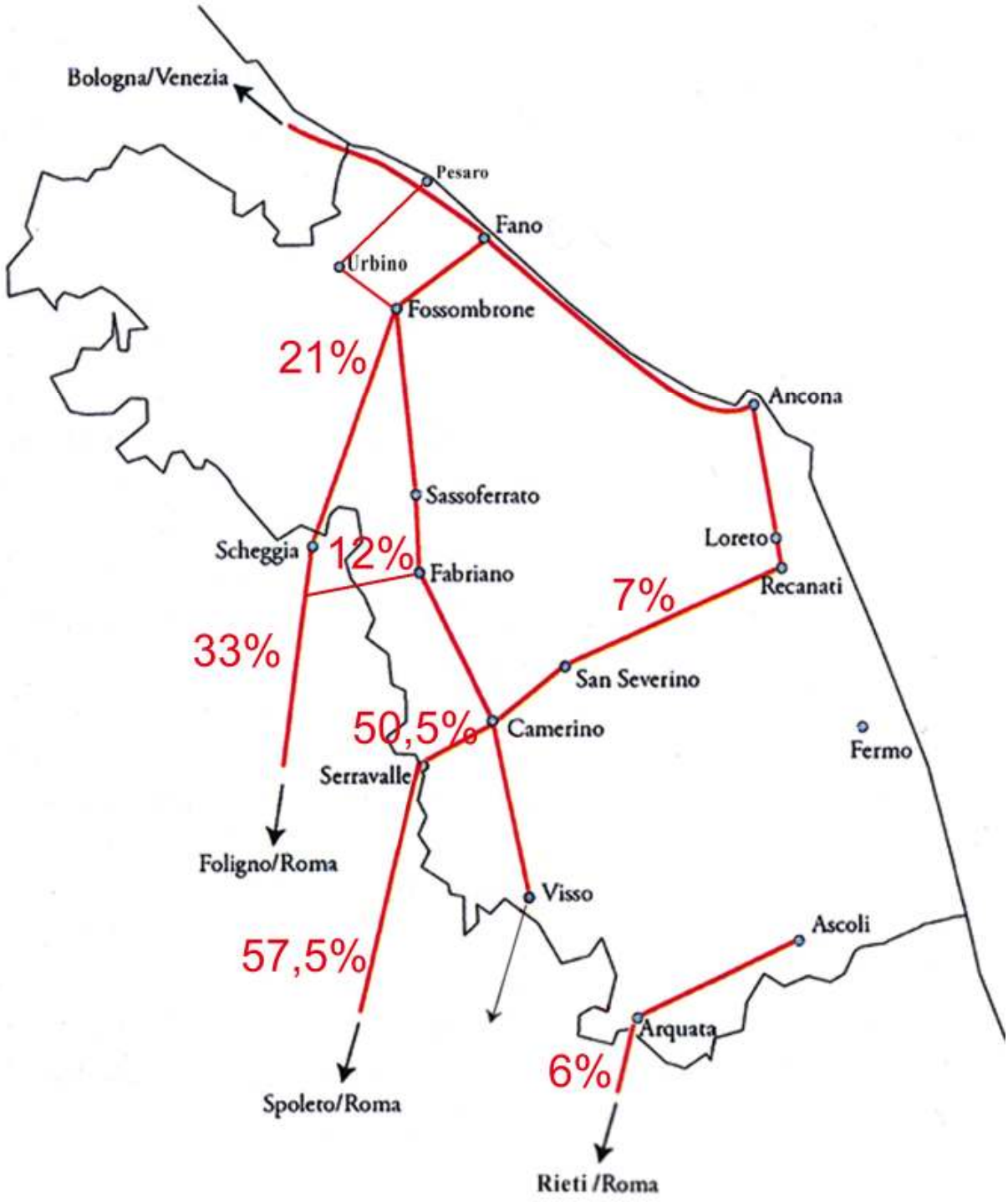

Fig. 2: The routes of merchants between Marche and Rome in the Middle Ages. The way most intensely frequented by caravans of merchants, with more of 50 percent of transit, is identified with the main itinerary Roma-Loreto before 1578. ASRoma, *Camerale I. Camera Urbis*, regg. 26-42; E. DI STEFANO, *Tra le Marche e Roma nel Quattrocento. Produzioni, mercanti, reti commerciali*, Camerino-Narni: 2011, p. 35.

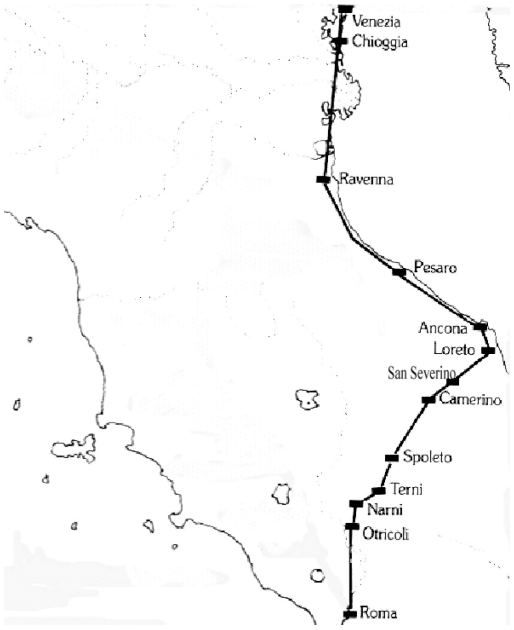

Fig. 3: From Venice to Loreto and Rome. The route of the journey of a French piligrim in 1480. E. DI STEFANO, Condizioni economiche e sviluppi politico-religiosi. L'antico itinerario romano-lauretano (fine XIII sec.- metà XVI sec.), in T.CROCE, E. DI STEFANO (Eds), *La viabilità interregionale tra sviluppo e trasformazioni. L'antico tracciato della via romano-lauretana (secc.XIII-XVI)*, Naples: 2014, p. 29.

Bibliographical References

[1] CHOAY, F. *L'allegoria del patrimonio,* Roma: Officina Edizioni, 2005.

[2] COUNCIL OF EUROPE. *Heritage and beyond:* 2009, p. 10.

[3] GAMBINO, R. Patrimonio e senso del paesaggio (Riconoscere il patrimonio territoriale). In PAOLINELLI, G. *Habitare. Il paesaggio nei piani territoriali*, Milan: Franco Angeli, 2011, p. 139.

[4] ICOMOS. *International Scientific Committees, Charter on cultural routes:* Québec, 2008.

[5] COUNCIL OF EUROPE, COUNCIL OF MINISTERS, *Resolution CM/Res(2010)53*, 2010.

[6] SARGOLINI, M. (Eds), *Paesaggio territorio del dialogo*, Rome: Kappa, 2005.

[7] CASSATELLA, C. *Iperpaesaggi,* Turin: Testo & Immagine, 2001.

[8] GAMBINO, R. Introduzione. In CASTELNOVI, P. (Eds), *Il senso del paesaggio*, Turin: Ires, 2000.

[9] PERABONI, C. *Reti ecologiche e infrastrutture verdi,* Rimini: Maggioli, 2011.

[10] SARGOLINI, M. Lo sguardo storico sugli aspetti naturalistici. Presentazione. In AA.VV. *Studi Montefeltrani:* 2009, vol. 31, p. 169-174.

[11] SARGOLINI M. MORANDI F. MARZO D. TOLA A. USAI A., *Organizzazione e pianificazione delle attività ecoturistiche: principi ed esperienze*, Milan: Franco Angeli, 2013.

[12] PAVOLINI, E. SARGOLINI, M. (Eds) *Economia, Società e Istituzioni tra processi globali e sviluppo locale - Uno studio nella provincia di Macerata,* Milan: Franco Angeli, 2009.

[13] PEANO, A. (Eds.), *Fare Paesaggio. Dalla pianificazione di area vasta all'operatività locale*, Florence: Alinea, 2011.

[14] CALZOLARI, V. (Eds), *Storia e natura come sistema*, Rome: Argos, 1999, pp. 137ss.

[15] GAMBINO, R., *Trento Landscape Observatory*, 2011.

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Correct use of materials and technologies for a sustainable design: the study of “Acrilica” lamp by Joe and Gianni Colombo.

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Abstract
The theme developed is the Re-design of a cult object of Italian Design: Joe and Gianni Colombo’s “Acrilica”. The initial lamp has been revisited with the aim of creating a product with a lower weight and a greater efficiency, in order to achieve a sustainable design through the method of “Concurrent Design”. At The end of Re-design a comparative environmental assessment with the initial product has been made, using specific software tools. The “AcrIlica”, has been subjected to analysis of transversal type.
This has led to a new lamp which provides a redefinition of the form of the convector in PMMA, a decrease of its thickness, a change of the direction of whole lighting apparatus; with the aim to ensure the refraction of light along the curve in PMMA and in the direction of its support plane and therefore reduce the dispersion of the light and the environmental impact. The whole design and the choice of the light source aims to an optimization on multiple levels which gives improvements in terms of use of materials, functioning, processing technologies and duration of the life of the lamp.
Finally for the comparative LCA(Life cycle assessment), we have followed the ISO14040-ISO14043 standards that regulate the same LCA methodology and to communicate the data, the EPD certification scheme(Environmental Product Declaration. ISO14025).
The final product has a higher lighting efficiency with an implementation of the illuminated area of 50% and a weight reduction of 46%.

Keywords: Sustainable Design, Research and Innovation

1. Foreword
This work is the result of an ambitious project of re-design. Through experiments and comparisons, an attempt was made to redesign a cult object of Italian design: the “Acrilica” of Joe and Gianni Colombo. Knowing the progress made by science and technology, we have tried to highlight the limitations that the original design presented and groped, at least in part, by rethinking its physical characteristics, materials and processing technologies to overcome them. The object in question, in fact, although for the time in which it was made, represented a commendable and pioneering design expression designed and built today gives inspiration to many criticisms. In particular, the original insight of using a curved sheet of PMMA to convey light has not been accompanied by a rational use of the same material, aimed at optimizing its characteristics without, instead, to highlight its limits. The basic idea of this work is to re-design, recast, revise the concept of Acrilica, adapting it to new process technologies and new materials, enhance its functionality, improving it without neglecting aspects such as those related to the lighting function, the "gute form" and the proxemics. From a purely technical point of view, the method used for the re-design is articulated through various phases. The work starts from analysis of the shape, from the characterization of the materials, from the discretization of the components and from the study of the lighting function with the main purpose of identifying the “week points of the object” and to eliminate them for the redesign. Nothing is taken for granted, every aspect is examined and verified by computer simulations. The shape, the thickness, the surfaces of the materials used, the orientation of the lamp, the positioning of the light source are rethought(with a

particular attention to photodegradation of the acrilic polymer). There isn't an idea that precedes experience, but the experience becomes a way to give shape to an idea. Solutions are devised, tested and proven. The work was organized as a design process, as a work in progress that through empirical findings and practical applications ended with a significant study on the life cycle of the product (LCA, life cycle assessment). The "Acrilica" lamp and its redesign are compared from a point of view of environmental impact, in order to generate for the Re-design innovation and improvements also as regards the aspects linked to ecosustainability.

2. Description of "Acrilica" lamp

"Acrilica" is a table lamp giving indirect and diffused light, with a painted steel base and a Perpex diffuser. The lamp, designed by Joe and Gianni Colombo in 1962 and still produced by Oluce, golden medal at the thirteenth triennal of Milan 1964, was honoured with various prizes and rewards and now it is present in many permanent collections of great significance, among which MOMA stands out for its prestige (Museum of Modern Art). The desk lamp "Colombo 281" consists of a convector in PMMA bent into the shape of the letter "C" and a metal base, where is placed a small fluorescent tube (max 6W). The luminous flux rises through the convector, from the base to the top pointing downwards, which allows the enlightenment of the supporting surface. Therefore, a kind of diffused and indirect enlightment is obtained. The approach to the project perfectly reflects Joe Colombo's poetics turned to technological research and the exploration of material characteristics, inclined to futuristic scenarios.

3. The method to re-design.

The method used for re-designing of "Acrilica" lamp starts from a depth analysis of the same. This analysis is divided into several phases: the study of its form, the discretization of the components, the study of materials and their characterization, the analysis of processing technologies. Each part of the analysis is based on the identification of all the weaknesses of Acrylic lamp pointed out in the previous phase of analysis. After this stage, the re-design of the lamp starts, having an effect on the weaknesses, which are transformed into the strong points of the new project. Finally, after the definition of re-design process thanks to an evolution of design concept and by the means of the tools typical of integrated design(especially those related to verification tests and the validation of the efficiency of the luminous device), re-design is also validated from the environmental point of view, performing a comparative analysis between the life cycles of Acrilica lamp and its re-design.

4. Study of the shape of the lamp and discretization of its components.

The lamp "Colombo 281", or known as "Acrilica", occupies a footprint in space of 250x270x240 mm. The lamp consists of two main components: a bent 30 mm PMMA convector and a metal base. The metal base, which is the lodging of the light source (fluorescent tube max 6Watt), is made up of two parts. The assembly and the fixing of the components occurs by means of only five screws. Three screws are fixed in the lodging of the light source and the remaing two are directly fixed in the PMMA convector.

5. Characterization analysis by RAMAN FLEX400F

Physico-chemical characterization of the convector material was realised by means of two tools: RAMAN FLEX 400F and DSC822 METTLER TOLEDO. The Raman corresponds to a technique used for the identification and the analysis of molecular types; it is an equipment(RAMAN FLEX 400F) similar to FT-IR, but it offers a series of advantages. For example, raman cannot be used for the analysis of samples in the solid, liquid and gasseous state and for the analysis of powders, gels and sludges. Raman spectroscopy is based on the observation of the scattered light. Usually, when the light interacts with a substance, it occurs in three different ways:

- It can be absorbed
- It can be transmitted
- It can be scattered

Raman spectroscopy is the result of the dispersion of the light. The radiation can be resiliently scattered, that is without any variation of its wavelength (Rayleigh scattering), or it can be inelastically scattered, producing the consequent Raman Effect. There are two types of raman transitions: "Stokes radiation" (the photon collides with a molecole and loses some energy) and "anti-Stokes radiation" (the photon collides with a molecole and gains energy). Both "Stokes" and "anti-Stokes" radiations consist of lines that correspond to molecular vibrations of the substance in analysis. Every compound is characterised by its own and unique Raman spectrum, which can be used as a sort of digital fingerprint for the identification. The purpose of the experiments is to trace and identify a series of tracepoints along the body of the curve in PMMA, in order to understand the quality of the compounds found in the sample, through the raman spectra and the Stokes lines, thus succeeding in interpreting the type of photoaging that is observed on the material and the influence of

the light source position. A protocol for raman analysis was created and implemented, including 13 tracepoints and the analysis was repeated 3 times for each of them, in order to guarantee the accuracy of the result. The tracepoints were identified depending on their distance from the light source and every one was associated to a letter from A to O; the letter A corresponds to the closest point and the letter O corresponds to the most distant one. An analysis of 4 seconds (0,5 sec. per 8 esp.) was planned for each point and, before this analysis, the sample (in our case the curve in PMMA) should be cleaned with a special cloth.
The results of the analysis denote that the peak of photodegradation, pointed out by the presence of carboxyl groups (C=O, 1730 cm-1), in correspondence with the area identified by the points E, F, G , H and L (F and G with the maximum value). This area corresponds to the area that, in simulations, represents the maximum dispersion related to the light of the lamp. The fact that the N and O zones near the light source, but shielded from external light, do not show a considerable degradation, indicates that the material undergoes a combined effect of natural and artificial light.

6. "Acrilica": analisys of critical points

The Acrilica lamp is characterised by many criticalities, especially from a functional point of view and from the point of view of environmental impact. The peculiar shape of the convector, with a sharp curve and other curves along it results in a significant dispersion of the light and a poor lighting. For example, observing the Acrylic in a dark room, it is possible to notice that a considerable amount of the light, generated by the light source, is not conveyed, but it illuminates the area behind the lamp. This corresponds to an inefficiency, because the performance of the unit is not close to the maximum attainable. On the basis of this first analysis, the use of a 30mm PMMA convector is a possible solution, because a greater thickness permits a greater capacity to convey light. However, this kind of solution collides with environmental issues and manufacturing technology; actually, the overabundance of material (PMMA) induces an higher environmental impact (it will be showed in one of the next sections). Moreover, from the technological point of view, the use of a material with a high thickness, because it induces many problems in the process of heating and curving the sheet, in the phase of thermoforming.

7. Patent: study of utility model given in 1965

The research of data, informations and details about the brothers Colombo's study and path taken to arrive at the design of the "Acrilica", corresponds to one of the most important moments in re-design process of this lamp. This research, conducted in a transversal manner, engaging many people, corporations and archives, such as the architect Ignazia Favata, Joe and Gianni Colombo's archive, Biblioteca della triennale di Milano, UIBM (Italian Patent and Trademark Office) and Oluce. The research ended with the finding of the utility model n° 99349 (title: "Luminous component with the body in transparent material and radiant end") in ACS (Central State Archives), which was granted to Colombo brothers on 9th October 1965. As it is showed in the images, this utility model is not directly referred to the Acrylic, but it is useful in order to recall Joe and Gianni Colombo's experience in the early sixties. The shape of the luminous component designed according to the patent is linear, without any curve; as it was showed in simulation tests, realized through the use of softwares for rendering, this shape improved the funtionality and the efficiency of the product. Then, Colombo brothers have gone further on the research and they tried to convey the light through curved components in Polymethylmethacrylate. Although motivated by laudable intentions, the procedure represented a considerable step backwards from the functional point of view and it contrasts with many other logics related to the project (for example, the manifacturing process is more difficult, the production costs become higher, environmental impact rises). After the designing of the Acrylic, designers totally adopted its shape and carried on because of unwillingness, or the lack of means of simulation. In conclusion, Acrylic lamp produces great dispersion of light because of the curves of the convector in PMMA. Stretchings prevail over smart and green choices, nowadays required by development and environmental issues.

8. Design research: evolutionary steps

This paragraph shows the main developmental stages of the lamp. As it can be see from the image on the following page, the re-design process served many design aspects; the developments are not only relate to the the curve of the convector, but they involve, for example, the thickness of the component in PMMA, its curved surface, the direction of the lamp, the location of the light source and the ends of the convector. The evolution visualised in the image is not exclusively formal, but it is also characterised by a technical and functional development. The validation of design choices is done by means of simulations, realised by special softwares.

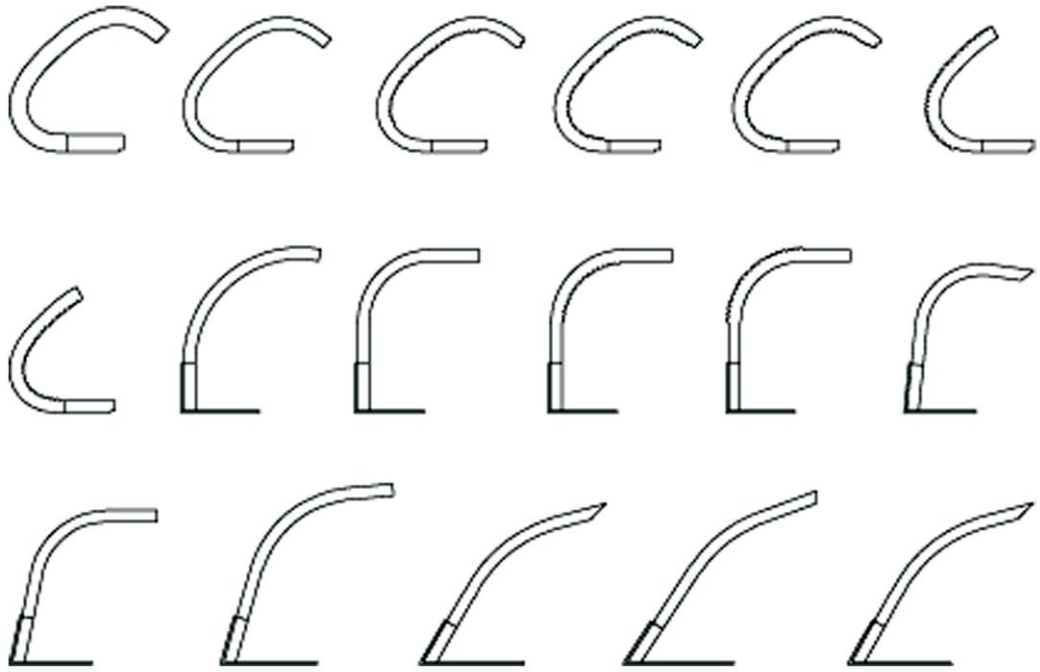

Fig. 1: Evolutionary steps of design

The stage of design research passed through simulations that allowed to verify and validate step by step the re-design the device from an aesthetical and especially functional point of view. The validation tools were the key, because they indicated what choises were to be made. The rendering softwares were not used for the presentation and the adornment of the project, but in order to verify its functioning and efficiency. In conclusion, thanks to simulations, it was possible to make certain choices, such as the changes of the direction or the declivity of the lamp.

9. Materials and production technologies used for re-design

The base of lamp is made of aluminum and it is produced by means of the curvature processing with numerical control and through the realization of 4 countersunk holes. After this process, the base can be painted with the defined colours.
The support of lamp is made of aluminum and it is produced by means of the curvature processing with numerical control; its shape is that of a box open on the rear side, inside which there is placed an housing by the shape of a "V" for the light source(LED). After this process, the base can be painted with the defined colours.
The coil is made of PMMA and it is produced by means of a sheet, previously realised by pouring; then, the sheet is curved by thermoforming. Later, it is necessary a cutting process with numerical control, in order to produce the component which is to be inserted in the metal base.

10. Life Cycle Assessment

The hypotheses formulated in the LCA study arise from the will of creating the basis for a serious and reliable comparison between the LCA of Acrylic lamp and its re-design. Consequently, the functional unit is defined as “support and shield of the light source during its usage phase”, not as the enlightenment during a certain period, in order to exclude the analysis of impact related to the two different light sources, which would have altered the focus of the study concerning the optimization of the design process, creating a considerable gap between the environmental impact of the two lamps. Actually, Acrylic lamp is characterised by a fluorescent light source; on the contrary, re-design lamp involves the use of led lights as luminous source. Although the use of led lights for re-designing is part of the eco-friendly designing choices related to the life cycle of the product, it would have overshadowed the environmental benefits linked to structural re-designing, which is more sustainable.
In the present case:
1) The consumption of Kwh per lumen of the light source is appreciably lower than the led light.
2) The duration of the phase of use of the two lamps is different.
In “Acrilica” lamp, the fluorescent light source produces the degradation of the polymer and, consequently, of the convector in PMMA, whereas in re-designing the degradation of the polymer is slower, because of the minimal dispersion of the heat per lumen, which is produced by the source of

led light. The formulated hypothesis are aimed at creating a comparative LCA between the life cycle of the two lamps, in order to provide to the designer the best eco-design informations.
According to this approach, the two cited conditions are omitted.

	ACRILICA LAMP	RE-DESIGN
CML2001, Acidification Potential(AP) [kg SO2-Equiv.]	3,364	0,509
CML2001, Eutrophication Potential(EP) [Kg Phosphate-Equiv.]	0,135	0,025
CML2001, Global Warming Potential(GWP 100 years)[Kg CO2- Equiv.]	388,806	62,809
CML2001, Ozone Layer Depletion Potential(ODP, steady state) [Kg R11-Equiv.]	0,001	2,430
CML2001, Photochem. Ozone Creation Potential(POCP) [Kg Ethene-Equiv.]	0,379	0,056

Fig. 2: Environmental impact of lamps

From the data shown in the table, it is clear that for four categories of environmental impact, the same impact is less than in the case of Re-design of the lamp and especially for the category of Global Warming Potential it is in a clear manner. Only for one category(Ozone Layer Depletion Potential) the environmental impact appears to be greater in the case of Re-design.

	ACRILICA LAMP	RE-DESIGN
CML2001, Acidification Potential(AP) [kg SO2-Equiv.]	0,241	0,114
CML2001, Eutrophication Potential(EP) [Kg Phosphate-Equiv.]	0,020	0,009
CML2001, Global Warming Potential(GWP 100 years)[Kg CO2- Equiv.]	31,145	14,851
CML2001, Ozone Layer Depletion Potential(ODP, steady state) [Kg R11-Equiv.]	0	0
CML2001, Photochem. Ozone Creation Potential(POCP) [Kg Ethene-Equiv.]	0,021	0,009

Fig. 3: Environmental impact related to the convectors of lamps

The data of table on the previous page refer to the impacts generated by the coils in PMMA of two lamps, they include the extraction of the material and its manufactoring(transport and energy are excuded from environmental impacts). It was decided to compare the coils, because the EPD shows that a good part of the gap of impacts between the two lamps is due essentially to the part in PMMA.

11. Concluding remarks

It is necessary to point out some findings of synthesis. The work explained in this paper recounts a design path aimed at the definition of a methodological approach to design. This method is oriented to an evolutionary and adaptive design method. All this is oriented to a kind of design that is not separated in different phases, but the stages are enclosed in a spiral which turns on itself several times, retracing and stopping at different times on the same aspects. It is a design that involves an "holistic" approach, without putting aside the rigor and the scientific aspect. First, the book focuses on the study of the Acrylic lamp: its shape, the discretization of the components, the study of materials and their characterization and the analysis of the technologies of processing. Later, the book focuses on the identification of the weaknesses related to the Acrylic lamp in the previous stage of analysis. In light of the found deficiencies, the re-designing starts and it proposes the transformation of those weaknesses into the strong points of the new project. Finally, after the definition of re-design process thanks to an evolution of design concept and by the means of the tools typical of integrated design(especially those related to verification tests and the validation of the efficiency of the luminous device; the device is also valued from the environmental point of view, performing a comparative analysis between the life cycles of Acrylic lamp and its re-design, by means of a peculiar software (GABI). Although the design so defined is based on premises related to materials and their processing technologies, involves all the aspects of design; actually, as it is showed in the preceding sections and subsections, changes in the re-design of "Acrilica" related both to the physical principles at the basis of the propagation of light and the aesthetic aspect of the device. Every possibility is examined by means of simulation tests, starting from the concept of "Acrilica" and leading to a lamp which is not "Acrilica"; but a luminous device which has changed its direction, uses materials with different thickness, different light sources. Moreover, it is a device based on a sustainable designing, thanks to the correct use of materials and technologies; it is a concrete project, which passes from rendering to a finished product and survives the productive, economical and environmental logics.



Fig. 4: Two prototypes of lamp

Bibliographical References

BELLOLI. *Nuove direzioni della cinevisualità plastica totale*, in Metro. Venezia, 1962.

CHOMKHAMSRL, WOLF, PANT, SALA, PENNINGTON. *Jrc Reference report on the International reference Life Cycle Data system(ilcd) handbook .* Institute for environment and sustainability. Lussemburgo, 2012.

MARTUSCELLI. *The chemistry of degradation and conservation of plastic artefacts*. Edizioni Paideia, Firenze, 2010.

http://refractiveindex.info/?group=PLASTICS&material=PMMA

http://www.acs.beniculturali.it/

http://www.archiviogiannicolombo.com/

http://www.botteon.it/?page_id=5

http://www.custompartnet.com/wu/thermoforming

http://www.fondazioneplart.it/museo/collezionestorica.aspx

http://www.idemat.nl/

http://www.intertek.com/analysis/dsc/

http://www.joecolombo.com/

http://www.materialmente.com/

http://www.moma.org/collection/object.php?object_id=102017

http://www.oluce.com/it/

http://www.perkinelmer.com/

http://www.philamuseum.org/

http://www.renishaw.it/it/spettroscopia-raman--6150

http://www.triennale.it/it/biblioteca/bibliotecaprogetto

http://www.uibm.gov.it/

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Methodological approach for the restoration of the Castle of Belvedere Marittimo (CS) - Calabria

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Abstract

In order to better preserve a monument, it is important, not only to be fully aware of its state of conservation, but also to be able to recognize any critical phenomena that might cause damage to it. Therefore, specialized studies should focus on rational methods, thus allowing correct interpretations of critical phenomena, the definition of the most suitable actions to take, and the identification and elimination of the causes which, over time, could damage the structure. Background knowledge plays a significant role in boosting the importance of cultural heritage and promoting enhancement actions able to raise the awareness and participation of the community. To this purpose, the study was focused on the analysis of the Castle of Belvedere Marittimo – in the province of Cosenza (Italy), which is currently in a bad state of conservation. The specific analysis method adopted was made up of three interconnected steps: knowledge management, control and representation, which enabled the coordination and execution of many operational steps. A preliminary phase of investigation was carried out focusing on the analysis of the geographical and historical contexts. This was followed by an analysis of the materials and structures together with an overview of the state of conservation of the Castle in order to obtain substantial information which may facilitate effective preservation actions. A preliminary static analysis was also carried out with particular attention to the enclosure wall.



Keywords: Cultural heritage, Conservation management, Masonry construction

1. Introduction

In order to guarantee the conservation and enhancement of a historic ancient building, it is necessary to acquire deep knowledge of all that is related to the monument, so as to be able to have a complete and detailed view, thus allowing the identification of appropriate interventions [1,2]. The study of the Castle of Belvedere Marittimo (CS) was carried out in line with the above mentioned approach. The

rational methodological procedure adopted started from the geographical and historical context of the city of Belvedere Marittimo. This was followed by an analysis of the monument (supported by graphic representations and photographic dossiers) aimed at producing an architectural and structural description of the Castle. Lastly, an analysis of materials and of the Castle's state of preservation was carried out. All of these steps are represented in the diagnostic plan scheme, reported in figure 1 [3,4,5].

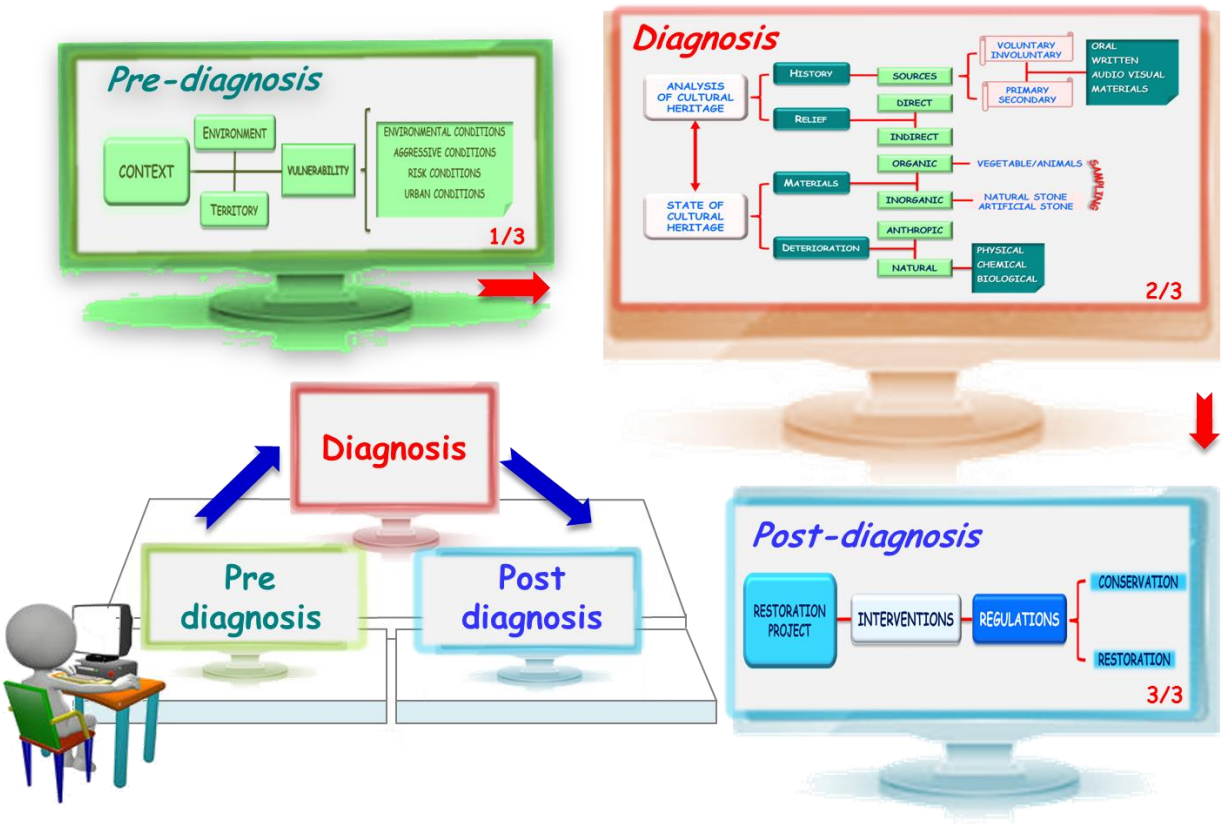


Fig.1: Diagnostic plan scheme

2. Geographical, urban and historical context

The Castle placed in the historic center of Belvedere Marittimo, is located at 300m above sea level, on the foothills of the Pollino massif not far from the Tyrrhenian Sea (Fig. 2). The area is characterized by plains and slopes, behind the Montea mountain, where the highest peak is 1786 m; and it has a rich variety of fauna and mature trees favored by a mild climate.

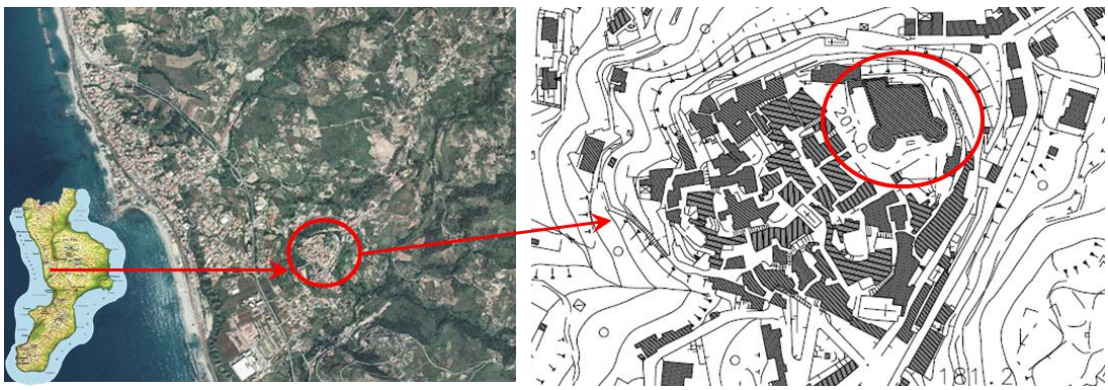


Fig. 2: Geographical and planimetric location

Sources trace the origins of the historical center of Belvedere Marittimo around the year one thousand, although some findings refer to previous centuries. When the Normans arrived in Calabria, around 1050, the feudal system was introduced and several castles were built to protect the territory; the first fortifications are said to date back from the VII to the X century A.D..

In 1046, after the siege of the Norman Drogo of Hauteville, the Belvedere Marittino Castle was partially destroyed. It was rebuilt in the XI century on its remnants, thanks to Roger II of Sicily. Subsequently, the Castle underwent a series of restorations by several owners, i.e. Ruggiero Sangineto (in 1287), Ferdinand I of Naples (in 1490), and finally Prince Sanseverino of Salerno and Prince Carafa. The Castle, thus, shows elements amenable to different periods: the portal with the royal shield and the enclosure walls can be traced back to the Aragon Era, while the two cylindrical towers are characterized by architectural ornaments of the Gothic Era. The interior was completely rebuilt for residential use by the Spinelli family. Finally, the Castle, which was completely restored at the expense of the citizens, took on its current appearance (Fig. 3). A plaque with two cherubs and an engraving was placed on the drawbridge to illustrate the reasons for the restoration carried out. Declared a National Monument for its peculiarities, its scale model is exposed in the park of miniatures -Italy in Miniature- in Rimini [6,7].



Fig. 3: Photos of the scale model in Italy in Miniature (Rimini) compared to a current photo of the Castle

In the XVI and XVII centuries, numerous towers were built for the sighting and defense of the town, four of which were located in Belvedere. In the sixteenth century, large noble palaces, which still exist, were built on the walls and defense towers, fulfilling different functions over time. Between the sixteenth and eighteenth century, several families with noble titles took over the Castle, changing its coat of arms. Over the years, Belvedere Marittimo gradually expanded, occupying the surrounding countryside; and, once the area below the town was reclaimed, the town further expanded reaching the coast. Despite its numerous stratification levels, the town still shows its Medieval origins, which characterized the social and political life in the historical center, and later allowed its fortification by creating a real urban plan. The historical center is crossed by a central road - with small shops and houses - and by the Castle from which the remnants of Medieval walls branch off, surrounding the historic center. During the twentieth century, some adaptations were made to the Castle in order to modernize its living conditions. Despite an attempt to maintain its original structure, the latter has been at times modified by restoration activities [8,9].

3. Architectural description of the castle

The Castle is located in the historical center of the city, on a steep rock, not far from the coast. It has a trapezoidal plan characterized by a smaller tower with crenellation on the South-East side, and a thick blind wall on the South-West side protruding from the enclosure walls which have a cylindrical truncated cone shape (Fig. 4). The entire complex is divided into two levels consisting of a slope and an overlapping parapet culminating in a Guelph crenellation. The two orders are characterized by the stringcourse, covering the entire perimeter of the Castle, including the curtains and the towers. On the towers, the stringcourse marks the separation between the cylindrical and the upper part. The main tower is decorated at the top by lancet arches with inclined piers supporting two stringcourse. On the south and west slopes, there are the remains of a moat; while in front of the old entrance are many narrow areas, which were used for the chains that supported the drawbridge. The Eastern walls are made of roughly squared rock made with the same rock the Castle was made of.

(A) (B) (C)



Fig. 4: East side of the castle: (A), (B) Two towers; (C) Drawbridge.

The drawbridge, which was built over a small ditch, connected the entrance to the masonry structure, allowing access to the Castle. The courtyard led to the blind walls , where a narrow path led to three central cells. In this narrow canal, there is a stone spiral staircase leading to the top of the flat roof. At the top of the Castle, there is an open space with gardens, surrounded by guarding routes. From the garden, it was possible to reach the rooms and the underground where, it is said, there was a hiding place, connecting the underground to the tower of Paolo Emilio, which was partially destroyed [10,11].

4. Conservation status

Nowadays, the overall structure of the Castle appears to be significantly compromised by the presence of creeping plants, such as moss and weeds, whose roots are the cause of the instability of the original masonry. Unfortunately, this biological degradation is significant, and it affects most parts of the Castle (fig.5).



Fig. 5: East side of the castle: biological degradation

The poor state of conservation of the Castle is evident on the East side of the perimeter wall where electric cables scar the view. In view of the intense erosive action caused by the location and the neglect of the area, the mechanical properties of the Castle have undergone significant alterations. Many cracks on the walls have caused, over time, the fall of parts of the structure, leading to an increase in its seismic vulnerability. This is mainly due to the action of exogenous agents; i.e. water has dissolved the limestone cement rock by transforming the calcium carbonate into calcium bicarbonate, thus creating new cracks which facilitate degradation (fig.5). In the 80s, the head of Fine Arts regional Board carried out strengthening action on the rock supporting the structure. The few timely interventions, carried out by the Castle's current owners, despite being technically inadequate, have prevented more significant collapses.

5. Construction materials, sampling and laboratory analysis

The stone materials used to build the walls of the Castle are mainly of sedimentary origin; the rocks are of irregular shape, many of which were taken from the area where the Castle was built and used for building one of the sides of the Castle.

Sampling of specimens taken from the upper part of the Castle were analyzed in order to formulate a scientific contribution aimed at realistic intervention actions. The sampling of specimens was not

invasive. Many of the samples which were taken had already fallen from the structure due to the cracks on the walls.
In particular, three samples taken from three different positions were taken into account. In addition to the samples of sedimentary rocks, samples of mortar were found (Fig. 6). Before carrying out an analysis of the samples, macroscopic pictures of the external surface of each of them were taken, and technical sheets regarding their macroscopic characteristics were compiled [12,13].

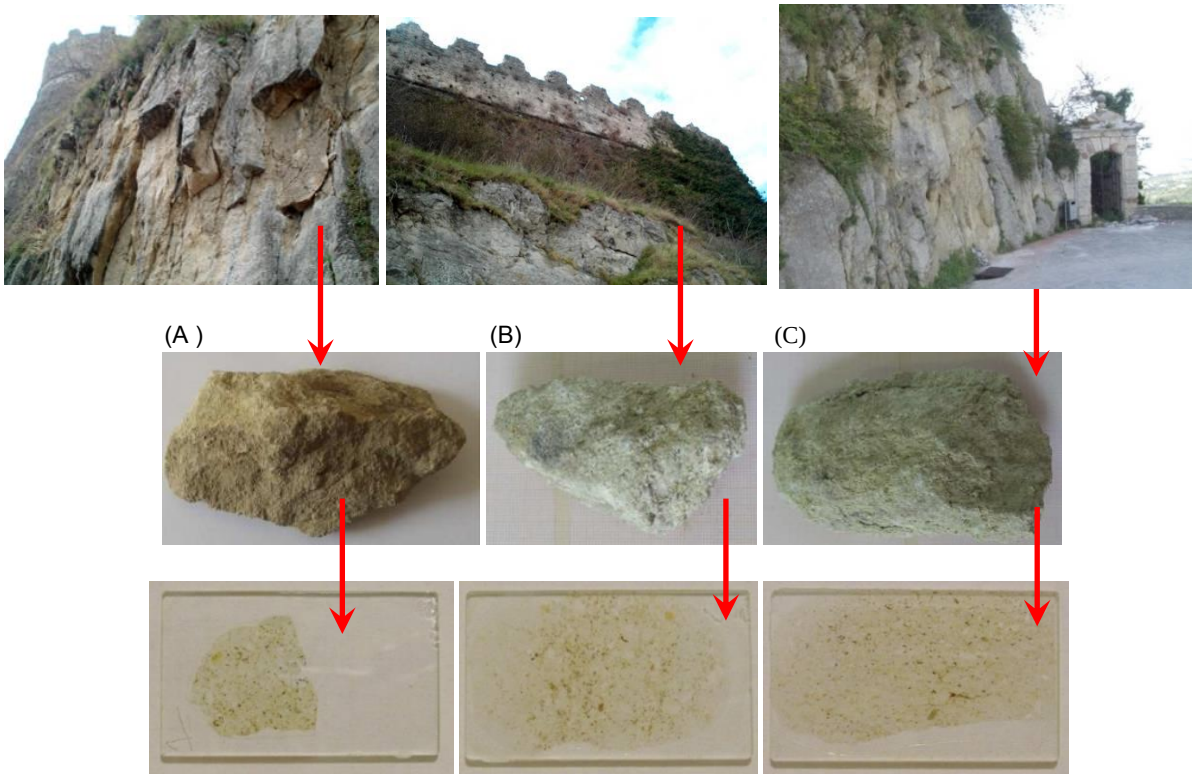
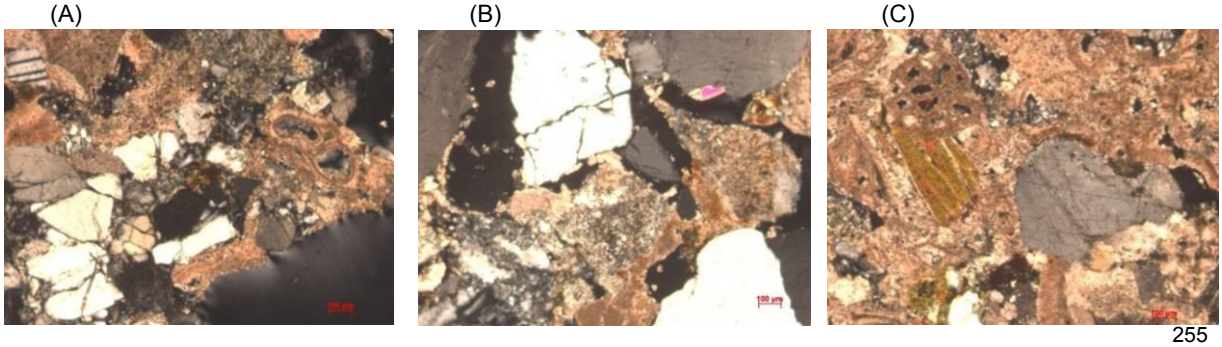


Fig. 6: (A) Sampling of the East side of the castle; (B) camp1, camp2, camp3; (C) thin section

Macroscopic description Camp1 **(wall near staircase)*:*** The sample is rather tough and gritty, it has a jagged and mostly gray-brown surface; larger white, gray, brown and green minerals are present.
Macroscopic description Camp2 **(perimeter wall)** The sample is hard and granular with small holes on the surface and areas of different colors; it is not clear, however, if they are due to the presence of different minerals or caused by external factors. The dominant color is gray with black, green, white and brown larger minerals.
Macroscopic description Camp 3 **(Eastern wall)** The sample is tough and gritty, it has a very rough and jagged surface. It is mostly gray-brown; larger white, black, brown and yellow minerals are present [14,15].
Specifically, the thin sections, observed under an optical microscope, both through parallel Nicol, and crossed Nicol with a zoom of 5x, are characterized by the presence of minerals of quartz, plagioclase, orthoclase, biotite and mica, embedded in a micritic cement matrix [14,15]. In addition to the grains, which have an irregular granulometry, the presence of a benthic fauna in foraminifera was detected. It is characterized by the presence of fusulinid, nummulites and fauna platonic species, belonging to the family of globigerinidi (Fig. 7). Among the foraminifera, species belonging to the family of Bryozoans are also present and only sporadically, in cross section, corals and algae may be found [18,19].



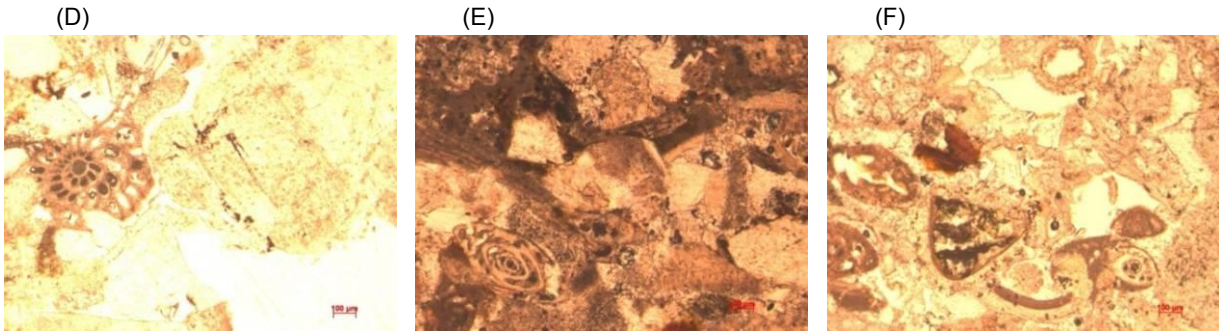


Fig. 7: Thin sections by optical microscope: (A)(B)(C) crossed Nicol (D)(E)(F) parallel Nicol -camp1,2,3

6. SEM analysis

In order to inquire into the composition of the materials, an analysis by SEM (Scanning Electron Microscope) was carried out. The three different samples analyzed have shown a very similar composition. The figures below (Fig. 8a, 8b) show some of the most representative images related to sample C1. In particular, in all the samples there was the presence of calcarenite with large granules inside the sample, mainly quartz and feldspar, embedded in an almost completely calcitic matrix. The matrix is re-crystallized and between the grains there are some crests, caused by the crystallization of cement. It is not very compact and it is highly porous and disgregrated [16,17].

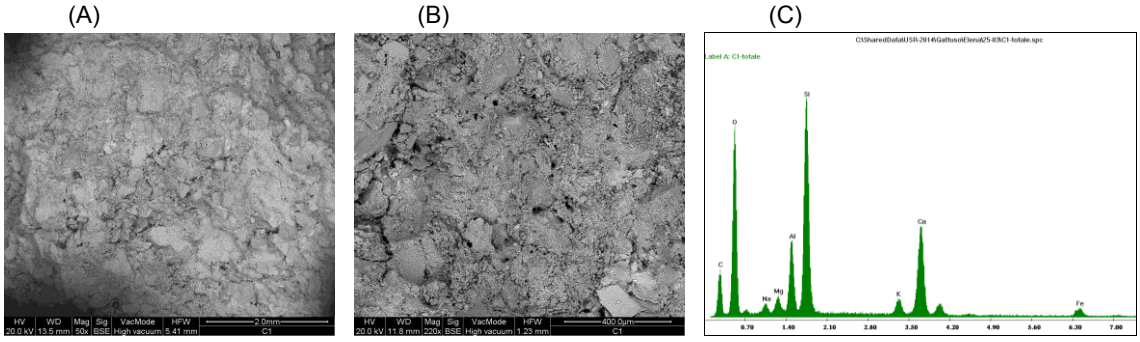


Fig. 8a: (A) Sample C1; (B) Disgregated and porous surface; (C) Analysis of the sample C1

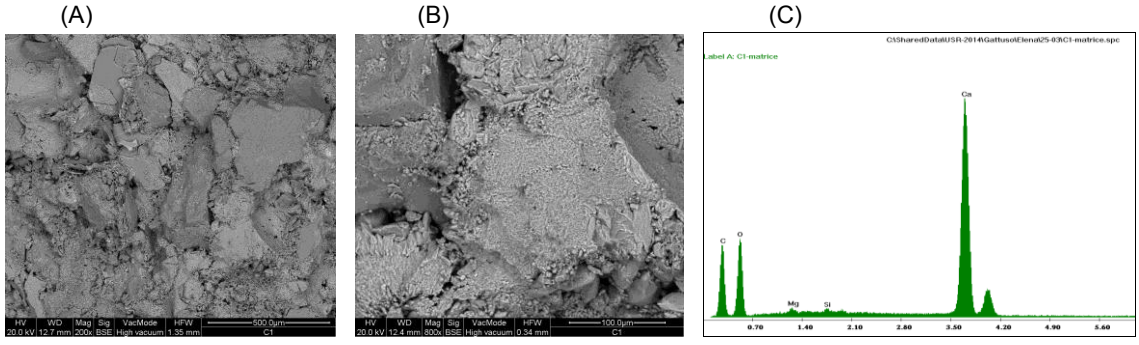


Fig. 8b: (A) Granules immersed in the matrix; (B) Matrix; (C) Analysis matrix

7. Diagnostic plan concerning the Procedural protocol for masonry construction with particular attention to the cultural heritage

As it has been said, when historic masonry buildings are analyzed, it is necessary to take into account many factors. Architectural structures belonging to the cultural heritage present major difficulties when compared with ordinary buildings. The former are characterized by a clear typological variety and different construction techniques, due to the changes undergone in the course of time and their conservation state. This variety leads to the lack of a unique and consistent strategy of modeling and analysis. The first step towards an analysis of the structure is based on the comparison between its current state and the project hypothesis, on the one hand, and the definition of the nominal life on the other. The nominal life is the period in which the structure can be considered safe in the sense that it

is able to face the seismic action during a reference period. In accordance with current standards and the classification of interventions, in the case of historic ancient buildings, it is necessary to restrict the choice to seismic improvement interventions, rather than seismic retrofitting. This means accepting a shorter nominal life. [20-21-22-23-24]. For the evaluation of seismic safety and the choice of improvement intervention of historic masonry buildings, in keeping with the standards, [21] the following operational phases must be performed: to achieve adequate knowledge of the structure, to define the mechanical models to apply to the entire structure or to its parts, and to choose the methods of analysis. Moreover, it is important to define a level of seismic safety, evaluate the structure's nominal life in the state of art, design the seismic improvement intervention, assess nominal life in view of the project, and adopt appropriate technical rules during the realization of the interventions.

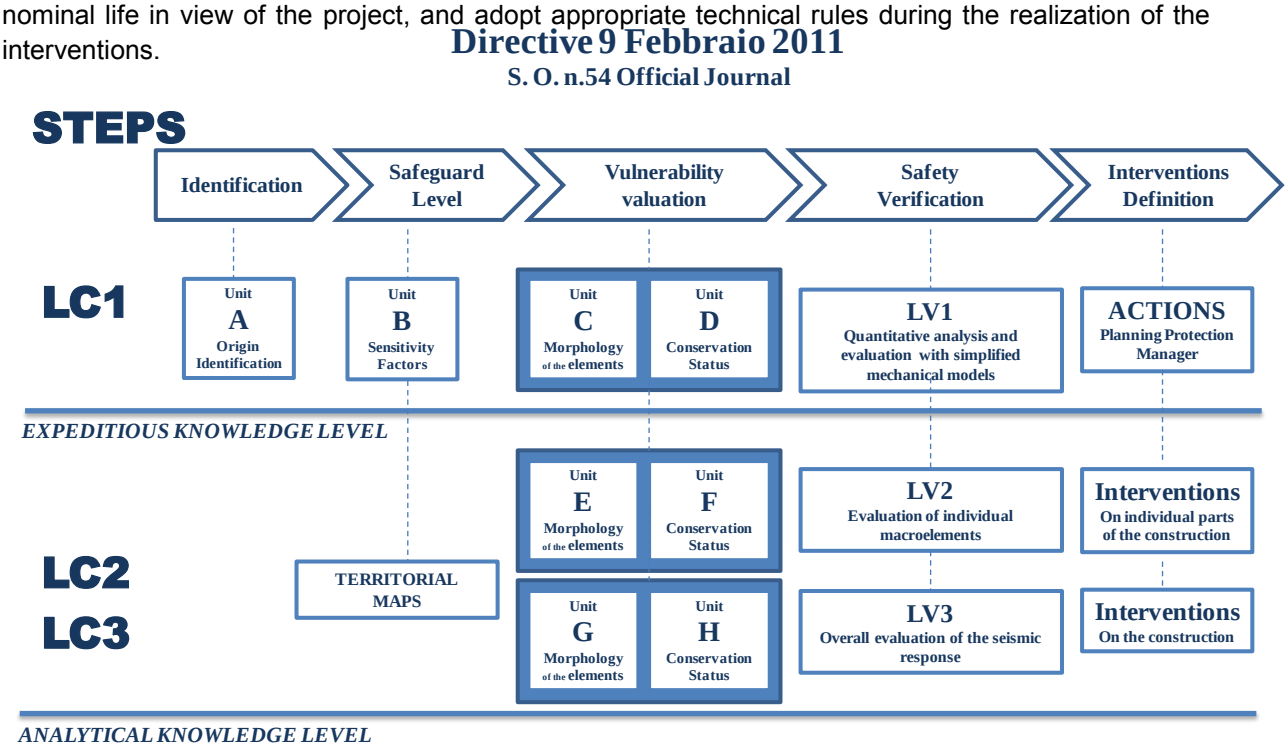


Fig. 9: Schematic representation of the knowledge levels

In accordance with these steps, the standards distinguish two types of knowledge levels: the rapid level, which refers to the direct observation of the construction quality, and an analytical level, which refers to the knowledge of the geometrical and materials construction. Fig. 9 summarizes the methodological process proposed by the current legislation [22], in order to define an interpretative model for the assessment of the state of conservation and seismic safety. Within the restoration project of the Castle of Belvedere Marittimo (CS) the analysis of A-B-C-D has already been carried out (LC1). The procedure for the processing of LC2 and LC3 levels has started, with the static analysis of individual macro-elements, which are to be strengthened in order to reduce the seismic vulnerability.

8. Static analysis of the enclosure wall of the castle

After the historical-cognitive phase of the monumental Castle, the next step is to conduct an analysis and development of the analytical knowledge level, with particular attention to the assessment of individual elements: the enclosure wall of the Castle since, at present, it is the most accessible part of the Caste. The visual and geometric survey allowed to schematize the geometrical and mechanical parameters (Fig. 9) of the examined section (Table 1). The loads acting on the structure and on the upstream ground of the wall were calculated, achieving a distributed load on the upstream ground of the enclosure wall equal to g = 5280 kg/m^2 and an accidental load equal to q = 500 kg/m^2. To ensure the safety of the enclosure wall, it is necessary to satisfy the inequality between the stabilizing moment (M_s) and the overturning moment (M_o), where the latter must be smaller than the former.

Table 1

GEOMETRIC PROPERTIES		MECHANICAL PROPERTIES	
Height	14 m	Specific weight	2200 kg/m^3
Thickness on the top	1,2 m	Compressions Stress	40 kg/cm^2
Thickness of the bottom	5,5 m	Internal friction angle ϕ_p	40°
Inclination Angle	15°	Shear strength τ_p	2 Kg/cm^2
Length	1 m		

For the calculation of the overturning thrust, due from the upstream ground of the wall, it was necessary to obtain both the characteristics of the ground itself, in terms of weight of unit volume, γ = *1800 kg/m^3*, internal friction angle, ϕ = *30°*, friction angle ground-wall, δ = *20°,* and the characteristics of the foundation ground (γ = *2000 kg/m^3, ϕ = 38°,* α = *25°*). In particular, the thrust was calculated according to two different situations: in the presence of friction between the ground and upstream walls and in the absence of friction (Fig. 10). In the latter case, taking into account the horizontal component of the static thrust, S_0 = *40948 kg*, the increase in seismic thrust, ΔS = *3569 kg*, of the weight of the wall, W_t = *110880 kg*, of the weight of the wall, *F = 7762 kg*, the overturning moment (M_o = *237115 Kg·m*) was lower than the stabilizing moment (M_s = *381396 Kg·m*) so as to satisfy the inequality safety. In the case, instead, in which the presence of friction was considered, the static thrust (S_0 = *34155 Kg*) was lower than the increase of seismic thrust (ΔS = *4025 kg*) so as to produce an overturning moment (M_o = *395756 Kg·m*) which was greater than the stabilizing moment (M_s = *208705 Kg·m*). This preliminary static analysis clearly highlights the need for a seismic improvement intervention on the Castle and a detailed seismic analysis, which must not only be localized, but focus on the entire structure.

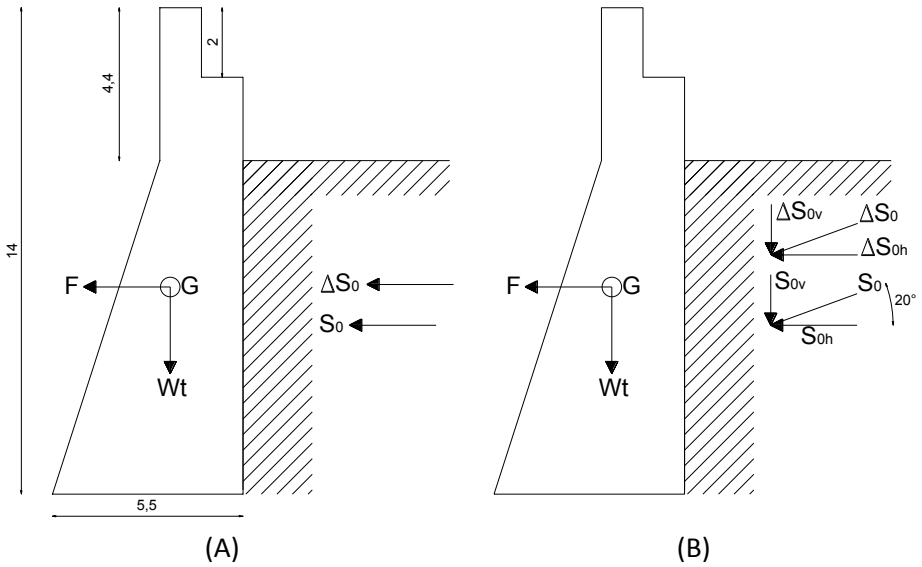


Fig. 10: (A) Scheme without friction; (B) scheme with the presence of friction

9. Conclusion

The interdisciplinary analysis aimed at gaining a general level of knowledge, necessary to understand the conservation status of a construction of historical and architectural importance, the Castle of Belvedere Marittimo (declared a national monument because of its importance). The articulated study, based on an interdisciplinary methodological procedure in three main phases, contextualized, in the first step of pre-diagnosis, the structure into its territorial and urban dimension also with reference to historical evolutions. In the second part, the architectural and historical aspects related to the conservation status of the Castle were developed. To this end, a sampling plan was prepared and implemented, aimed at characterizing the constituent materials of the Castle. In the present work, the results relating to the characterization of three samples have been reported. Both the optical

microscope analysis and the SEM analysis, allowed the classification of the materials the Castle was built with, such as calcarenite material. To complete the cognitive and material characterization phase, an analytical knowledge phase has been started, performing a static analysis of the enclosure walls of the Castle. From this preliminary analysis, it is clear that the realization of a post-diagnosis project of restoration and seismic strengthening is of great importance, in order to protect and preserve the historical value of the Castle over time.

Bibliographical References

[1] Riviezzo A. - Napolitano M. R. - Maggiore G., *Acquisizioni nei settori ad alta intensità di conoscenza - un'analisi interpretativa basata su casi di successo*, Franco Angeli Ed., 2011.

[2] Profili S., "Il knowledge management" Franco Angeli Ed., 2004.

[3] Gattuso C. , *Per un approccio razionale al piano diagnostico*". Atti del convegno "IIth Convegno Internazionale AIES - Diagnosi per la Conservazione e valorizzazione del Patrimonio Culturale", Napoli, 15-16 Dicembre, 2011.

[4] Gattuso C., *Approccio Object Oriented nell'opera di conservazione e/o restauro di beni di pregio storico-architettonico* - atti IIIth Convegno Internazionale AIES - Diagnosi per la Conservazione e valorizzazione del Patrimonio Culturale, Ethos ed., Napoli 2012.

[5] Gattuso C., Crisci G. M. , *Il piano diagnostico tradizionale e la procedura informatizzata DIMA*, Atti del convegno "Convegno Arkos: la diagnostica intelligente", Cosenza, 28-29 Giugno, 2007, 2008.

[6] Cono Araugio, "*Belloviderii"*, tipografia La Poligrafica- Scalea.

[7] Nocito Vincenzo, Spina F. (terza edizione a cura di), *"Belvedere Marittimo Memorie- Studi- Riflessioni"*, tipografia Don Bosco- Belvedere Marittimo.

[8] Rogato Egidio, "*Belvedere Marittimo: Viaggio nel Passato"*, Editur Calabria- Belvedere Marittimo.

[9] Associazione Socio-Culturale Ambiente e tradizione, *"Una Bussola per Belvedere Marittimo"*, grafica e stampa Tipolito Lapico- Santa Maria del cedro, (guida turistica).

[10] Cristofaro Vincenzo, *"Analisi statica delle mura di cinta del castello in Belvedere Marittimo in provincia di Cosenza"*, (tesi di laurea, anno accademico 2000/2001).

[11] Bencardino Elena, "*Metodologie di diagnosi applicate al patrimonio architettonico di Belvedere Marittimo"*, (tesi di laurea, anno accademico 2009/2010).

[12] Elvidio Lupia Palmieri, Maurizio Parotto, *"Il Globo Terreste e la sua Evoluzione"*, Zanichelli editore.

[13] Angelo Bruno, "*Materiali da Costruzione"*, edizione Medicea.

[14] Alfonso Bosellini, *"Le Scienze della Terra e l'Universo intorno a noi"*, Italo bovolenta editore.

[15] Frank Press, Raymond Siever, Elvidio Lupia Palmieri e Maurizio Parotto, (edizione italiana a cura di), *"Capire la Terra"*, Zanichelli editore.
[16] Lucio Morbidelli, *"Le Rocce ed i loro Costituenti"*, Bardi editore.

[17] Sergio Raffi, Enrico Serpagli, *"Introduzione alla paleontologia",* UTET.

[18] Andrea Allasinaz, "*Invertebrati fossili", UTET.*

[19] Annibale Mottana, *"Fondamenti di Mineralogia Geologica"*, Zanichelli editore.

[20] D. M.14 gennaio 2008 "Norma tecniche per le costruzioni"- G.U. n. 29 del 4 febbraio 2008, Supplemento Ordinario n. 30.

[21] Ministero delle Infrastrutture e dei Trasporti - Circolare 2 febbraio 2009, n. 617 Istruzioni per l'applicazione delle «Nuove norme tecniche per le costruzioni» di cui al D. M. 14 gennaio 2008 – G.U. n. 47 del 26 febbraio 2009, Supplemento Ordinario n.22.

[22] Direttiva del Presidente del Consiglio dei Ministri 9 febbraio 2011 - Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme tecniche per le costruzioni di cui al D. M. del 14 gennaio 2008 - alla G.U. n. 47 del 26 febbraio 2011, Supplemento ordinario n. 54.

[23] Ministro per i beni e le attività culturali – D. L. del 22 gennaio 2004, n. 42 "Codice dei beni culturali e del paesaggio".

[24] Presidenza del Consiglio dei Ministri - Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme tecniche per le costruzioni di cui al D. M. del 14 gennaio 2008 – G.U. n. 47 del 26 febbraio 2011.

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Specifics and Landscape Conditions of Dispersed Settlements in Slovakia – A Case of Natural, Historical and Cultural Heritage

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Abstract
A specific type of rural settlement system in Slovakia, the so-called dispersed settlement, is typical for several regions in this country. They represent a part of the historical landscape's structure of a unique natural and cultural value. Their use reflect both the situation in society and its progress and each change (sudden or gradual), that appears in society, i.e. the way by which the landscape is used. There is a possible threat that dispersed settlements in this region are going to loose the dominant landshaping ano eco-stabilizing areas.

The paper focus on the investigation of the current state of dispersed settlements and its evolution in the area of Kysuce region through history and its effect upon their development .Based on the analysis of the problem, we want to show the need for saving the historical landscape structure in this region as it is important to impose the saving of such specific countryside not only through legislation or management but also to promote the pressure of society.

We have analyzed various approaches to investigation of land's evolution together with analysis of natural and demographic characteristics. Natural conditions that created suitable conditions for developing of disperesed settlements from the past till present time were processed, giving reasonable detail.

Keywords: historical landscape structures, dispersed settlements, landscape structure protection, genius loci

1. Introduction

One of the few preserved historical landscape structures in Slovakia is the "kopanice" or dispersed settlement. It represents an autonomous demonstration of social and economic activity as a result of specific natural and historical conditions. It was created as a product of the latest colonisation waves on our territory and its genesis was both territorially and timely significantly differentiated [1]. Such specific elements are usually described in the light of their socio-historical, environmental and visual aspect and in the context of sustainability. There are two main types of specific elements: specific elements with anthropogenic origin and with natural origin. This paper is focused more on the anthropogenic elements.

"Kopanice" is a specific type of soil exploitation and at the same time a specific type of settlement [2]. It was created in a certain historic period when certain part of population due to social poverty cultivated and colonised soil in more favourable mountainous terrains.

The basic function of such settlements was to allow soil cultivation at remote places, mainly in foothills and/or hill zones [3]. Originally, they have been established first as temporary (seasonal) settlements and farm constructions (field barns, stables, chalets, cots) for summer as well as winter cattle stabling. Later these seasonal filial farms became the foundation of permanent settlements. Historical rural settlement structures that have been preserved to these days are a reflection of complicated historical development of Slovak settlement landscape, reflection of human struggle with nature as well as cultural and social changes of our society [4].

What affected “kopanice“ the most, was the socialism period and interventions of communist government. Placement of big, mostly engineering factories to cities such as Myjava, Detva, Stará Turá or Čadca that was connected with construction of new housing estates resulted in migration of population from “kopanice“ to cities and it was the beginning of their gradual depopulation. Also collectivization of agriculture and mending of lands, that mostly took place around Myjava, had contributed to this. It forced the population to redirect from agriculture to industry and “kopanice“ lost their original agricultural function, that was replaced by residential function.



Fig.1: Landscape mosaic structure of Myjava region dispersed settlements (next to the border with Czech Republic)

There are five regions of dispersed settlement in Slovakia. In addition to these five main regions of dispersed settlements several other adjacent regions and islands of dispersed settlements could be identified [1,5].

Historically, they were classified based on multiple features: classification according to origination, according to their size and settlement functions of central village, classification based on affiliation to main regions of dispersed settlements, based on the relationship between dispersed settlement and its core/nucleus, based on number of houses and based on kilometre distances from such settlement to central village [3,6,7]

The only paper focusing on a comprehensive research of dispersed settlements in Slovakia was presented by Nahálka et al. [7]. Nevertheless, even in this paper information were not complete. In Slovak literature there is a tendency to concentrate in more details on one region of dispersed settlement. Great problem of data gathered on dispersed settlement is that within census these has not been presented as elementary settlement units, subsequently they were administratively merged and hence the information on number of inhabitants in each of individual unit within the entire village do not exist [8].

Methodology of research in this field is very broad. Important phenomenon of historic landscape of dispersed settlement is its qualitative value – significance that is the result of perception of landscape and its evaluation by a human being. The importance of identification of visual landscape quality was evaluated in studied community, i.e. its genius loci, landscape identity and characteristics. Landscape therefore represents social value of such type of historical landscape in the light of time changes

having impact on the development of historical landscape, on natural elements of historical landscape (e.g. landscape limits, potential) and socio-cultural or cultural characteristics (e.g. population development, attractiveness, cultural importance).

2. Landscape conditions of study territory

The Kysuce ethnographical region is one of Slovak regions with a relatively untouched nature and a very specific history. The Horné Kysuce region is formed by eleven villages of the Čadca district which are grouped in a microregional association. The region is situated between Javorníky Mountains, Turzovská vrchovina highlands and Moravsko-sliezske Beskydy Mountains. The first look at the map says this is a marginalized area (both from the point of view of its location at the borders of our country as well as concerning the interest of the society). We can observe the marginality within the region of Kysuce itself, as the Southern part between Čadca and Žilina is more developed in terms of tourism and industry, while the Northern part is poorer and less developed.

Dispersed settlement is a specific feature of this area. The villages belong to the Javorníky-Beskydy area of the dispersed settlements and to the Kysuce subdivision. The term "dispersed settlement" is being described as a separately standing dispersed houses or small groups of houses we can find in some mountainous areas. Typical dispersed settlement in the Kysuce region is is a hamlet formed by a group of several settlements which are sporadically situated in different shapes of the relief. Dispersed settlement in Slovakia originated in the period of early or very early colonization (16th - 19th century) on the forested hills originally as shepherd´s hamlets. Shepherding was later substituted by agricultural activity. This form of settlement was influenced by two important factors. The first one was the effort to gain land. New arable land was acquired by deracination of the existing forests. Another factor was economic and communicational. Using land with low fertility, it was necessary to cultivate large areas in order to obtain the necessary amount of products. Since the deforested areas lied in hilly terrains a long way off the village, to walk all the way every day was very time and effort-consuming. That is why the inhabitants of “kopanice”, so called “kopaničiari”, used to build their houses at the newly acquired lands.

Area of Čadca town is situated in Kysuce region in the basin of the river Kysuca surrounded by several orographic units: Javorníky, Turzovská vrchovina and Kysucké Beskydy. This study area is well known for its specific historical landscape structures – dispersed settlements, forests, terraced fields, grasslands and non-forest vegetation. The fact that the district town of Čadca with almost 27000inhabitants is situated in the centre of the region cannot be overlooked, i.e. it is partly urbanised and partly rural landscape. Traditional ways of soil farming have gradually been ceased, nowadays they are really rare. On places of former small strips of arable soil and former extensive as well as intensive grasslands different stages of succession are beginning to appear and elements of a cultural landscape gradually disappear. This type of settlement resulted from three colonisation processes (especially in Slovak mountain area): “wallachian” in 15th century, “goral” in 17th century and “kopanitse” colonisation in 19th century. Several fragments can still be seen – as small settlement units with unique structure of arable land and grassland (Fig.1 and 2).

3. Research methods

The methodology is based on the principles of sustainable development and integrated landscape management where not only the environmental view but also social and economic views are considered. We have inventoried 63 dispersed settlement units around Čadca town and grouped them into five categories depending on their qualitative attributes. There is no universal methodology of mapping and evaluation of this type of settlement to be used in regional development plans and land use plans. Consequently, we have elaborated a methodological plan how to identify and evaluate dispersed settlement units to be able to propose a proper management. Elaboration of environmental assessment is based on the current landscape-environmental research where the methodology is modified for historical landscape structures, and specified for dispersed types of settlements. These analyses will focus on the results of the typical visual characteristic evaluation and results of the analysis of changes in landscape structures in time and spatial context. The result is an identification of the most valuable localities and a proposal of management measures for their preservation in the context of using the entire landscape space. The management measures based on needs of local people with an objective to allow full-value life in the locality are set based on the analysis of social economic relationships that include participation of local inhabitants.



Fig.1: Aerial picture of typical dispersed settlement around Čadca town in Kysuce region, Slovakia





Fig.2: Typical folk architecture of study area

The final result of the entire methodological process will be the complex proposal of management measures and regulations aimed at preserving dispersed type of settlement and a landscape value on the model territory in the context of sustainable development of the territory and clear understandable and concrete guidelines foe planning praxis, mainly for landscape planning and also for other planning activities of spatial planning: socio-economic planning, planning of transport infrastructure, spatial management and a system of territorial monitoring and information. Guidelines will be articulated in a way to be applicable within creation of land use plans (as an autonomous land use planning background materials or as a part of landscape plan), plans of social and economic development, land consolidation plans, territorial systems of ecological stability and during environmental impact assessment (EIA).

We have proposed several steps that are not legally binding but they can help to find a proper way of management. The proposed methodology will be modified during a further research and the final results will be presented then.

1. Preparation of background material
2. Field (terrain) research
3. Elaboration of thematic maps and their interpretation in text
4. Historical and development characteristics of specific settlement forms – elaboration of a map of changes of landscape structures in time and spatial context with calculation of ecological stability and quotient of landscape diversity for every time layer and interpretation in texts.
5. Identification and evaluation of characteristic landscape appearance according to the methodology
6. Elaboration of background study for determination of wood succession of study area
7. Elaboration of maps of positive and negative landscape elements, that take into account also the legally binding land use planning documentation and elaboration of maps of conflict of interests and interpretation in texts.
8. The forecasted changes of selected landscape structures and their interpretation in the text (comparison of present status with land use planning documentation
9. The complex graphical output with classification of historical landscape structures, their evaluation and interpretation resulted in identification of the most valued dispersed settlement locations. The following evaluation criteria will be used:
   - Origin and development
   - Settlement structure
   - The importance of visual impact
   - The typical architecture surrounded by landscape
   - Appearance of constructions
   - Landscape management practise
   - Characteristics of the local society
   - Preserved folk architecture, traditional handicraft
10. Comparison of most valuable localities with dispersed type of settlement with maps of positive and negative landscape elements and the map of conflict of interests – interpretation in texts.
11. Proposition of management measures and regulations necessary to preserve and sustainably develop dispersed type of settlements on the given study territory from an environmental perspective.
12. Socio-economical characteristics of a territory focusing on dispersed type of settlement: history of the territory, trends in number of inhabitants, dynamics of population, age and sex structures, nationality, religion and education structures, housing structure, economy: agriculture, forest economy (industry, unemployment, transport, tourism),
13. Historic development, current status and prognosis of settlement and economic development.
14. Sociological research (to be done mainly in the given most valuable localities) in a form of questionnaires with prevailingly closed questions and directed interviews.
15. Proposal to use construction objects built in settlements of dispersed type.
16. Socio-economic benefits of maintaining dispersed settlements.
17. Proposal of management measures resulting from needs of local inhabitants and from economical perspective.
18. Complex proposal of management measures and regulations aimed at maintaining and developing of scattered settlement type at the study territory in the context of sustainable development and clear directions for landscape planning.
19. Proposal of a monitoring process.

    Result will be presented in both visual (maps and drawings) and textual forms (reports), with interpretation of the acquired information from individual steps.

Table 1: Description of the individual methodological steps

4. Proposed measures

Specific settlement forms, including e.g. also the dispersed type of settlement on the study territory represent according to the Swedish rural development plan its advantage, property or asset“ and take into account also the development potential of individual preserved farms as parts of landscape values and so emphasize the connection with tourism and recreation. It is an amazing knowledge if we

imagine that such statement is not present in landscape or scientific studies but in a regular national-level planning document. Examples from abroad, as available in the overview, confirm that the area of dispersed type of settlement is actual all over Europe and in many countries (e.g. Ireland, England,

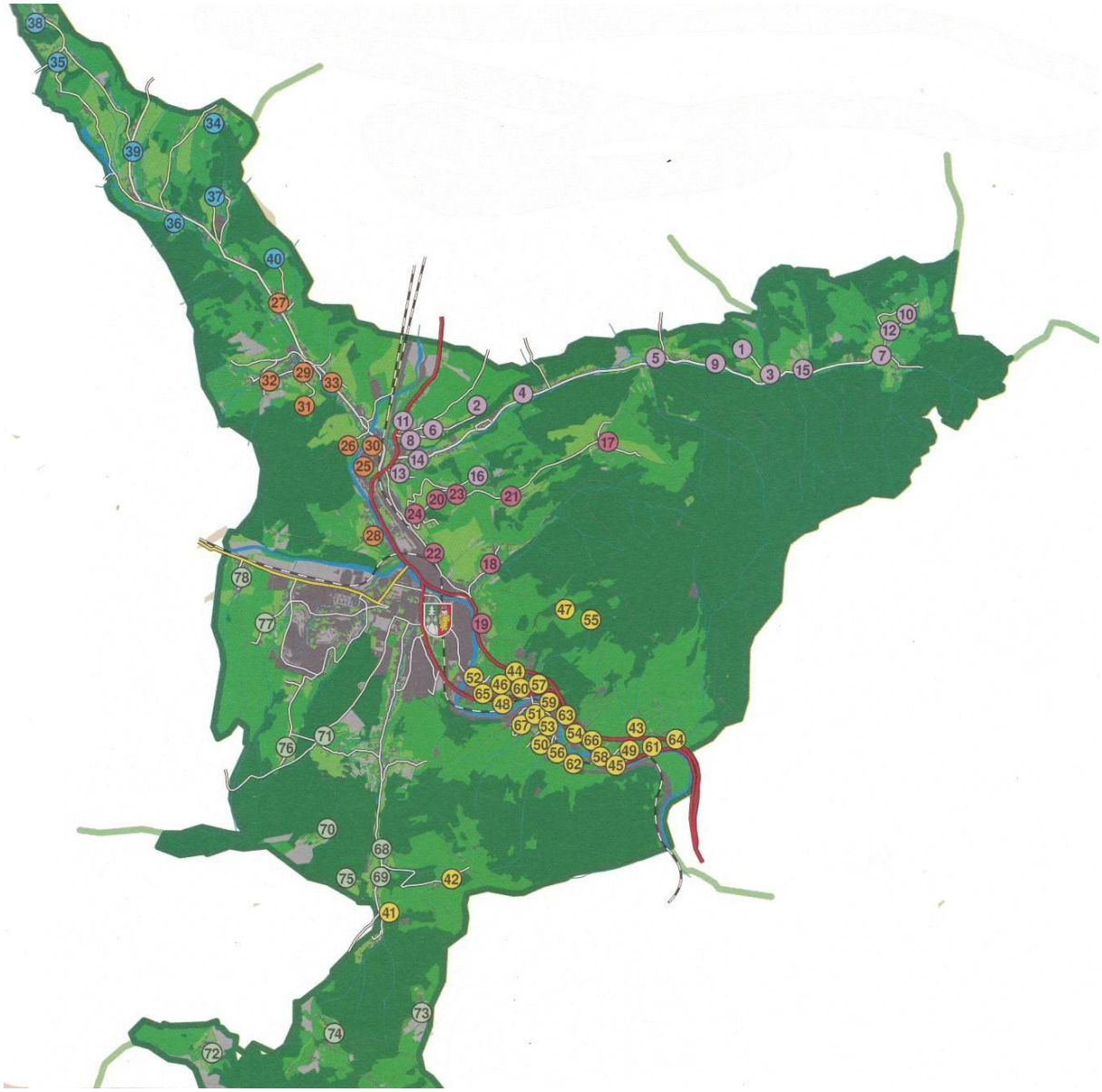

Fig.3: An example of location of dispersed settlements around Čadca town (indicated by numbers)

Sweden, Alpine region) there are studies for their preservation and development that are then implemented into planning document and in some cases they even achieve positive results.

From actual management trends in solving the given area we can mention that especially sustainability of these structures is getting to the spotlight because in the present their primary function loses justification. The most frequently mentioned ways of utilization is recreation and tourism, specifically agro-tourism and traditional crafts.

Another undeniable trend is the effort to keep the local people in their individual locations. It is the key requirement for preserving as well as for developing not only the dispersed type of settlements but also for other elements of landscape structure that are linked to it – as for example small agriculture farm, grasslands and overall care for cultural landscape, preservation of landscape diversity and characteristic landscape appearance related to them.

For keeping the inhabitants it is necessary to know their present way of life, their opinion on local landscape, know their requirements and show them the ways how to maintain their landscape

valuable. The best way to achieve it is a sociological survey that is a part of the proposed methodology. Based on its results and social economic forecast it is possible to suggest measures for a full-value life of people in specific forms of settlement.

Landscape, naturally, evolves, changes according to the needs of a society and that unsubstantiated and functionless structures fade out. It is important to realize if the newly risen elements are valuable and the vanishing elements lost their value. Fortunately today in Slovakia we have also legally binding methodology for an objective assessment what is valuable in landscape. It is the Methodology of identification and evaluation of characteristic landscape appearance. With its assistance and with other additional criteria it is possible to determine the most valuable locations of the aforementioned type of settlements preservation of which is also in present days legitimate.

The final products of the literal overview, with regard to the Slovak environment are the proposed sequential steps for evaluation and management of dispersed type of settlement in landscape. Concrete management measures for preserving and developing dispersed types of settlement and guidelines for territorial, landscape and spatial planning documents will be the results of this evaluation.

5. Conclusions

The essential prerequisite for a successful implementation of the strategy of sustainable development of Kysuce dispersed settlements and their surrounding will be not the contradictory but the mutually supporting resolution of accumulated problems. The development should change from an extensive and prevailingly quantitative to a goal-directed, adequate, qualitative, harmonic and sustainable one. Protection of nature, landscape, sights, historical landscape structures and landscape character (genius loci) should be regarded as a stimulus and not as a restriction factor limiting prosperity of the territory. As a stimulus that will not be at the expense of the scale, degree, efficiency, quality and regime of nature and landscape protection as well as smart and sensible administration of the entire region. Numerous experiences from abroad from Scandinavia, USA, Great Britain and some alpine countries have proved that it is not impossible, that a consistent protection of landscape, genius loci and growth of prosperity are two sides of the same coin. Consistent implementation of such development scenario is not a short-term issue and ultimately it requires modification of the in our country still prevailing industrially yielding, quantitative paradigm driven by major part of responsible executives for a post-industrial, qualitative, that fortunately is in line with opinion of still greater part of both professional and non-professional public.

The key strategic middle-term objective is to achieve an effective protection and sensible interpretation of natural and cultural values as well as sustainable development of dispersed settlement. It is evident that there is a need for mutual understanding that these types of rural landscape represent one of the key territorial entities of Slovakia from the viewpoint of natural and culturally historical values, their protection, proper integration and interpretation is therefore urgent. Prerequisite of success is the existence of multiple protected areas, existence of a range of significant natural sites, several historically valuable complexes, solitaire sights and historical structures of rural landscape preserved in several areas. All these as well as other partial values together create non-recurring character of the Kysuce landscape.

Another strategic objective is to break the de-population trends in parts of rural settlements, improve the demographic structure of inhabitants in the given area and subsequently end the process of demographic structure deterioration and desolation of settlements and rural landscape. This is linked to creation of suitable job opportunities, increase the quality of social and technical infrastructure, extension of possibilities for cultural, social and sport activities, etc. It means an overall increase of life quality and an adequate level of prosperity coupled with protected and mostly attractive natural and cultural values as well as coupled with expected trends (trends ranging from management of raw materials, energy and waste to trends of spending leisure time).

Bibliographical References

[1] HROMÁDKA, Jaroslav. *Všeobecný zemepis Slovenska*. Bratislava: SAVU, 1943. 256 p.

[2] HUBA, Mikuláš. *Historické krajinné štruktúry. Ochranca prírody, odborná príloha spravodaja MV SZOPK.* Bratislava: MVSZOPK, 1988. 62 p.

[3] HUBA, Mikuláš. *O niektorých otázkach genézy a súčasného stavy kopaničiarskeho osídlenia na území Slovenskej socialistickej republiky.*Geografický časopis, Vol. 41 (2), 138 – 155.

[4] JANŚÁK, Štefan. *O kopaničiarskom osídlení na Slovensku.* Vlastivedný časopis. Vol. 16 (1). 23-28.

[5] NAHÁLKA, Pavol et al. *Výskum rozptýleného osídlenia na Slovensku.* Bratislava: VÚPS SF SVŠT, 1966. 144p.

[6] PETROVIČ, František. *Vzťah rozptýleného osídlenia k morfometricko-polohovým vlastnsotiam relief.* Acta Environmentalica Universitatis Comenianae (Bratislava). Vol. 14 (1). 105-113.

[7] SITÁR, Emil. *Kopaničiarske osídlenie na Slovensku (niektoré otázky súčasného stavu).* Vlastivedný časopis. Vol.16(3). 125-135.

[8] THURZO, Igor. *Rozptýlené osídlenie – tradičná súčasť nášho vidieka.* Zivot. Prostr., Vol. 31 (2, 1997), 132 – 148.

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The Appian Way: enhancement of the landscape between nature and culture from Rome to Capua

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Abstract
The research has as its objective the development of a survey methodology to be developed in a GIS environment designed to spatially analyze the archaeological and natural heritage of the stretch of the Appian Way from Rome to Capua. The analytical method is aimed at supporting actions for the protection of cultural and environmental heritage. With regard to *Appia Antica* further insights are necessary pertaining not only to the exact path but also to the cultural and botanical landscape which although being modified it is still recognizable in some traces; you may think of the row of pine trees that still characterizes some sections of the road. The more detailed study of the settlement structure of Roman society present in Upper Campania together with the study of settlement structures of pre-Roman societies , was a first step for the development of the mapping of archaeological evidences relating to *Appia Antica* in Northern Campania and Southern Lazio.

Keywords: Ancient toponomy, Appian way, Lazio landscapes, Campania landscapes, GIS mapping.

1. A research for the Appian Way between culture and nature

For *Appia Antica* there is the need to carry out further investigations relating not only to the exact path but also to the reconstruction of its landscape; to this aim a comparative reading of historical maps was made within investigations into specific districts. In particular, we analyzed the section of *Via Appia*, which crossed Campania, being abandoned during the early Middle Ages and restored only as of the end of the eighteenth century eighteenth-century; studying the eighteenth-century maps we were able to identify useful information for the reconstruction of these places. The route of the Appian Way between Sinuessa and Capua has long been among the most problematic parts of *Appia Antica* despite being the most described stretch by ancient literature; throughout history various studies have been performed to reconstruct this stretch of the Appian Way but only in the second half of the twentieth century, thanks to the topographical studies made by Antonio Sementini, the correct reconstruction of the whole route of the Appian Way between Sinuessa and Capua is realized. The landscape of Lazio and Campania was strongly characterized by the Appian Way, as evidenced by the archaeological remains found along its path; traces of rows of trees lining the street are still recognizable in some stretches. The main purpose of this research is to integrate the restoration of the archeological sites with the enhancement of the landscape including *Appia Antica*.

The scientific activities provided by the research are intended to further integrate the information, documentation, mapping and modeling of the interested territories affected by the consolidation and development of a Open Data GIS platform aiming at making data accessible and usable by users with specific rules. The realization of a GIS information system for archaeological sites and landscapes of *Appia Antica*, is intended to contribute to the creation of a body of knowledge which can also be used for the purposes of scientific and archaeological investigation and to support the setting up of a coordinated and homogeneous data system (DSS) to help achieving better enhancement, dissemination and teaching projects based on contents of recognized scientific validity.
Among the main GIS applications in archaeological studies we may include mapping and integrated management of recognition data, geophysical and geognostic projections, analyses and simulations of the natural landscape, reconstructions and views of the landscapes themselves. The knowledge and information coming from different disciplines can be incorporated into GIS systems and analyzed in an integrated manner with the purely archaeological data based on the fact that the data vary in type (collection and storage of data), use (processing and analysis) and in the presentation and visualization (data presentation). Hence, data produced by specialists from other disciplines can be introduced into the GIS system so as to include typical analyzes of Earth Sciences, such as the creation of soil digital models, the determination of slopes and exposures of the slopes, hydrogeological modeling. GIS ability to integrate different levels of information on the landscape allows to use them as tools with which to test and evaluate the correlation among archaeological, archaeobotanical data and the physical landscape .



Fig. 1: The V mile of the Appia Antica with the Nymphaeum and Villa dei Quintili (archive Fratelli Alinari 1920 - 1930 ca.)

1.2 In-depth topographic studies

The Appian Way was realized as a result of a specific military strategy project aimed at creating the conditions for the conquest of Southern Italy, the territory controlled by the Samnite confederation. From the sources it results that the construction of the Appian Way is fixed, by work of Appius Claudius Caecus, in 312 B.C. In his censure of the same year, the magistrate started and finished the construction of the *regina viarum* from Rome (port Capena) to reach Capua. As a matter of fact, many saw in this tradition an excessive schematization noticing some inconsistencies that would suggest the implementation of the road into several lots and in a longer period. Nor should we believe that it has been paved in stone at the same time of its realization as this happened much later and in different steps. Just think that to pave the first section from Porta Capena to the Temple of Mars, that is only the first mile, it was not until 296 BC when *Ogulni* covered the office of *aediles curules*. The additional length of up to 11 miles Bovillae was paved in 292 BC. With the exception of these tranches and the urban areas,the Appian Way in 174 BC was in the best case only graveled as Livius witnesses: « (Q. Fulvius Flaccus and A. Postumius Albinus) Censores vias sternendas silica in urbe, glarea extra urbem substruendas marginandaque first omnium locaverunt ... ». The milestones, then, do not tell us much more than just that tiling were made by Caracalla and then by Nerva and Trajan. Besides Formia, however, there is no notice of stone paving although recent excavations show that even

outside urban centers there could be found, however, paved stretches realized in times very distant from 312 BC. In 312 BC, however, it certainly began the construction of the Appian Way that from Porta Capena after *Ad Nonum, Bovillae, Aricia, Sublanuvio (Ad) Sponsas, Tres Tabernae, Forum Appi, Ad medias, Terracina* came to *Fundi*. It passed, after getting wedged in the narrow valley of St. Andrew, through Itri, and continues towards Formia. Beyond Formia the construction of the road would be started in 307 BC (the year of the consulship of Appius Claudius) or in conjunction with the construction in 296 BC of *Sinuessa* and *Minturnae* colonies. Once bypassed *Minturno castrum* and the bridge over the river Garigliano, the Appian Way wedged in the narrow strip of land between the sea and the latest offshoot of the chain of Massico Mount (Cicoli Mount) where *Sinuessa*, a coeval colony of *Minturnae*, is localized being placed as a guard of this obliged coastal passage that gave access to the fertile plains of Campania. Unlikely, the Domitian Way which was built in 94 AC, crossed a little over Sinuessa the Appian Way, along the coast, and reached the important port of Pozzuoli, while the *regina viarum* turned sharply to the inside through the *Ager Falernus*. From there the road headed towards the *mansio* of pons Campanus being famous because nearby, in a small tavern, Horace stopped there. Today this place is localized close to S. Janni farmhouse on the river Savone. Once gone ahead pons Campanus, after having crossed Urbana colony during the age of Silla, which is localized under the management of the Municipality of Francolise, headed towards *Casilinum* (today Capua), meeting point of the *Appian Way* and the *Latin Way* and reached Capua (today S. Maria CV). Little remains today of the *Appian Way*. Often placed several meters below the present ground level, it is covered by a thick layer of *humus*; trace of it remains in many cases only in aerial photos: thin white lines betray the stone paving placed below the ground level. Badge of honor and pride of engineering and of the Italic lineage, there is not a wise legislation that has sensibly taken in charge its preservation seriously promoting its enhancement. The excavation of the first part of the Ancient Appian Way is due to the foresight, economic availability and cultural sensitivity of the papacy. The first kilometer is one of the most picturesque routes that the human being can walk on the earth. Since then nothing or almost nothing: no excavation planned, no attempt to recover even the minimum stretches of *Appia Antica*. Neither neglect nor insensibility, only lack of programmatic and cultural horizons. The cultural asset is certainly a public good that should be protected, but it can and must be a flying wheel for the economic development. This is what has been done in other places, such as Santiago de Compostela or, to remain within our boundaries, for Via Francigena: the project is already fully realized, and it is a very good representation of the synergy between Culture and Tourism. Via Francigena is a way to create employment and opportunities for small businesses and, at the same time, a way to connect various parts of Europe highlighting a common identity. A project that looks away, and that aims to enhance the whole environment: food and wine, art and architecture, traditions and breathtaking landscapes. All priceless Italian values. After the first mile of the Appian Way to find stone paving we need to get to the Natural Park of Monti Auruncis and in Campania to the *ager Sinuessanus* (territory of Mondragone, near the municipal cemetery). Other sections of the *Appian Way* have been excavated but then covered for security reasons. The latest architectural emergency in Campania is the triple arch which represents the entrance of the *Appian Way* in the city of Capua. Then only traces here and there of the stone paving, the *itineraria picta et adnotata* and some news from archives. In spite of this we are able to define its path up to Benevento. A mystery is the *ancient Appian Way* after Benevento: The reconstructions are exclusively based on the few strongholds offered up by the Roman names transmitted to us through the *itineraria*.

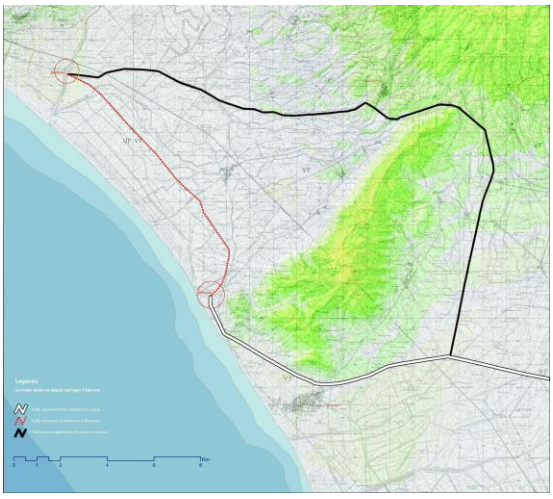

Fig. 2: The route of the Appian Way between Lazio and Campania and the internal road alternative to the coastal path.

1.3 Landscape crossed by the Appian Way

To support actions for the protection and enhancement of *Appia Antica* cultural resources, the archives to be prepared and implemented in the GIS system should also include storing of useful data for the exploitation of natural resources. With reference to the transformation processes that have occurred over time, a reading was made of the interested landscapes affected by the passage of the first stretch of the Appian Way (312 BC) that linked Rome to Capua. The Appian Way started from Porta Capena (378-352 BC) and allowed to continue in the valley of Almone river. The landscape of the valley is characterized by a vegetation consisting of a residue of evergreen maquis in which the dominant species are *holm oak* and *broom;* the valley floor is covered with a wet wood composed of oaks, dogwoods, elms and white willows. A deciduous bush with mostly oaks, downy oaks and periwinkles covers tufa outcrops while the vegetation cover of the alluvial valley consists of willows, poplars, arum, horsetails and riparian vegetation where the dominant species is the reed marsh. In this landscape, where the road retains significant remains of the original calcareous stone paving, the arches of the Aqueduct of Quintiles run parallel to the course of the road.

Once crossed the valley, the Appian Way went back toward the Alban Hills exploiting the summit of a hill overlooking the Roman countryside where the landscape is characterized by the presence of volcanic lakes and a dense woody vegetation: as a testimony of the original forests, largely replaced by chestnut, oak and beech trees, remain holly, linden, hazel, field maple, hornbeam and clematis. The vegetation cover of Colli Albani is also composed of Mediterranean shrub species among which we find viburnum, privet, laurel and hawthorn. The Appian Way crossing olive groves, vineyards and chestnut woods and along the Pons Aricius descended into the valley of Ariccia, a volcanic crater with the bottom covered with cultivated fields and slopes covered with residual forest formations composed of holm and downy oaks. In the valley the road reached Ariccia and then crossed the southern end of Colli ALbani through the Pontine marshes with a long straight and reached Terracina on the Tyrrhenian coast. The pontine section that was the object of powerful interventions of consolidation because of the swamps, today shows the typical reclaimed landscape, characterized by canals, embankments, fenced ditches, vast areas of arable land and rural homes. After reaching the maritime colony of Terracina, the Appian Way continuing towards Capua, following a difficult hilly course, crossed Monte Sant'Angelo, the last offshoot of Ausoni Mounts; on top of this outcrop overlooking the sea there was the Temple of Jupiter Anxur whose archaeological site, declared a Natural Monument, can be reached by traveling part of the Ancient Way that once ascented, it slope down the opposite side of the plain of Fondi one of the many marshy plains that follow each other along the Tyrrhenian coast; among the ponds that persist in this landscape there is the lake of Fondi, near which the road passed. The lake being rich in springs, is seat of a rich plant population of aquatic flora consisting of marsh hibiscus, marsh marigold, penta carpus hibiscus, and bell marsh; once crossed the plain of Fondi with a long straight, the Appian Way reached the town of Fondi situated at the foot of Aurunci Mounts and continued his path beyond the mountains of Fondi and the rugged gorges of Itri: of this stretch, perfectly fitted into the natural landscape, the ancient terraces, the large cisterns to collect water and the volcanic basalt polygonal paving remain. The crossed landscape is typical of Aurunci Mounts, characterized by hills surrounded by forests of carob trees, holm oaks, oaks and beeches alternating with typical plants of the Mediterranean maquis. After passing the mountains of Fondi and Itri gorges, the road descended towards Formia, on the Tyrrhenian coast, where the sandy beaches alternate with stretches of rocky coast covered with Mediterranean maquis composed of mastic trees, holm oaks, cork oaks and maritime pine trees. After crossing Formia area, landscape showing simultaneously the rural character of the countryside and the maritime character of the coast, the Appian Way, following the coast line, crossed the maritime colony of Minturno, Ausone city located at the mouth of the River Liri-Garigliano and conquered the plain of the Liri-Garigliano, which today features the typical reclaimed landscape, being mainly cultivated with wheat. The last coast step of the Appian Way was Sinuessa, a maritime colony situated at the southern edge of the plain, after which the road was diverted to the slopes of Massico Mount towards the interior of Campania; this deviation is documented by the calcareous stone paving found in Mondragone, the stretch of road was that connecting Sinuessa to Ager Falernus, an important agricultural land of the ancient Roman world among Volturno River, Massico Mount, the Tyrrhenian coast and the river Savone. Ager Falernus was and continues to be a lush countryside where fruit orchards, vineyards, olive groves, wheat fields and woods preserve archaeological sites related to rustic villas and rural settlements; the landscape is characterized by the design of the organization of agricultural soils made by the cadaster registration of the Roman civilization. Even today this organization of the countryside, based on large square divided into parcels, persists in the agricultural tradition of the area; in fact in the countryside an intensive agriculture is practiced based on cereal fields alternating with rows of vineyards and fruit orchards. The fertile plain of the Lower Volturno river, characterized by horizontality and leafy crops, is the ultimate landscape traversed by the first section of the Appian Way that after meeting in a bend of Volturno river the Via Latina in the river port of Ancient Capua, after having crossed the river by a bridge, ended his path straight focusing on the western gate of Capua, a town sheltered by Tifata

Mount and placed near a wide bend of the Volturno river. In a second phase the Appian Way continued towards Brindisi , but that's another story.

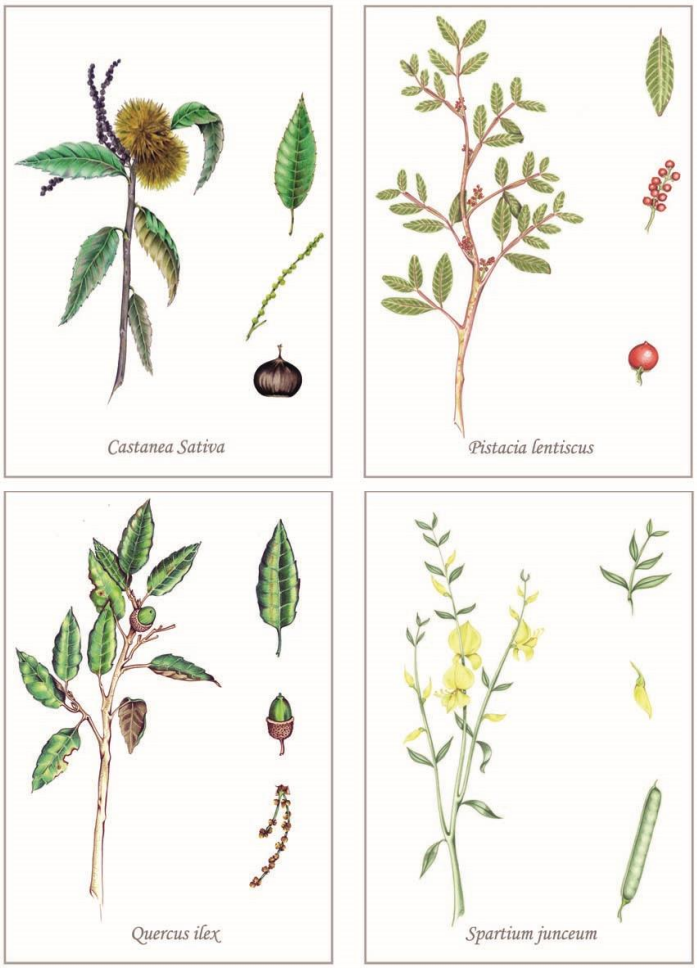

Fig. 3: Some botanical species of the Appia Antica illustrated by Marina Russo

1.4 Data management with GIS technology

GIS technology and methodology is an important resource for any activity that pertains to the territory and in any case to phenomena that have a spatial distribution. The quantitative geography has contributed in a decisive manner, in recent decades, to greatly amplify the possibilities of spatial analysis and to put in relation to each other gradually increasing quantities and types of data. As we have seen, the space of the Appian Way is not only constituted by material places, but by a set of references and images that only through the power of multimedia can find a suitable space to be properly read and understood. In recent years we have tried to integrate a series of researches, and in particular researchers and methodologies, on the territories involved with the path of *regina viarum*, researches that led to the definition and construction of a first structure of GIS database. The basic structure of the GeoDB is constituted by the chorographic structural territorial model. A physical model and an administrative model through which it is possible to pursue the systematic storage of a wide and heterogeneous set of data and models. The current debate about the cultural heritage identifies in the ICT fundamental and irreplaceable tools for knowledge and enhancement, with a very significant progression of solutions and developments. In parallel to the diffusion of technology, however, the availability of data structures related to the territory still remains marginal, completely lacking a proper policy of sharing and reuse of geographic data. This implies an extra effort, being not marginal, to start building over again structures and models that could be easily shared. The current physical model of the territories crossed by the Appian Way has been achieved with the use of DTM realiized by the National Institute of Geophysics and Volcanology through the project TinItaly; the model is based on a grid resolution of 10 m. For a chorographic study a DTM based on a 75m ISPRA grid was also realized. For the more detailed topographical components, we think to be able to utilize, when available, the model with 1m resolution being tested by the Ministry of Environment. For the analysis, the open data from project DBprior10K of CISIS relating to information layers result to be of particular interest: linear and polygonal hydrography, road and railway networks, administrative boundaries,

urban areas, very useful to chorographically define the current urbanization on the territory is constituted by ISTAT open dataset concerned with census variables. The structural administrative model is certainly more complex, because it refers to a heterogeneous public Subjects. The route of the Appian Way crosses four regions and more than one hundred municipalities. In the current state of the work it was only used a raster cartography, being homogeneous for the whole area, consisting of IGMI sections; and only afterwards vector CTR of the different Subjects will be able to be integrated with more detailed scales. The reconstruction of the road network of *Appia Antica* was carried out for different sections according to the different origin and type of data. The road layout, although being presently organized into a single dataset, keeps the information of the different sources being utilized. The most detailed stretch is that between Sinuessa and Capua. A section that was investigated directly by the work group, with specific studies at a topographical scale, including the use of aerial photo interpretation. All the other derived information of the study were organized in datasets, such as: the location of the milestones and their characteristics, the classification of road sections on the basis of their recognition, exploratory essays and planning assumptions, the existing and potential archaeological sites; georeferencing and classification of bibliographic records related to the findings in the areas, etc.. Particular attention should be given to the studies on *fora* along the Appian Way and the role they have played in the economy of the ancient territory, including the agrarian structure of the same land and its definition through centuriation. The traces and the assumptions of the centuriation structure will be similarly structured in vector datasets. The two additional sections, towards Rome to the north and towards Benevento and Brindisi to the south, are currently less detailed and heterogeneous between them. Based on studies of other authors they are consistent with the scale of the more detailed documentation that it was possible to find for them. In the northern section there were also recognized some variant stretches due to special reasons, such as weather that even in ancient times, as it is known, have profoundly altered the economic habits and determined significant changes in the infrastructure in the area. Of particular importance is the internal variant that from Minturno deviated towards the inner area on the volcanic terraces of Roccamonfina through the pass of the current Cascano overcoming Massico Mount reaching the plain linking up to the previous road path near the crossing over the river Savone. A fixed course from the swamping of the coastline excluded completely the colony of Sinuessa. The goal is to reconstruct the idea and the image of the ancient territory through the layering and interrelationship between all the physical and cultural elements of the territory. A certainly incremental path that is progressively integrating more and more complex research profiles being necessary to continue the work. A GPS survey of Campania sections will be shortly carried out also in order to quickly produce traces of routes and POI facilities in formats suitable for the tools of hikers to start data dissemination to a wider audience of users. An appropriate policy to promote the understanding and use of the area linked to a new and integrated fruition of cultural heritage.



Fig. 4: The Appian Way from Rome to Capua.

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Bibliographical References

[1] CIRILLO, Clelia. I paesaggi attraversati dalla Regina Viarum da Roma a Capua. In Valletrisco (A.C.) La Via Appia racconta. Minturno, 2007, pp 37-54.

[2] ARTHUR, Paul. Romans in Northern Campania: Settlement and Land-use around the Massico and the Garigliano Basin, Roma 1991.

[3] BOSIO, Luciano. La Tabula Peutingeriana. Una descrizione pittorica del Mondo Antico, Rimini 1983.

[4] *CARAFA, ROSA Le vie di comunicazione nella piana tra il Volturno e il monte Massico attraverso la cartografia antica in G. Guadagno (a cura di), Storia Economia ed architettura nell'ager Falernus,Minturno 1987.*

[5] *COLLETTA, Teresa. La struttura antica del territorio di Sessa Aurunca. Il ponte Ronaco e le vie per* Suessa, Napoli 1989.

[6] COMPATANGELO, RITA. Archeologia aerea in Campania settentrionale: primi risultati e prospettive, in MEFRA 98, 1986-2, pp. 595-621.

[7] LEVI, Mario Attilio. *Itineraria Picta. Contributo allo studio della Tabula Peutingeriana*, Roma 1968.

[8] MAIURI, Amedeo. *Passeggiate campane*, Firenze 1957.

[9] MAZZARINO, Santo. S. Mazzarino, *Aspetti di storia dell'Appia antica*, in Helikon, VIII, 1968, pp. 174-196.

[10] PAGANO, Mario. *La via Appia fra Sinuessa e Capua alla luce di un nuovo miliario,* in *RendAccNap*, LXIII 1991-1992, Napoli 1994, pp. 109-124.

[11] PRATILLI, Francesco Maria. *Della via Appia riconosciuta e descritta da Roma a Brindisi*, Napoli 1745.

[12] QUILICI, Lorenzo. *La via Appia* regina viarum, Roma 1997.

[13] SEMENTINI, Antonio. *Sinuessa. Ricognizioni archeologiche lungo l'Appia e la Domiziana*, Napoli senza data ma pubblicato postumo nel 1977.

[14] ZANNINI, Ugo. Indagini storico archeologiche in Campania Settentrionale: il territorio di Falciano del Massico, Caserta 2001.

[15] ZANNINI, Ugo. (a cura di), *La via Appia attraverso i secoli*, Napoli 2002.

[16] ZANNINI, Ugo. *La scomparsa di Sinuessa e l'invenzione del suo episcopato*, in Riv. St. del Sannio, 23, 3ª Serie, anno XII, Napoli 2005, pp. 45-54.

[17] ZANNINI, Ugo. *Miliaria, itineraria, archaeologia*: la via *Appia* da *Formiae* a *Sinuessa*, A. C. Valletrisco, *La via Appia racconta*, Minturno 2007, pp. 55-84.

[18] ZANNINI, Ugo. *I fora in Italia e gli esempi campani di Forum Popilii e Forum Claudii*, Caserta 2009.

[19] SCARPA, Luigi. *Lo spazio geografico nei GIS.* Napoli: CUEN.2001

[20] SCARPA, Luigi. Metodologie e strumenti multimediali per l'analisi e la modellazione dello spazio storico del territorio. Cantone F. a cura., *Ambienti multimediali per i beni culturali*, Napoli: Liguori, 2012.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Laser scanning as a measuring tool: a practice in laser scanning at Pompeii for archaeology and architecture

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Abstract
We established how laser scanning has given reliability to the work in Pompeii. Ordinary measuring with tapes or a total-station does not accommodate effectively the strong connections between geographical features and structure of buildings, in design or in urban configurations, essential to a definition of the whole geographical contexts. In practices from 2012, we introduced a middle-range laser scanner. The long-range laser scanner was applied particularly to land surveying, while a middle-range laser scanner worked for measuring houses and town blocks in scale. With Faro Focus 3D, we explored several selected buildings; the insulae 7 and 15 of Regio VII and the streets along the south-west edge of Pompeii. As the result, we created orthographic photos of plans, elevations, cross-sections and various mosaics in the House of Trittolemo (VII 7.5) and the House of Gallo (VII 15,2). The mosaics can be set into the plans in the orthographic views of point clouds. And in detail, the each piece of tesserae can be identifiable. We have to develop the measurement using up-to-date technology, such as GPS, Photogrammetry and laser scanning. As the work of surveying engineer using optical transits undoubtedly contributed to the spread of a new knowledge of urbanization in the ancient world in the first half of 20th century, the new technology in 21st century could provide new evidence.
Keywords: Pompeii, mosaic, laser scanning, orthographic image

1. About laser scanner
The development of the measuring method is exemplary for technical change in archaeology: equipment that as important for production of the drawings; new mechanism, such as ranging technology of triangulation, time of flight or phase comparison, was introduced on the field survey. The laser scanner provides a technology, which accurately and repeatedly measures distance, based on a precise measurement of time, and aggregates these measurements into a collection of 3D coordinates, called as point clouds. Terrestrial scanners are best suited to recording complex objects, such as buildings, city blocks and streets, as they can record the largest number of measurements.
Whatever type of terrestrial scanners we use, the basic premise remains the same: the distance to numerous points on the surface of an object are recorded by a laser scanner which is fixed to the floor, after which the inbuilt ranging system, which is key to all these scanners, calculates the horizontal and vertical angles of the individual points. Having been assigned these 3 values each point now has a set angular coordinates which can be used to locate them within 3D space. In the case of the Faro Focus, the maximum distance a point can be from the scanner to acquire the optimum reading is 20m (Fig.1).

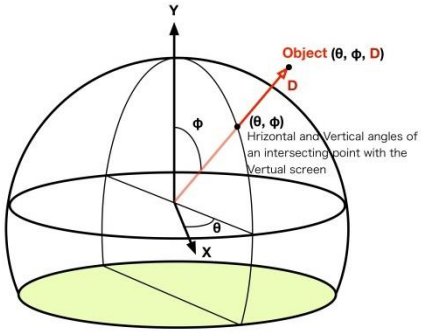

Fig.1 Scanning system of Laser scanner

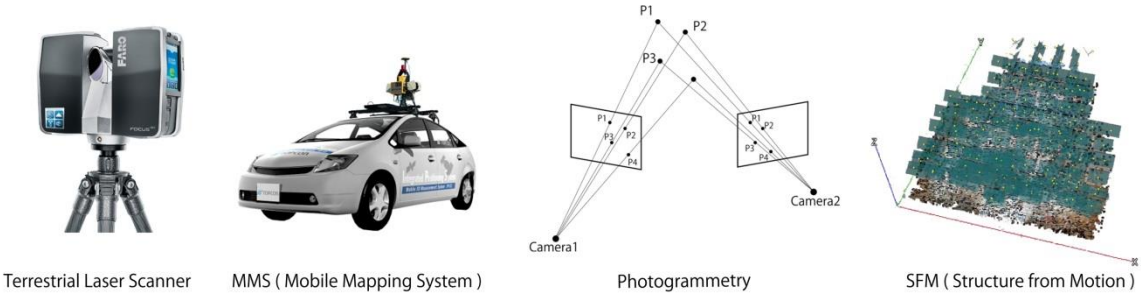

Fig. 2 Various techniques of capturing for three dimensional information

Many types of terrestrial laser scanners have an in-built or externally mounted camera, which can collect high-resolution digital images. These images are assembled into a multi-image mosaic and the RGB data extracted from the images is applied to the point cloud; RGB data can be used as an aid in classification and identification of objects within the scan, and facilitates the development of realistic visualizations. Originally photographic techniques, most obviously digital cameras, has been used to record the surface of the object without losing any nuances of detail and the laser scanner with digital camera can take over their role of recording in the near future. In some ways they are quite similar to digital cameras, allowing us to take a picture by releasing the shutter, although in the case of laser scanning this picture is a 360 degree panoramic view.

As Fig.2 demonstrates, there are a variety of techniques available to capture information for a three dimensional survey, and it is important that the method chosen corresponds adequately to the scale of the project. This is determined by the size of the object and how many points one wishes to record; the more complex an object, the more measurements that are required.

2. Laser scanning in Pompeii

The laser scanning market is becoming increasingly crowded with a range of vendors and products to choose from, with equipments produced by Leica and FARO tending to be the most popular on archaeological sites. Each company offers a variety of formats for storing 3D data, as one of the key elements to be considered is data compression. PTX, which is written in a text format (point text format; X, Y, Z, intensity, RGB), by Lecia is a common format and is supported by all vendors. However, Cyclone, which is Leica's software for data processing, uses Leica's system file format (binary format), which is incompatible with other companies' products or third-party software. Currently, we use the FARO Focus 3D scanner, which was produced in 2011 by a German manufacturer. Prior to this, we mainly used Ilris and the Faro Photon 120. Optec producing Ilris scanner is a company which produces long range scanners that are useful for geographical and urban scale measuring. In Fig.3, a reconstruction of the streets of Pompeii, which consists of over 200 million 3D points, grouped together in what we call point clouds, has been recorded in black and white during three week periods in both 2005 and 2006.



Fig.3 Laser point cloud of Pompeii street

In Pompeii, the most advanced 3D scanning system available at the time, Ilris, which could emit more than 2,000 laser beams per second has been applied. Optec in Canada is a company which produces long range scanners, such as Ilris, that are useful for geographical and urban scale measuring. We recorded the entire Pompeian city wall, which equated to over 200 point clouds consisting of more than a million 3D points. Consequently the whole structures of the town walls in the visible area were separately measured into more than 300 points clouds consisting more than million dots having independent local coordinates (the places of machine is the original point of those local coordinates), and thus we have to align, merge and compose them into one three-dimensional model on the united coordinates, which can provide a new general map in 2006 as a by-product of our works (see a map in above in 2006). The result was published in the final report of Japanese excavation of in-existing Porta Capua in 2010 and the point clouds data provided the useful data for analysing the drainage system of Pompeii, which was published in 2012. As a long-range scanner, Ilris can record objects over 500m away, but the resulting image for such a distance is produced in a low resolution, and is thus not suitable for the investigation of buildings or city blocks, but can still be used for geographical surveys, such as the work we undertook at Akoris, Egypt, in 2011.
We introduced an up-to-date laser scanner in 2012: a middle-range scanner; Focus 3D by which more than 900,000 scanning laser beams emitted in one second can be reached to the object in spherical area with a radius of 20 m (less than 1mm error) and those objects can be described as the aggregation of dots having 3D coordinates. In 2012, we launched a new project of laser-scanning in Pompeii, in which the materials including walls, paintings and mosaics of the whole insula can be visualised. And by clipping the points cloud data, the elevations, which are quite helpful for geographical studies, can be created as seen in figure. Furthermore we applied object-scanning in high-resolution mode built in the Focus 3D to the mosaics, that have been well preserved in the House of Trittolemo (VII 7, 5). The dimension of each piece of tesserae could be measured as seen in figure. The visualization of the point cloud data, which can be used in the report, should usually be produced as a JPG or TIFF files, although it is now also possible to have them in a 3D PDF, PDS or true vision file in html format, or as a OBJ file. Pointools, which was recently acquired by Bentley, who are one of the largest vendors of CAD and CAM software worldwide, is an effective tool for rendering images.

3. Works in Pompeii from 2006

During two seasons (from 26th August to 9th September in 2006 and from 22th December in 2006 to 11th January in 2007), the investigation of town wall applying a long-range laser scanner has been carried out at Pompeii by Japan Institute of Paleological Studies (JIPS), a member of which we were. In the resulting model, the object has a set of local coordinates. To place them on a global model, we must convert their coordinates into latitude and longitude. Certain markers, which had their longitude and latitude coordinates recorded in a survey by Rispoli in 2006, were included in our data in order to provide fixed GPS (Geographical Positioning System) points. With this completed, we produced the first 3D model of the Pompeian streets. Although there were errors in some of the merged clouds, resulting from dimensional inaccuracy in the scanning process, these all fell within the accepted 0.05% error percentage.
In that investigation, Japanese team established how laser scanning has given reliability to the work on the Archaeological sites contains large-scale structure of the town.

In 2012 it is a merit of our investigation to show three-dimensional data can bring the elevations of structures. Furthermore, measuring with tapes as orderly method, with its attractive, is still a useful way to record archaeological sites, but it does not accommodate effectively the strong connections between geographical features and varied structures of buildings; such as the rubble, brick and mixed works in Pompeii, widely spreading over this town, which has been recorded by photos and not measured, in design or in urban configurations, essential to a definition of the whole geographical contexts; laser scanning is somewhat like an useful tool that can collect point clouds with three dimensional coordinates and RGB data.
On the other hand, we faced the problem of occlusion behind the structures in the work with the long-range laser scanner. In the case that stations of the laser scanner were set on high-raised places, from which the lower parts of structure could be visible, it was possible to draw a general map tracing the 3D model of points clouds. However those scanned areas were often larger and more widespread than other stations, yet the radiating laser-rays were sparse and often occluded by walls so that the 3D models could not be created.
However, since the measured area has been limited along the streets in two years of 2005 and 6, we should move to inside of the city block in this stage. Our re-examination with Focus 3D is producing valuable new data in three dimensions in the insulae 7 and 15 of Regio VII. By merging the new data into those in 2005 and 06, studies in the 3rd year will be greatly enhanced by a collection of three-dimensionally measured surveys of the principal structures in the final report, as detailed analysis will doubtless provide much telling information on the methods and modes of construction, and, it may be hoped, will clarify an often sketchy chronology.(Fig.4,5,6,7)



Fig.4 Plan of th House of Trittolemo(VII 7.5) and the Houseof Gallo(VII 15,2)

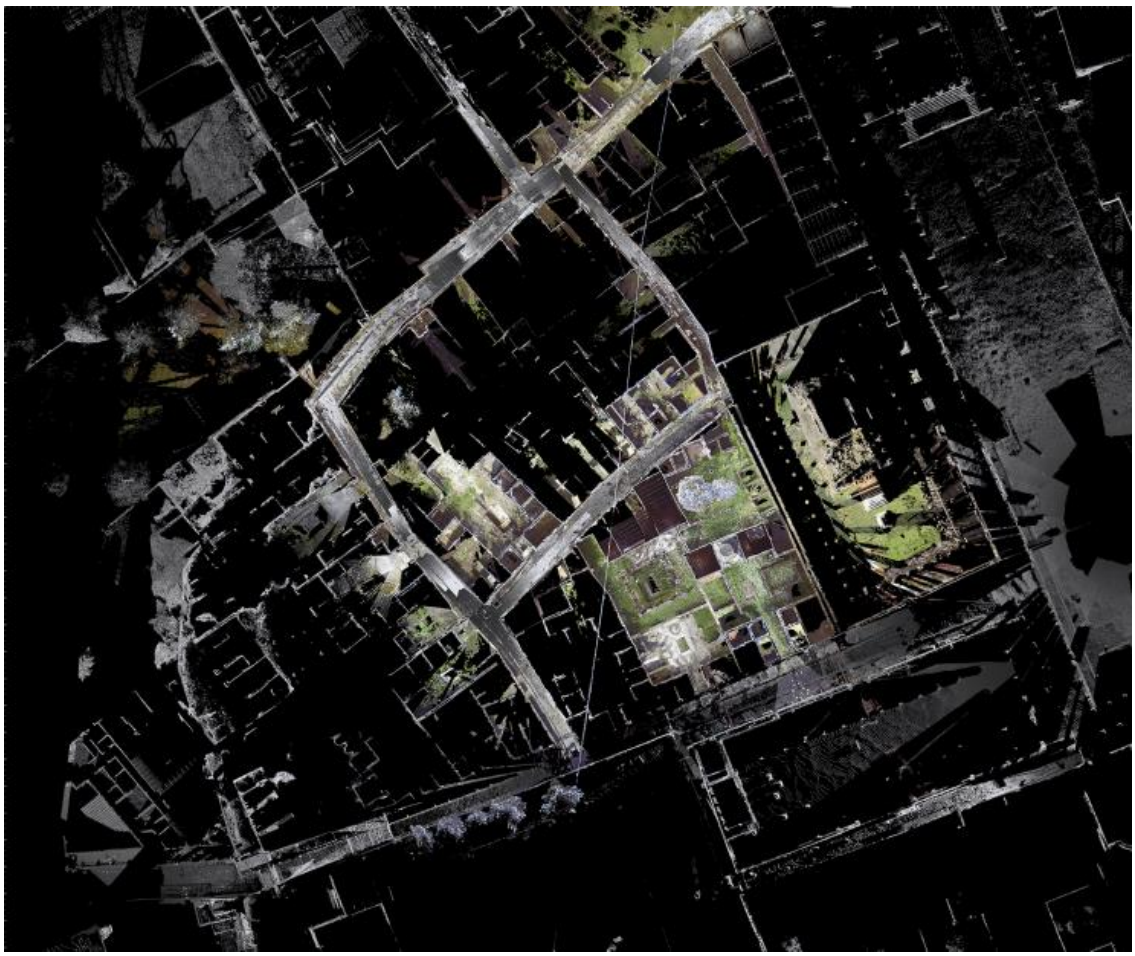

Fig.5 Image of the point cloud in town-block scale



Fig.6 Plan of the House of Trittolemo created from the merged point clouds data (on 50 cm by 50 cm grid, North above)



↑Via Soprastanti Via Marina↑

Fig.7 North-South Section of the House of Trittolemo (on 5m by 5m grid, North left)

At last, we tried to create orthographic photos of various mosaics in the House of Trittolemo (VII 7.5) and the House of Gallo (VII 15,2), but, unfortunately, the 3D data of the House of Gallo does not be analysed yet(Fig.8,9). This point cloud offers the possibility of providing geographical information about the streets of Pompeii that archaeologists could never achieve by using a total station, for the simple reason that it would take far too long to use a total station to record anywhere near the required number of points.

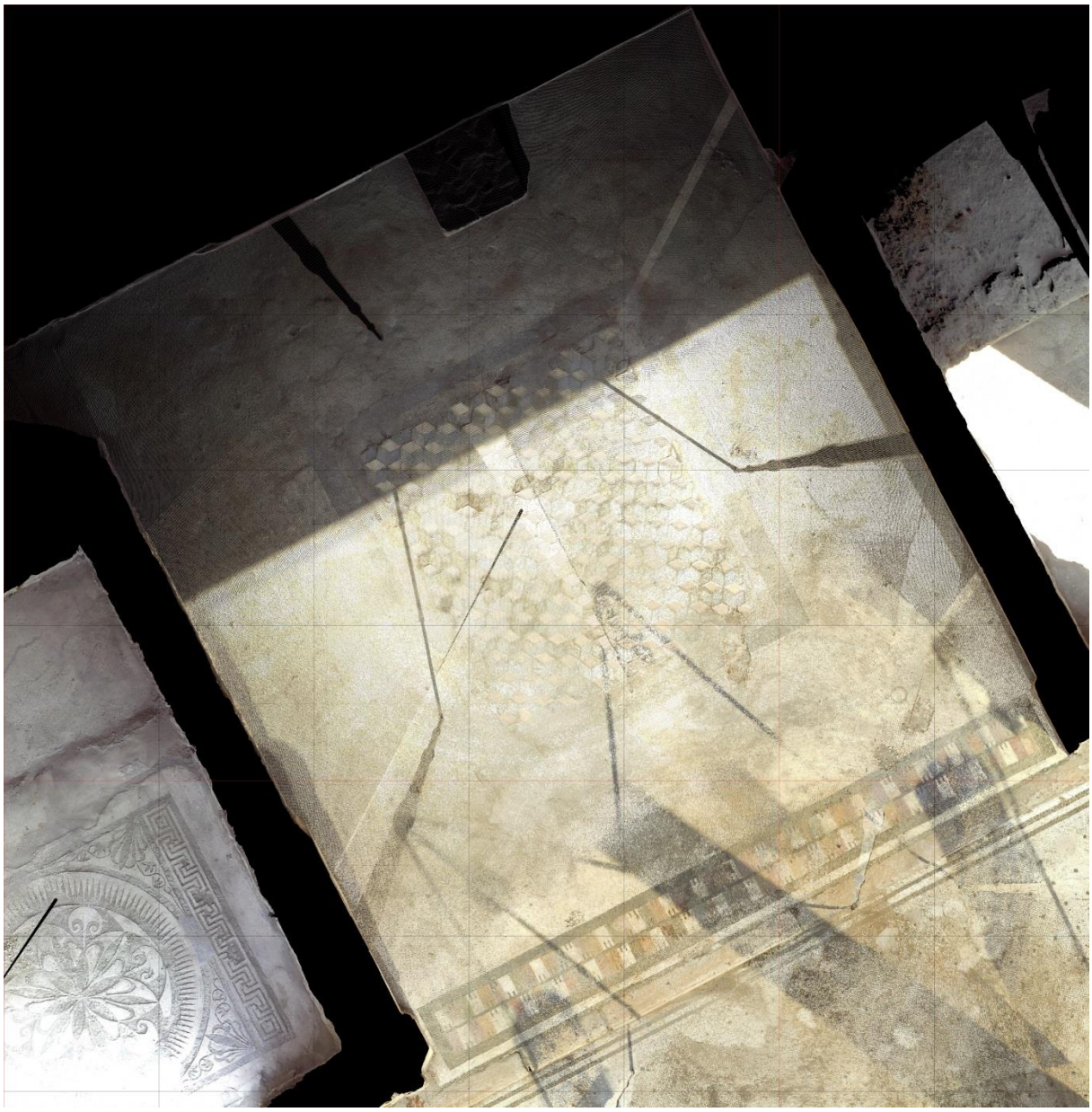

Fig.8 Mosaic in the House of Trittolemo (central tablimun, on 50 cm by 50 cm grid)



Fig.9 Mosaic in the House of Trittolemo (west ante-room of the central tablimun, 50 cm by 50 cm grid)

4. Conculusion

We provide 3D points clouds data covering the parts of Insulae 7 and 15. And a major part of this paper is devoted to the brief summary of laser-scanning applied in two weeks (from 11/09/2012 to 21/09/2012).

Why is laser scanning becoming increasingly important in archaeological recording? One of the main reasons is that by capturing the data in this way we can avoid the high cost and numerous working days necessitated in the construction of scaffolding in order to record the objects and surfaces that are out of our reach. Furthermore, the point cloud data captured by a laser scanner can allow us to alter the angle at which we view an image and enables us to zoom in on specific elements and view them in both two and three dimensions, thus allowing us to scrutinize an object up close and in high detail, something that we previously would only have been able to with the construction of scaffolding.

As mentioned above, we established how laser scanning has given reliability to the work in Pompeii, contains well-preserved mosaics of the House of Trittolemo and the high raised walls of the House of VII 15. 2; it was a merit of our investigation to show three-dimensional data can bring the elevations and sections of structures.

One of our main purposes in the work of re-measuring the streets and buildings in the map of Pompeii by Eschebach from 2005 to 2006, which is still general but unreliable in detail was the revise by applying up-to-date technology; laser-scanning. On the new investigation of 2012, the smaller-scale structure of the town, such as insulae, could be revised by that technology. In insulae 7 and 15 have many curving walls and winding streets, of which the three-dimensional data collected in 2012 will be analyzed in detail in the near future. In the field surveys in 2012, an unusually dense concentration of point clouds happens along the streets and on the other hand, less conspicuously by going farther from the streets, the structures can be described from the point clouds. To provide a completely revised map of those insulae, the work will be continued inside of city blocks and we will be helped by at least point clouds of what the finished work should like room by room rather than along the streets. On the other hand, mosaics can be set into the plans in the orthographic views of point clouds (Fig. 5). And in detail, the each piece of tesserae can be identifiable. Repaired area including the damage of bombing in the Second World War II, could be detected in future analysis.

The laser-scanning created among archaeologists a new confidence in the possibility of identifying and drawing the whole structure of buildings including features such as mosaics and wall paintings, which are more abundant in larger structures. Our re-examination with Focus 3D is producing valuable new data in three dimensions in the Insulae 7 and 15. By merging the new data into those in 2005 and 06, studies in the 3rd year could be greatly enhanced by a collection of three-dimensionally measured surveys of the principal structures, as detailed analysis will doubtless provide much telling information on the methods and modes of construction, and, it may be hoped, will clarify an often sketchy chronology.
We have to develop the measurement using up-to-date technology, such as GPS, Photogrammetry and laser scanning. As the work of surveying engineer using optical transits undoubtedly contributed to the spread of a new knowledge of urbanization in the ancient world in the first half of 20th century, the new technology in 21st century could provide new evidence.

Acknowledgements

The fieldwork in 2005 and 06 was financed by KAJIMA FOUNDATION and NISSEI FOUNDATION grants. Thanks are due to Dr. P. G. Guzzo and Dr. T. E. Cinquantaquattro, the Superintendents, who granted the permission to work at Pompeii, to Dr. P. Rispoli, who provided useful data of GPS in Pompeii, and to Dr. S. Sakai and Dr. V. Iorio, the Supervisors of the survey in 2005 and 06. I would also like to thank Dr. G. Stefani for her advice and help in 2012 and 13. I am grateful to engineers in KEISOKU RESEARCH Corp. in Japan, who lent their cheerful collaboration to the task and offered many useful technological comments. This report is a part of the result of a research project, “Architectural History as Reverse Engineering, reading the structural process of ancient Roman architecture and cities“, (director Prof. Yoshiki HORI in Kyushu University), which is financed by J.S.P.S. (Japan Society of Promotion of Science).

Bibliographical References

[1] Yoshiki HORI, “Pompeian Town walls and Opus Quadratum“. in Etani, H. ed. Pompeii Report of the Excavation at Porta CAPUA 1993-2005, 2011.

[2] Yoshiki Hori, Drainage system of the rainwater and the excess water discharged on the streets of Pompeii in Marta Zuchowska edt. “The Archaeology of Water Supply”, 2012.

[3] Van der Poel, H. *Rica maps of Pompeii*, Corpus Topographicum Pompeianum, vol. 2, university of Texas. 1984

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The documentation for the knowledge of the disappeared centers between "memory and measurement"

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Abstract
The tools of representation, related to the way of knowledge of architectural survey, allow a series of analysis of the built, such that they can deal with complex themes and often not clearly tangible in the stratifications of historical events. The theme of "young archeology" is particularly fascinating because it regards architectural and urban landscapes which, in sudden and irreversible events, caused an abandonment of the places that were vital and productive until shortly before. In fact, even though these sites can be perceived as archaeological excavations, in reality they are coeval to the many towns of our sites. For this reason, although there is the possibility to hypothesize the old reuse, the study of these places is very important because it allows us to understand the building tradition in relation to the place and to the historical periods that characterize the temporal stratification. Within the research, we focused in particular on the definition of a system based on different methods and tools used in the survey, which are involved in different professions and skills, not only in purchasing and returning three-dimensional, but also in those of use and cataloging of cultural heritage.

Keywords: documentation, storage, survey, abandoned heritages

1. Introduction: the method [1]

Memory and measurement represent, by now, an inseparable union in the field of conservation and protection of the heritage inherited from the past. The path of knowledge is, and always will be, the starting point for any kind of "action" to be taken in the field of valuation, recovery and restoration, a huge responsibility that sees students and operators of the sector such as guarantors of the continuity between past and future. This responsibility requires a strong methodological rigor that brings together all of those elements of analysis that affect the future "project" of an architectural and/or monumental asset. Memory is therefore the key element for the understanding of an asset, the principle that enables the stratigraphic temporal reading of our heritage and that defines the history and the events that led to the current situation. There is no future design without memory, there is no continuity in the life of an asset without a conscious inheritance of the past. The historical and critical analysis is, therefore, a vital step in the definition of the "identity card " of an asset, is that part of the learning process that uses the "spent " not merely for the documentation and disclosure of the knowledge, but to put the groundwork to a project of revitalization and of temporal extension. Sometimes it is easy to trivialize this stage of "approach" to the asset as a "necessary act", as if you want to shape a foregone process. Instead, those who work for the historical and critical analysis of a heritage know that they

are faced with something that does not belong to them, because they have to do with a "bridge" that crosses the river of time and that connects also very far away generations and temporal contexts. The heritage of the built is, in fact, the only tactile reality that pierces the temporal space and which requires, on our part, a sense of duty which on one hand makes honesty to the past and, on the other hand, ensures continuity with the future. If the memory is that part of knowledge that ensures immortality to the heritage, the measure will take a snapshot, a detailed survey of the objective conditions (geometric-formals, materials, etc.) and of support for the critical evaluations related to memory. The surveying techniques, which support and complement the knowledge of an asset, allow a process of analysis and evaluation of the tangible evidences, that put the bases, together with the memory, to the strategies to be adopted to invigorate and to prolong the life of our built heritage .

On these simple but fundamental concepts is based the method of study and research adopted by the Working Group ICAR/17 of the University of Basilicata, which operates on different local realities which range from the study of the ancient [2] to the modern [3], from the architecture to the city [4], from the territory to the landscape. Minor fortifications, monasteries, religious architectures, historical sites, underground constructions, etc., are themes that have found, in the researching method adopted, exciting results that represent the experiences to pass on to the young researchers, to the students whom, with passion, continue the training in the PhD and/or in the personal studies.

In the following paragraphs, in fact, we go to document the study that Giuseppe Damone plays in his PhD [5], where the searching experience, that is an integral part of the "young archeology", becomes the reference model to be followed in his studies on the disappeared centers in Basilicata. The continuous and progressive abandonment of centers, of architectural assets, is now, in Basilicata such as in other national and European realities, a strong emergency that calls us, researchers and students, to a sense of "duty" with respect to our human existence.

In the procedural application of the method of research, the "measure" makes use of advanced technologies for the survey and the representation, trying to govern and to control the computer applications on the market in the best way suited to the importance of the issues discussed in the specific studies. In this critical logic with respect to the use of software for the survey and the representation, we can also catch the possibilities offered, on the open market, from the open source applications, to encourage a more widely spread of the potential offered today by technology, and to interact, in a "constructive" way, on the refinement of the software themselves.

Without getting into specifics of the instruments, not to deviate from the specific topic of this paper, we include now the applications where the technological experimentation is underway, with particular reference to the instruments for survey and for communication and disclosure.

The survey system with 3D Laser Scanner allows, for example, to operate in particularly complex conditions both in terms of geometric shapes, both with respect to the state of conservation of a monument. Even the modern photogrammetry facilitates a series of operations that postpone the analysis phase to the study of a model manageable in virtual. In fact, specific software, including the open source ones, digital cameras on the market today, make accessible to everyone the operations of an architectural photo-survey, which once were made possible with expensive and hardly manageable equipments. In a way, with the help of modern tools, we try to establish a cognitive apparatus that can serve as a valuable support to the whole technician process using different instrumentation, traditional or innovative. The choice of which technology-instrumentations use for data acquisition is related to several factors such as the size and the geometry of the survey, the material nature itself, the purpose of the survey, and the conditions in which one operates.

From survey Laser Scanner 3D to the Fotomodellation 3D, from virtual modeling to the implementation of the pano virtual tour, the traditional survey methods (direct and instrumental) integrate with the possibility of managing digital models that can be explored and manipulated for the creation of multimedia products useful to the analysis of the heritage and to the disclosure of knowledge.

The invention relates, therefore, the operational phases of the documentary production and of the graphic rendering of the data collected. In fact, to the survey's irreplaceable paper representations approach three-dimensional models that allow you to thematize, in a more intuitive way, the data coming from the process of knowledge. The ability to model reality to communicate it also allows you to create digital models representative of a reality in times forgotten, or never existed.

Citing the above said to the historical-critical survey, namely to that study conducted by comparing in field-acquired data with information obtained by an archival study, it is possible to clarify the concept of "historical-critical" thinking of two possible applications: the reconstruction of the three-dimensional models for the projects documented by original archival sources, or the reconstruction of the evolutionary phases of the object of the survey. The techniques and the innovative tools of survey and representation play a fundamental role in the study of architectural and cultural contexts to discover and recompose, namely in that realities of abandoned centers whose degradation is such that it requires a complex process of analysis of archaeological type . Furthermore, the study of these places is very important because it allows us to understand the building tradition tied to the place and to the historical periods that characterize the temporal stratification.



Fig. 1: Map of the town of Campomaggiore in Basilicata.

2. The ghost towns: problems of documentation and protection [6]

2.1 The value of the documentation for the protection of memory

Always the problem of the documentation for the knowledge and the valorization has assumed a pivotal role in the academic world and not only. In fact there are numerous architectural evidences, or human in the broadest sense of the term, that have come down to us from the past, and of which we want to give knowledge to the future generations.

The possibility of "snapping" the condition of the places at any given time in the history of an artifact offers the possibility to block a concrete image of the same in that place, and therefore is an excellent base for study and research.

To a more traditional survey, are now related multi-disciplinary knowledges in order to break down, and then analyze, individually and as a whole, the building blocks of an architectural artefact.

Through the development of informations obtained from the examination of archival documents and of data acquired from campaigns of directed, instrumental and photographic survey it is possible to conduct historical-critical studies that also allow you to fill any eventual archival gaps.

The man-made material has a limited duration in time, and therefore is destined to disappear. It is for this reason that comes the need to document, analyze, and then, store the data related to architectures, or, more generally, in structures built by man.

Of course, the analysis of an artifact cannot be separated from the operation of the survey itself. It is indeed only by the survey that a building is described in its simplicity or complexity.

Investigate the building lexicon allows then to determine the value of an architecture, a key element in the study especially of the minor construction where it must be recognize the formal value of structures in which the form is not born as a product of the designer's artistic intentionality, as it happens in monumental buildings, but is the consequence of the specific needs of everyday life for those who live there, as well as being subject to continuous changes during its lifetime in response to the changing human needs [7].

The union of "memory" and "measure" in this context is linked inseparably, where the first term is intended to indicate the importance of documentation for future generations, while the second

summarizes all transactions involving the acquisition, analysis and interpretation of data related to a constructed object. We do not want to intend therefore a mere exercise of data collection.

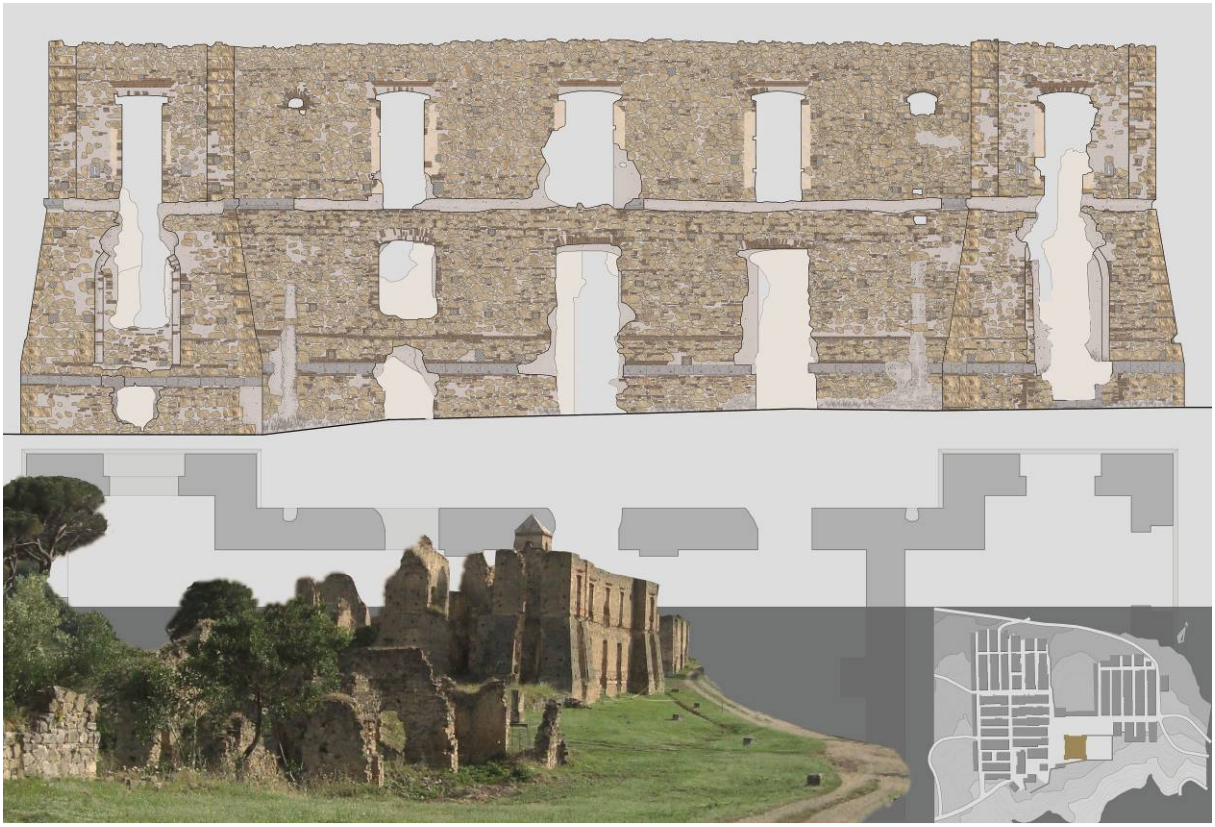

Fig. 2: Drawings of survey of the Palace Cutinelli - Rendina in Campomaggiore.

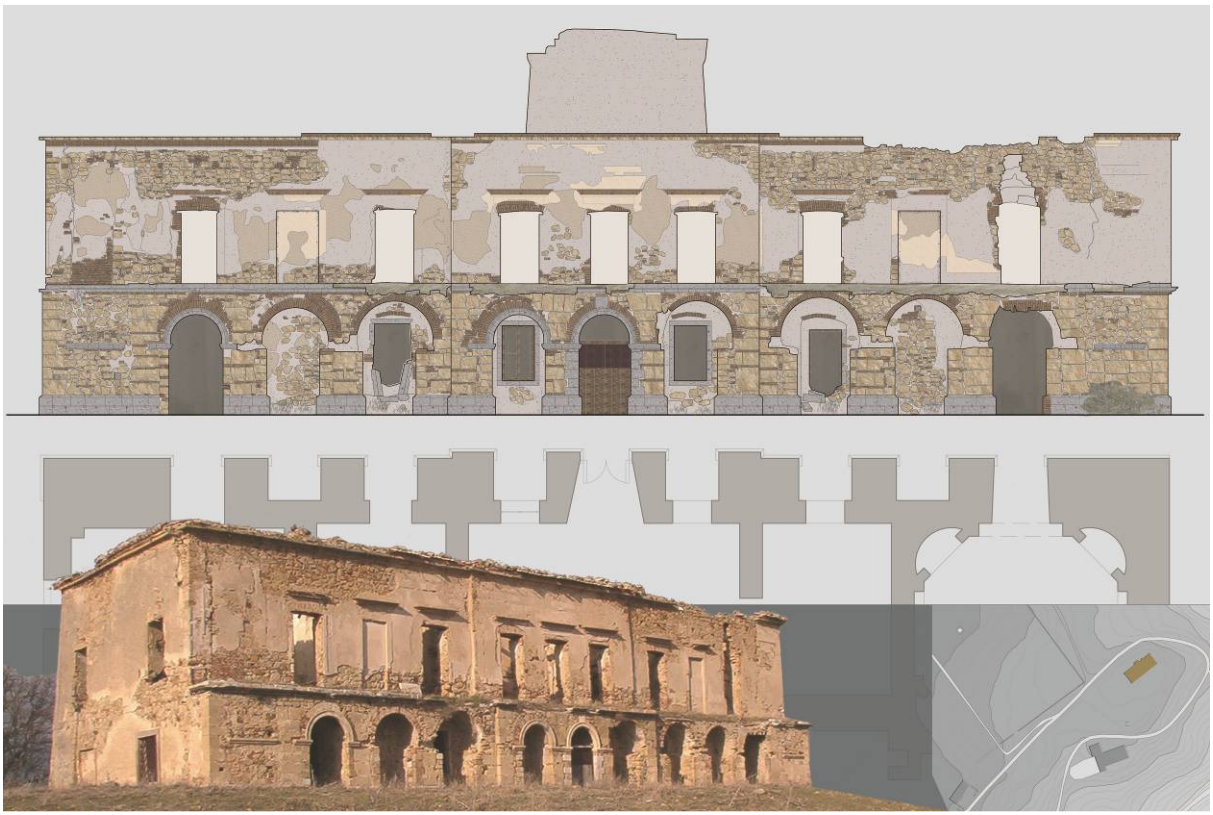

Fig. 3: Drawings of survey of the Casino of the Countess in Campomaggiore.

2.2 Abandoned centers: from the causes of the abandonment to the problems for their protection

Today, more and more often, we hear about abandoned village, better known as a 'ghost town', wanting to use an English expression. They are crystallized realities, no more inhabited due to an instantaneous and no longer reversible event, or simply as a result of a slow depopulation.

There are hundreds of abandoned centers in our region today left to the slow decay. But Italy is not the only nation to host ghost town; it is in fact a widespread phenomenon that is having exponential development in other countries. We can think, for example, to Spain where many internal realities are empty because of a migration to the cities due to social and economic changes.

Visiting one of these centers is to take a trip back in time and immerse yourself in urban contexts stopped at the time of the abandonment. Some examples are, to name a few, the countries abandoned after the Irpinia earthquake in 1980 where, along ancient roads, among collapsed buildings, it seems to relive the moment of the earthquake, as well as to bump into objects of everyday life of the time. But the most important characteristic is given by the possibility of being able to analyze the construction techniques of the past, since these buildings have not undergone alterations related to partial or total reconstruction with the use of different materials from those of the constructive tradition of the place, or even technological adjustments that usually have affected the structures of our city centers.

Of course the state of conservation of the centers is closely related to the period of the abandonment and the materials used in the buildings. We can speak of archaeological evidences with regard to abandoned centers in the times of which we have been forgotten, and of "young archeology" for all those realities fairly recently abandoned, and that now you have to study in ruins of Ruskin memory. In this latter case, they are centers that have a history of construction comparable to that of the many historic centers still inhabited.

The abundance of stone quarries has made possible the construction of our Italian realities, and therefore also of those which were subsequently abandoned, done in masonry with building panels of ashlars more or less worked. This constructive peculiarity has meant that came to us the ruins also of all the towns that were abandoned in the course of centuries and that now is possible to investigate. An exception is the lesser buildings made especially in the Middle Ages that was, instead, made of wood and of other degradable materials. Of this, having been abandoned before it was replaced by masonry structures in the later centuries of the structuring of the territory, it is often impossible to trace even simple archaeological traces, and the only feedback on their actual existence can be inferred from the old tax records, or from the ecclesiastical ones, or from the names of the areas that allude to towns with churches or monasteries. What has been described is still happening to many abandoned centers in Spain and made of adobe. In the media and bottom valley, the lack of stone quarries, resulted the construction of the same in raw land, an extremely friable material and intended to degrade in just a few years, as soon as fails the constant maintenance required. Only the main architectural emergences were made by stones. Therefore, a few decades from the abandonment, of the all of the inhabited realities there are only the ruins of churches and military architectures to testify the existence of a settlement in that site.

Another problem related to the conservation of the ghost towns is the phenomenon of looting, first for the recovery of material, in the aftermath of natural disasters, to use for the delocalized re-reconstructions, and then to the recovery of structural elements of the tradition to address to the market. For what just described the survey for the documentation is a key to ensure the memory of these centers with their history sedimented in the built. The impossibility, in fact, to be able to retrieve all the sites will result in the destruction of many of these.

2.3 The case study of Campomaggiore in Basilicata: the definition of a methodology for the reading

The method of analysis has been applied to various lucan abandoned centers and not in order to capture all the peculiarities of each individual situation analyzed. Being smaller towns, it is difficult to find traces of their urban and architectural history in documents or in literature sources.

A very interesting result is achieved by analyzing the abandoned center of Campomaggiore, in Basilicata. It is a reality of foundation built between the eighteenth and nineteenth centuries, and whose life ends in 1885 following a landslide that destroyed part of the town. Passed the state of emergency, in fact, was made the decision to make a delocalized reconstruction [8].

Since the beginning of the study conducted for the documentation of the center we realized the oneness of the same for its history and its urban layout so different from the other Lucan countries.

Today, of the whole center built according to a rational scheme with a public central area, and houses located checkerboard all of the same size, as required by the act of foundation of 30 December 1741, remains only a small amount of ruins because of the collapses, and especially the stripping of which has been the subject, at first for the recovery of materials for the re-reconstruction, and subsequently for the removal of architectural elements. At the same time of the analysis *in situ* was carried out the

study of archival and bibliographic sources, in order to capture all the changes of the center and place them in a precise space-time context.
Particular attention has been given to the analysis of the smaller building, of which was not find any trace in the examination of archival sources. It was clear, indeed, that although it is a center of foundation, its growth and expansion was not immediate, but is distributed over a period of one or two centuries. To a first group arose immediately after the purchase of the feud by Rendina in 1673, it will be gradually added portions of the urban fabric. Through the survey, the cataloging and analysis of the masonry pannels has been possible to define this trend, also catching in what stage of the urban development is part the intervention of the architect Giovanni Patturelli, a Collecini's student, which probably draws the diagram of the center as it is perceived today by visiting the ruins, as well as some important buildings such as the Palace Cutinelli - Rendina. As already said, the city is divided according to a rational scheme gravitating around 'Piazza dei Voti' and 'Piazza Rendina' on which face the main important buildings such as the Palace said, the parish church, the town hall, the barracks of the royal Carabinieri, and a series of buildings housing services for the community. Just outside the village find their place, instead, The Casino of the Countess, the summer residence of the Counts, the farm, the Laboratory of Wine and a public source. Also all of the major architectural emergences, also in ruin, were recorded and broken down into their components for a reading of the individual parts. It was possible to reconstruct the entire urban and architectural project wanted by Rendina Counts, and of which there are some documentary evidences. The traditional surveying techniques, was accompanied by an analysis of multidisciplinary data, in addition to the return of the three-dimensional objects of the survey.
The returned documents, in addition to being a valuable documentation of the main buildings, and of the whole center, also allow you to read the state of preservation, and thus provide a basis for the study of failures and pathologies of the same. Virtual reconstructions of the individual buildings and of the entire center also allow you to admire the entire complex as it must appeared before the landslide of the nineteenth century and the subsequent abandonment.



Fig. 4: Analysis of masonry panels of the Casino of the Countess in Campomaggiore.

3. Ghost town and landscape: ideas of searching [9]

An important element in the study of the documentation for the abandoned centers is definitely the reading of the ghost towns within the natural context in which they are located. Since these are actually blocked at the time of abandonment, nature slowly reclaims its space because there is no longer a regular input of man who, with his human activities, changes the natural environment. The landscape, in fact, is

the tangible manifestation of the relationship between man and environment, it is not only an expression of nature, but is an economic and social operative space in which we find objectified signs and works that man realizes. The landscape exists because man builds it, sees it and turns out it, is a matter of the senses but also a matter of culture that, to be understood, must be viewed as a concrete set of forms and phenomena related to each other and in constantly evolution. The concept itself of landscape is related to the ways of human perception and the moment of perception can, by design, result in interpretation. In the survey of the landscape is not too much important the collection of geometric data but rather the ability to observe and understand the geographical, natural, historical and cultural factors that define it. In this sense, the design is a real process of knowledge, because as the painting and photography it represents the landscape and allows the reproduction and the dissemination of his image but also because it allows the interpretation.

There is no landscape if there is no a man who observes it and lives it, to detect the landscape means to process a refund that is able to summarize the constituent and connoting elements. Naturalistic area, architecture, weather, seasons, colors, are all elements that need to find their place in the survey intended as a method of study of a system of relations. In particular, in the relationship between architecture and landscape, the color theme can be central in the search for the common thread that binds the system of relations in the unit of the landscape studied. The color of the architectural elements: houses, factories, historical, infrastructure, small towns, contributes significantly to the impact of the perception of a landscaped area. Deepening the relationship between natural environment and color artifacts helps to understand the building dynamics of a center. You can, in fact, identify the nature of stone materials with which the individual buildings have been made and, therefore, identify the quarries where individual segments were cut. Coming less the constant maintenance of the housing units, as well as of the historical architectures, vestments lose any layers of plaster and, by the action of atmospheric agents resume their natural color. What above said makes the abandoned centers of mountain almost invisible from great distances. Being the slots made in the same bedrock on which the center stands, from large distances the mountain seems almost imperceptibly shaped.

In the methodology of reading of the area, experienced in recent years in the researches, the description of the landscape, it was not only based on planimetric references. The term landscape, in fact, also implies a volume, a thickness in which the man himself lives and is immersed, and this space needs to be explored and represented through systems that enable the analysis of perceptual parameters or spatial relationship between the parties. For this reason, the boundaries of the section of the landscape to be analyzed are identified starting from the possibility that the landscape has to be looked at, resulting in the same geographical area more sections or scopes of investigation. For each section of landscape the margins are defined and identified, on the basis of direct observation, the benchmarks or baselines of the survey.

Using all the bases, the landscape is analyzed from several points of view. In every area, defined according to the visibility and no with geographic criteria, naturalistic or geomorphological, are then identified homogeneous areas that may be subject to specific analysis or to zooms to focus the details and connotative data. These areas may be more or less extensive, in a first phase of the observation one can proceed, for example, beginning to separate the natural scope from the settlement one, and then below, proceeding in the survey, it is possible to make insights that help us to identify the shapes that arise in the various areas the spatial pattern of the landscape and define its structure. Then we will get a series of graphs that will propose a reading of the place and of the elements that characterize, from perceptual and morphological data until the realization of a graphical depiction of the landscape observed. The proposed graphical analysis can not, however, be apart from more general considerations on the landscape, considered not as stable and defined perceptive datum, but as an expression of the environment in which man acts, a concrete witness of the relationship between culture and nature. In this sense it is important to extend the analysis to the system of relations that takes place between the different fields that characterize the landscape analyzed, starting from considerations relating to the nature and use of soil: the topography, vegetation, crops, the road system and the hydrografic one must be considered and analyzed in the general context that inevitably will include the works of man in the area (houses, industrial settlements, castles, monasteries, fortresses, etc.) and infrastructures (bridges, dams, viaducts, installations for the production of energy etc.) views always in relation to the landscape in which they are inserted .

In the schematic chart the coexistence of different elements and partly conflicting may suggest the type of ongoing dynamic and the evolution of the spatial order, since in the landscape there are no elements of stability and permanence and therefore it is important to be able to capture also the ongoing transformative processes. In the survey of the landscape, then, everything is incorporated and elaborated from the vision, the ability to look is at the basis of a method that leads to work establishing a direct relationship between the observer and the observed objects. The eye detects and the design revises and summarizes the elements of nature: mountains, trees, hedges, rivers, lakes, and those of architecture: towers, castles, monasteries and towns, but also dams, bridges, viaducts and, in many cases reduced to a state of ruin. The final product will allow us to create a pattern of

perception of the landscape: setting margins, nodes or references, will allow us to read the mutual relations between the parties and to highlight the figural and recognizable qualities, depending on the presence of signs useful to the guidance - architectural artifact, natural emergencies - or widespread signs that give identity to places, whether they are deemed to be positive or negative. In this sense we examined different elements that are evaluated not for their intrinsic value but for their readability.

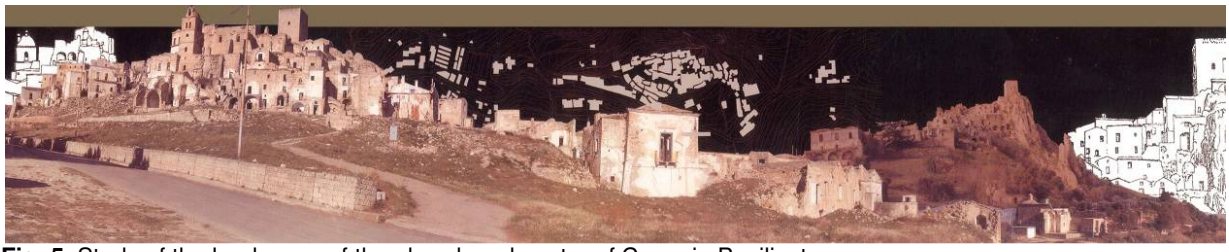

Fig. 5: Study of the landscape of the abandoned center of Craco in Basilicata.

Bibliographical References

[1] Written by Antonio Bixio.

[2] Research Project MURST 40 % 98 "Complex Buildings of ancient plant abandoned in the cities and in the region of Basilicata" (scientific coordinator of the local Unity: prof. Antonio Conte) within the National Research entitled "Emergency survey: applications and working methods in survey for the conservation and restoration of architectural and environmental heritag", coordinated by Prof. Mario Docci.

[3] Research project PRIN 2004-2006 intitled "Documentation and monitoring of urban centers, rural villages and complex architectural systems of new foundation of the early twentieth century in Basilicata" (scientific coordinator of the Local Unity: prof. Antonio Conte), within the national research program entitled " Coding of the documentation for the representation and the computerized management of the transformation of architecture and of the cities. Identification of the key features to control the transformation dynamics of the city and their organization in information systems: the historicized periphery" (national scientific coordinator: Prof. Vitale Cardone).

[4] TOLLA Enza, BIXIO Antonio. *Un laboratorio per il rilievo*. Salerno: Edizioni Cues, 2012.

[5] PhD in “Ingegneria delle strutture e del recupero edilizio ed urbano”, University of Study of Salerno.

[6] Written by Giuseppe Damone.

[7] Cfr.GIUFFRÈ Antonio.*Sicurezza e conservazione dei centri storici.* Bari: Edizioni Laterza, 2006, p.69.

[8] For the study of Campomaggiore sees: DAMONE Giuseppe. *Lettura storico critica di una ghost town. Il progetto utopico di Campomaggiore*. Salerno: Edizioni Cues, 2013.

[9] Written by Enza Tolla.

[10] BARONI Daniele. *Il manuale del design grafico*. Milano: Longanesi e C., 1999.

[11] BOFFITO Maura. *Il rilievo del tempo – percorso di un lavoro rigoroso tra archivi e biblioteche*. Genova: Sagep spa,1990.

[12] CONTE Antonio. *L'esperienza dell'antico. Memoria, rappresentazione e rilievo.* Potenza: Lamisco Editore, 1997.

[13] DE RUBERTIS Roberto.*Il disegno dell’Architettura*. Roma: NIS, 1994.

[14] DOCCI Mario, MAESTRI Diego. *Il rilevamento architettonico, Storia, metodi e disegno*. Bari: Editori Laterza, 1992.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The museums' world tries to safeguard and communicate the intangible dimension of heritage

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Abstract
The UNESCO Convention for the Safeguarding of Intangible Cultural Heritage signed in 2003 deeply questioned the museum world. It is necessary for the museum to modify certain among its essential functions and its ways of working, since a new challenge urges it. It's not an easy task, since the most spread museum model in the world is the Western one, which is conceived and lived as the reign of of tangibleness: it's not adequate for an intangible collection. In this respect the failure of museum in the colonial era is well known. A deep change in museum structure is required, and a "comparative museology" can help for this aim; the museological attitude is not exclusive of the Western world, and examples of it gathered throughout the world by anthropologists can provide a good model to face difficulties that arise when the museum meets the intangible.
The biggest risk the museum encounters is the one of freezing intangible heritage in fixed forms, thus letting it die. For this reason, a good practice of heritage conservation and management should be based on the engagement of the cultural community linked to a landscape or to a cultural expression. Firstly it should be aimed at making the cultural bearers continue to practice and produce their cultural expressions; secondly, the local cultural community should be involved in the process of communication of its heritage. Its correct communication is indeed a fundamental way to permit a right conservation of our heritage's memory and collective identity. Many different good example of it are rising in Italy, as the artistic interventions of Studio Azzurro, among the others, show.

Keywords
Intangibile cultural heritage; UNESCO; museums; living cultural community; heritage's communication

International policies about intangible cultural heritage
The 2003 UNESCO Convention for the Safeguarding of Intangible Cultural Heritage has been a turning point in the lively debate that has occurred particularly in the last forty years.
As a matter of fact, starting in the 1960s and 1970s the conception itself of cultural heritage has been widely debated by means of a confrontation among different cultural perspectives endorsed by various geographical areas of the world. The traditional normative references that had been enacted until 2003 were namely focused on the tangible aspects of cultural heritage, and the legislative tool that best represents this trend is the well-known 1972 UNESCO Convention for the Protection of Cultural and Natural Heritage, which has met extraordinary consensus worldwide. However, this convention has strongly disadvantaged vast areas of the planet whose culture is mainly represented by intangible forms of art, namely the native populations settled in Africa, the Americas, Asia and the Pacific region. On the contrary, the 2003 UNESCO Convention has drawn the attention over many cultural contexts that had never been considered at an international policy level, this way being excluded from the benefits of preserving interventions. It is precisely these contexts whose existence is nowadays threatened by several factors such as globalization, which has spread cultural models worldwide: it contributes to the detachment of communities and groups from their know-how, traditional values, usages and activities such as craftsmanship. As a consequence, today several actions are being

taken into consideration from the State parties in order to guarantee the safeguard of intangible cultural heritage. With regard to this aspect, article 2.3 of the Convention provides a list of the necessary measures in order to ensure the viability of the intangible cultural heritage such as «identification, documentation, research, preservation, protection, promotion, enhancement transmission, particularly through formal and non-formal education, as well as the revitalization of the various aspects of such heritage».

Despite the lack of express mention by the Convention, museums can play a pivotal role in the enhancement as well as in the transmission and revitalization of the intangible cultural heritage. As a matter of fact, museums have always performed a role of collection and protection of the cultural heritage, and they can no longer avoid considering that also intangible aspects represent an essential part of mankind's cultural heritage. Such improvement derives from the official recognition of the concept of intangible cultural heritage by the 2003 Convention. With regard to these developments, ICOM has been encouraged to re-conceptualize the form of museum shaping it over intangible collections. Already in October 2002 ICOM had officially taken into consideration this subject for the first time in the Shanghai Charter: Museums, Intangible Heritage and Globalization, following the workshop on Museums and Intangible Heritage (7th Regional Assembly of ICOM Asia-Pacific Regional Alliance). This charter encourages the adoption of "interdisciplinary and cross-sectorial approaches that bring together movable and immovable, tangible and intangible, natural and cultural heritage" and recommends "to develop documentation tools and standards in establishing holistic museum and heritage practices".

The most significant step towards a full endorsement of this perspective is represented by the XXIst ICOM General Assembly held in Seoul in October 2004 on the theme of 'Museums and Intangible Heritage'. During this conference, the member States have agreed to support the 2003 UNESCO Convention by promoting policies of enhancement of the cultural traditions, thus shedding new light on the definition itself of 'museum' . The motto that had been universally embraced by the national delegations gathered in Seoul was the well-known sentence by the Malian writer Amadou Hampaté Bâ: "In Africa, when an old person dies, a library burns down". The underlying reasoning of this sentence is crucial: the museums must first of all consider the human beings together with their knowledge, values and way of life as essential cultural resources.

However, a simple change in the definition of 'museum' is not sufficient in order to bring about substantial change to the present condition: it is necessary for the museum to modify certain among its essential functions and its ways of working. Today museums are facing a new challenge: safeguarding intangible cultural heritage. This task is not always a simple one to accomplish, since the museum can easily slip into the risky attitude of freezing the living intangible heritage into fixed forms and images. By acting this way, museums risk to misunderstand the true sense of their collections, to inaccurately hand them down, and, consequently, to disrespect them, thus betraying their main mission.

The materialistic gaze in the traditional Western museum

The most commonly spread model of museum worldwide is the Western one, which is deeply dependent on the "culture of the object". Such model is intertwined with the concept of material conservation and with the enhancement of the tangible aspect of heritage. Even though the history of the first proto-museums traces back very far in time in the Mediterranean culture, we can consider the current form of Western museum a direct heir of studioli, cabinets and galleries which began to rise in the courts of European and namely Italian Renaissance. The nobles used to collect mainly paintings and sculptures (and later any sort of natural or artificial curiosities), in search for personal prestige and inspired by an aesthetic attitude, and gathered them in specific architectural spaces within their palaces. Hence, since its origins, the museum emerged as a shrine of the most precious, extraordinary and rare objects of art and culture. Its specific task was the one of preserving its marvellous collection from anything that could damage it, first of all the passing of time. For this reason the museum spaces began to be commonly considered a sort of temple, a sacred space dedicated to the divinities of Muses, where the concept of time and history disappeared into the value of eternity. Clearly, this specific attitude was namely directed to the conservation of the material quality of objects and to the appreciation of their visual and tangible aspect. As a result, the idea of museum as an incorruptible and sacred space, deeply detached from the on-going reality, was handed down from generation to generation throughout the centuries in the Western European society.

Given the historical events that have taken place especially in the 19th and 20th centuries, the above mentioned model of museum has spread over a large part of the globe. Even in the Americas, in Africa, in Asia and in the Pacific region many museums have been conceived through a Western

museological discourse. Specifically, there was a particular moment in history when European people started considering and meeting the culture of native societies and groups in other continents: the colonial era. In that context, even museums became a tool of the foreign cultural domination. For the first time since its origins, such Western institution had to face a serious confrontation with an intangible collection, due to the fact that native cultural heritage was mainly characterized by intangible forms of culture. However, a large amount of customs, oral traditions, practices and representations obviously implied the use of various materials such as tools, images, masks and objects.

It was actually this tangible aspect of the culture of native peoples met by European conquerors that induced a significant misunderstanding. The museums that were settled in such new areas functioned exactly as they were used to do in their countries of origin: as collectors of objects. As a consequence, intangible cultural heritage was studied, collected and treated as if it was just tangible, being very often detached from its frame of life and from the symbols that gave sense to it. Many objects were considered and appreciated as mere curiosities or, at best, as works of art, whereas they were just tools and objects that should have rather been appreciated for their long history of traditions and know-how that they echoed. In addition, scientific and ethnographic interests often inspired the construction of new museums in the occupied areas. While native people safeguarded their traditional objects across generations in order to respond to their material and spiritual needs, Western collectors were rather animated by a scientific interest, which mainly focused on the tangible side of cultural expressions. This attitude led Europeans to build object-centred museums whereas today it seems more and more urgent to develop person-centred museums. Indeed, today we can say that this traditional approach to heritage's preservation has not brought about very effective results since it hasn't contributed enough to the survival of those cultural expressions. In other words, in the colonial era curatorial methods have been exclusively applied to objects, without considering the people who were using them, their lives, their intentions, their symbolic and empathic participation, not even the meaning they socially conferred to those same objects. As a consequence, collected artefacts were totally detached from their living context, therefore losing their main sense.

Furthermore, it should be mentioned that scientific research was unfortunately too often conditioned by cultural and political interests. As a matter of fact, museums were crucial vehicles either for the demonstration of the European culture's superiority, or for the attribution of meaning to native cultural expressions filtered through Western cultural, scientific and even aesthetic standards. Colonizers took control of the interpretative process of indigenous cultures: museums mainly focused their attention on the visual and aesthetic quality of the objects, without taking into consideration the wider intangible aspect, which, on the contrary, gave a more comprehensive meaning to that same heritage. This situation often brought about a misinterpretation of indigenous cultural heritage, and, more importantly, a total lack of respect of the very essence of their culture. In the absence of due consideration of native customs and artefacts, several detrimental events took place, such as the profanation of sacred objects and human remains (Simpson 1996). Such a difficult and thorny issue cannot be treated within the scope and possibilities of this essay: reference should be made to the contributions that have specifically treated this subject.

Nonetheless, even though the era of colonial museums is over, it must be considered that some bad practices have continued up to the present and that a strong and shared knowledge about how to preserve, enhance and transmit intangible cultural heritage through museum is still missing in various contexts. As M. Simpson effectively shows (Simpson 1996), postcolonial museums keep interpreting intangible cultural heritage of native peoples using inadequate instruments: in some cases museums still display their collection through Western cultural lenses, and it isn't until a very recent past that they began to involve indigenous people as partners or consultants in the management of their own objects of art and culture. Even though nowadays colonial and post-colonial museums are no more a current reality, and European museums are no more built as symbols of the Western superiority, the same "materialistic" gaze that inspired the past seems often to persist up to the present. Objects collected and displayed generally bear a large amount of symbols, cultural, spiritual and social information, beliefs, customs and know-how, but, unfortunately, they are in some cases welcomed by mere appreciation of their own shape and material quality. This behaviour can contribute to kill the fragile existence of some essential immaterial cultural expressions, consequently a museum can even become an element that helps to destroy a culture instead of preserving it. By contrast, museums dedicated to host intangible heritage should get involved towards the following aim: make an object speak and tell its stories, which go beyond its visual appearance.

A prompt response to this issue is even more urgent since 2003, when the UNESCO Convention drew the international attention on the safeguarding of intangible cultural heritage together with the 2004 ICOM General Assembly, dedicated to the theme of museums and intangible heritage. In addition to

this, in the last years “museums of the intangible” are increasingly arising throughout the world, and they are not exclusively ethnographic museums. As a matter of fact, many current collections in newborn museums concern historic memories, concepts, aspects of human life and ideas: therefore they display totally immaterial elements, which require appropriate policies of communication and safeguarding. Given this current trend, it is vital for museologists to reflect upon new systems and methodologies for preserving and transmitting intangible cultural heritage.

A different conception of museum experience

Nowadays a museum dedicated to intangible heritage is, first of all, solicited to welcome the idea of safeguarding its collection rather than merely protecting it, as the most commonly spread tendency would suggest. As a matter of fact, the major risk museums encounter when they relate to an intangible collection is the one of freezing it into fixed forms in order to protect it. Generally, it is not easy for the Western conceived museum to safeguard intangible heritage without giving to it a specific and durable form: as mentioned before, the very essence of the European museological model is indeed to guarantee enduring cultural and artistic forms despite the passing of time. For this reason, museums should favour the crucial passage from the concept of conservation to the one of safeguard as advocated by recent international policies. As the titles of the two UNESCO conventions of 1972 (Convention for the Conservation) and of 2003 (Convention for the Safeguarding) effectively remind us, the time has come to enlarge the very concept of cultural preservation: it does not refer just to the material structure of artefacts, but it affects a wider scope. The aim of museums is nowadays the contribution to intangible cultural heritage’s viability. Consequently, they cannot simply gather documents, objects and evidences, but they will hopefully encourage the constant living and sharing of the preserved cultural forms among their community.

This radical change in conceiving the approach to cultural heritage preservation takes part in the recent comprehensive reflection over the concept of cultural heritage, which obviously has many consequences with regard to museums’ ethos. As a matter of fact, the conceptualization of intangible heritage in the last years has thrown new light on some standards and qualities that have always been considered fundamental characteristic of cultural heritage in the Western intellectual milieu. The growing awareness of the existence and of the value of the intangible cultural heritage prompted the international community to re-examine some traditional axioms about the very nature of cultural heritage. If an essential feature of cultural heritage has traditionally been the outstanding universal value of objects, this is no longer a requisite for its identification: intangible cultural practices and expressions, together with their related instruments and objects, are not necessarily the fruit of a precious and elaborated art. Their value is not merely due to their superb, original and unique visual quality, or to the rich material utilized, whereas they are considered significant because groups and communities identify themselves with it. This is the very reason why the 2003 UNESCO Convention revisited the method of the lists adopted by the 1972 Convention; charged with elitism, they were abandoned for the creation of a Representative List of Intangible Cultural Heritage of Humanity, of a List of Intangible cultural Heritage in need of Urgent Safeguarding and for the national inventories. This new trend reflects the current museological modus operandi, which diverges from the former widespread model of museum as a “temple”, where sacred objects are guarded as exceptional and unique artefacts. Museum is rather a place of cultural identification, its collection is not “out-standing” but, on the contrary, it is “standing” in the midst of people and belongs to them.

Besides, the idea of cultural heritage has always gone along with the principle of authenticity, which, in the Western cultural context, is interpreted as material authenticity. A displayed object must be the original one, and its material existence should be as much preserved as possible: reproductions are not admitted. Therefore European museums have always been trying to keep their collections safe from the passing of time and from other potential damages; objects in museums have been guarded as relics, and, as a result, the main attention and care has been focused on their material existence and visual appearance. With the introduction of new parameters connected to the conception of intangible cultural heritage, also the cardinal value of material authenticity has been deeply called into question. Museums can no longer function as shrines for objects handled as relics, thus supporting and promoting the preservation of fixed and frozen cultural forms. At the present time authenticity, when referring to intangible heritage, redefines its scope; as very well the Nara Conference highlighted in 1994, authenticity is not exclusively linked to the tangible evidence of objects:

Depending on the nature of the cultural heritage, its cultural context, and its evolution through time, authenticity judgements may be linked to the worth of a great variety of sources of information. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other internal and external factors .

Ten years later, in October 2004, the Yamato Declaration corroborated such concepts and suggested to eliminate the notion of authenticity as a selective criterion for the denotation of intangible cultural expressions; since they are constantly recreated, authenticity is not relevant to their identification and safeguard. The museum world welcomes this principle and, consequently, it is encouraged to revise one of its traditional functions: guaranteeing the display of unique and original items. Rather, the museum space will hopefully come to be the place where the authenticity of the cultural context and of the human and social background, which gives life to cultural expressions, is maintained and safeguarded. As a consequence, museum's activities of preservation should aim at the larger scope in which testimonies of intangible heritage are inserted.

In order to conform to these renovated concepts regarding the very essence of cultural heritage, it can be very advantageous to consider other museum-like spaces developed throughout the world in many different cultural contexts and in a large number of geographical areas. Even though we generally speak about museum and use such term by referring to what was born and developed in the European culture, we can't avoid considering that the "museological attitude" is trans-cultural: the need of gathering objects with a special value in a devoted space belongs to the very nature of human beings. Anthropologists show us how many ways of creating museum-like structures human beings have elaborated in different cultures. Studying these models and forms is crucial, especially to the contemporary museologist: they represent indeed a very successful example of how intangible cultural heritage can be optimally safeguarded and transmitted form generation to generation across the years. Nowadays the debate over the museum and the intangible cultural heritage can greatly benefit from what we could call a "comparative museology" (Kreps 2003: 4). Non-Western examples of "museums" show advantageous methodologies that are meant to keep the heritage alive. In some cases, those indigenous models can be easily identified due to their very explicit nature, such as –for instance— the meeting house in the Pacific Islands; in some other cases they must be traced within their larger cultural context: religious practices, social systems, popular knowledge or artistic traditions. We can nonetheless learn from what these peoples have been creating in order to make their culture live across the generations, as well as to help intangible cultural heritage survive in our menacing world, where it risks to shortly disappear. Indigenous models of museums and curatorial methods are so precious that they can be considered themselves as part of cultural heritage worth of preservation, as C. Kreps suggests (Kreps 2003, 2009).

The native museological attitude has always been focused on people, since museum-like spaces and activities have been meant to keep their culture alive, and culture can survive as long as people live. Objects arranged in a special place for their preservation either have an artistic and religious character, or they are tools that take part in the community life, both for specific rituals or simply in everyday life. Museums and items are intertwined with people's life: they are touched, utilized, consumed, visited, lived. A completely different museum behaviour emerges in comparison with the Western conception: in the "sacred temple of the Muses" (this is the origin of the term "museum"), objects must be kept incorruptible, they are not part of people's life unless considered under an intellectual point of view. This is quite a paradox: the heritage that is usually considered as the "material" one requires a very immaterial fruition, whereas the so-called intangible heritage needs a real and concrete involvement of the people in order to stay alive. This is true for the cultural transmission too: native people keep their cultural objects living because their uses and symbols are constantly communicated to the community (with specific restrictions changing with the context) across the generations through non-formal education: oral traditions such as storytelling, songs, dances, rituals and ceremonies.

Museums that nowadays face the issue of how to correctly and fruitfully safeguard intangible heritage, can be concretely inspired by the indigenous curatorial methods. Under their influence, the museum can aim at becoming a place charged with a deep meaning for the community: from this perspective it can't be considered something detached from the context of which it is part, a mere place of scientific research or of aesthetic and intellectual pleasure. Besides, another important suggestion from native museology is about local people, it is essential to safeguard intangible heritage through people: by means of their lives, their thoughts, and their experiences. Intangible heritage is a living heritage, and for this reason it can be in no way separated from life, i.e., from people. People are also essential to the cultural transmission in the museum environments, which will hopefully become a place where culture is produced and shared with others in a sort of workshop.

It could be said that intangible heritage's museums today challenge the pervasive and hegemonic curatorial model that is spread in our transforming world. The roles are switched: if for a very long time the Western culture has been exporting its idea of museum to other contexts, nowadays a change of

direction is occurring. As a matter of fact, non-Western models of museum can help national and international policies of cultural preservation find effective strategies aimed at the viability of mankind's heritage. For that reason, Western museology should become very receptive to different methodologies of safeguarding, diverting its historical role. Western approaches to cultural heritage preservation have developed through time museums that are still today similar to temples or shrines, which keep objects intact and almost mute. Nevertheless, such an attitude can no longer contribute to the actual safeguarding of a large part of our heritage.

The museum as a vital space for cultural production and transmission

Nowadays it is quite recommendable for a museum with an intangible collection to be structured as a vital space where cultures keep living through the participation of the groups and the communities involved. As a matter of fact, in the current proliferation of intangible heritage's museums, it is essential for them to become useful and efficacious for local people, in order to help them practice their cultural activities and to transmit their knowledge to others. The museum should become progressively an experiential space, in other words, a place of cultural life and cultural production, where cultural expressions, customs and know-how, can be practised and shared with other people. Thus, considering museums as the guardians of mankind's cultural heritage, the concept of preservation traditionally endorsed by Western museology has to be completely revised. Preservation is not to be interpreted in terms of absence of use, whereas, on the contrary, it is bound to human practice and exercise. The care for a cultural object obviously implies the material conservation of its physical structure, but it is also essential to safeguard its original function, its narratives, its relationship with people who created it and use it. Otherwise the result is the one of assembling and exhibiting died and mute artefacts.

With regard to these aspects, it could be said that the true turning point in museum's policies is the participatory approach. Only if tradition bearers are involved as partners, consultants, actors and public, the museum turns out to be a space of safeguarding a dynamic, immaterial and living culture. Since the major characteristic of intangible heritage is the one of being a lived and a living heritage, it is necessary to consider that people's involvement in the museum's projects and activities is essential to guarantee heritage's preservation and transmission. As pointed out earlier, the direct participation of the people to the project, to the development and to the management of museum's space and collection evokes to a great extent the indigenous curatorial models.

Considering the participatory approach, it must be recognized that some museums around the world are already working very well, interpreting preservation of the intangible cultural heritage as a dynamic practice and as a living process. The Museum of Anthropology of Vancouver, for example, is one of the museums leading a new approach to the policies about the management and the communication of a living heritage. Built on the Natives' territories, this is first of all a place conceived for them: in the museum's rooms, objects are not just displayed for an external visitor or for a tourist, as the traditional approach would suggest; their exhibition is expressly developed for the indigenous community. This is the very reason why, for example, some objects are put on display but are not visible, they are covered because they are sensitive objects for the Natives'culture: they can be seen with restrictions, i.e. only by strictly determined categories of individuals and/or in particular occasions. Therefore, since the museum is a place primarily oriented to the local community, it becomes a very important instrument in order to facilitate the practice and the transmission of intangible cultural expressions. For the Native people, the MOA is, for example, a place where adults can teach the young generations traditional skills and craftsmanship, such as weaving baskets; in other words, it is a place where the youngest ones contribute to the perpetuation of their intangible heritage in our contemporary society. A similar process occurs in the Ned Hatathli Cultural Center Museum, within a Navajo reservation in Arizona: its main aim is to educate the young Navajo people, teaching them the oral history, the traditions and the language of their community. As a result, the museum is the place where they can attend classes and participate to workshops of traditional weaving, and of wicker or ceramic craftsmanship. In addition to this aspect, the museum with an intangible collection can turn to be a place hosting living performances too, namely dance or music performances, and this is not made with the intention of creating a touristic attraction. The MOA, for instance, allows the Natives to use a part of its environments for their rituals, a space on the contrary hard to find in the modern city of Vancouver. Similarly, another important function of the "museum of the intangible" is to collect oral histories, which are the most immaterial and fragile heritage to preserve. Since oral histories are bound to people's life, it is very important to record and collect them: a museum's archive of the oral history and of the language of a community is a treasure, as the MOA's archival collections show.

A similar approach to the Native community is endorsed by the National Museum of the American Indian (NMAI) in Washington and New York, where the collection is displayed and managed giving

importance to the “Native voice”. For this reason, this is not a traditional object-based museum, objects are not considered as mere things, since their meanings are deeply intertwined with people who use them and animate them. Rather, it is a people-based museum, where the Native community can participate in the process of cultural interpretation. As Richard Kurin maintains, “cultural heritage for that museum is not something dead, frozen, stored away for the voyeuristic gaze of tourists or the idiosyncratic interest of scholars, but rather something living, vital and connected to the identity and spirit of contemporary people trying to make their way in a complicated world today” (Kurin 2004A: 9).

Beyond that, an efficient way to preserve intangible heritage should engage the generic public too. If visitors are invited to take part to workshops where they can learn particular skills or specific know-how, and to participate to performances where they discover traditional dance, music, food preparation, craftsmanship, etc, these practices contribute to maintain intangible heritage as a living process in our present time. Nowadays many museums hosting various kind of collection employ workshops as a tool to communicate their scientific, artistic or ethnographic heritage to the public; similarly the “museums of the intangible” are strongly encouraged to offer workshops not only addressed to local communities, but conceived for visitors too. A particular example of workshop is offered by the Lusaka National Museum in Zambia that has developed in the last years a programme called “Catching the Culture of Food”, in order to teach to the young urban generations traditional dishes belonging to the Zambian folklore. The aim of the project is not only documenting traditional food, but it is especially to educate children to the value systems around them, such as the importance of sharing and of hospitality, or even particular rituals and celebrations. The young public is not only engaged in performances of cookery, since tours to rural markets and villages are conducted too (Mudenda 2008).

Furthermore, it should be considered that even a right and efficacious mediation of the museum’s collection to the public can contribute to its own safeguarding; for this reason, Western-oriented museums must look at ways of communication different from the traditional ones: they are solicited to involve either real or virtual people in the process of mediation, because objects won’t remain voiceless if someone or something makes them speak. Panels, labels and written texts in general are –for example— significantly spread in the Western museums, but they are not always so stimulating and so communicative as other means could be. They often contribute to provoke the so-called “museum fatigue” among visitors, and for this reason they are just partially read, thus loosing their usefulness. Consequently panels and captions in museums’ rooms are often lifeless and ineffective media, which only partially succeed in their attempt to communicate and mediate the true meaning of the heritage that they denote. Conversely, it is important for the museum not to offer itself as a book to read or as a traditional frontal lesson: it should rather communicate as a storyteller.

Storytelling is indeed one of the traditional and most powerful means of cultural transmission across generations used throughout our planet. Thoughts, emotions, symbols, cultural and social constructions, cosmogonies, rituals, habits, customs, traditions, legends and know-how have been shared through time by many individuals with the help of storytelling. This narrative performance has been ensuring their survival because it is bound to human being and, consequently, to life: there is no storytelling without human beings. This is the same suggestion we can take from the observation of indigenous museum-like structures too: in such contexts the cultural objects, artefacts, practices, representations, and expressions are kept alive not only because they are used and performed, but also because their stories are told. Therefore, the current challenge for the museums hosting the intangible heritage is not only to create a chance for living and experiencing the collection, but it is also to give life to a place where collected things can reveal their narratives through the persons who are their own protagonists: in other words, a place where objects are no longer mute. As a result, it could be said that at the present time the “museums of the intangible” are both solicited to be museums of storytelling and expected to be spaces for the actual making of culture. In such a situation the presence of the human being is essential to both aims, but it cannot be always guaranteed in the museum’s rooms, especially for the mediation of the collection.

However, luckily, today this is possible, thanks to new media that are able to virtually reproduce the living presence and the interaction of individuals in the museum, as well as their voice, their experience, their activities and thoughts. Despite being a fascinating possibility, this is a quite delicate option, since a good use of technological devices is not always ensured, with the consequent risk of misinterpreting and mistreating the cultural manifestations that the museum hosts. It is not rare to find museums that try to avoid the temptation of freezing their collection through the employment of new media, especially videos and interactive devices. It is true that audio-visual technologies allow us to go through extraordinary experiences, even specifically related to the appreciation of heritage; it must be said, however, that they can turn out to be very insidious and misleading tools. Especially with regard

to the intangible cultural heritage, the utilization of videos can appear very advantageous at first blush, because the video is able to immediately do what museums generally fail to achieve: catching life. As a matter of fact, it maintains and shows the movements, the sounds, the lapse of time and sometimes even an emotive side of the cultural manifestation that it represents. In addition, if videos are enriched with interactive devices, the illusion of taking part to a living cultural experience is very strong for the visitors, as well as the idea that the museum is truly safeguarding that heritage.

On the contrary, it is not as simple as it could appear. When we employ visual technologies in museum, we risk merely offering to the public a documentary of a specific cultural expression or activity. But documenting is not equivalent to safeguarding, a documentary can indeed be produced also in many other different places that are not specifically museums. Which is then the specific task of museums hosting the intangible heritage? It could be identified in the effort to make it keep living and be known and shared by the public. With regard to the latter aspect, videos are often intended as means of communication aimed at presenting and showing cultural heritage, but, for this same reason, they don't significantly contribute to the safeguard of its existence. Vice versa, they can actually have a very detrimental effect, because they freeze one form of cultural expression and reproduce it always in the same way. If intangible cultural heritage is subject to continuous reshaping, instruments to safeguard and transmit it must evolve into dialogue with the cultural community too. If a museum, for example, chooses to use videos, they have to be constantly connected with the cultural and social framework to which they refer. In other words, museum's media should be interacting with the cultural substratum of their collection as well as encouraging it to dialogue with the visitors, who do not necessarily come from the same background.

An Italian contribution to the safeguarding of intangible cultural heritage

In Italy, as well as in several other European countries, the issue of the preservation of intangible heritage is a recent one; it does not have an historic and solid tradition, except for the reality of ecomuseum conceived by Hugues de Varine in the 1970s. Relying on its excellent and rich artistic tradition, Western Europe in the centuries devoted itself to the study and improvement of methodologies for conserving and restoring paintings, sculptures and architectures in the best possible way. This does not, however, imply a lack of intangible cultural heritage in Western Europe, yet it has been overlooked for a long time by scholars and cultural policies. Particularly, until a very recent past, the museum institution has never been considered as a place where the immaterial essence of cultural expressions can be lived and experienced by people. The traditional Western museological model is indeed strongly entrenched in Europe, and mainly in Italy, which was its country of origin: the museum is first of all an object collector. This being the case, nowadays many initiatives about safeguarding intangible heritage occur far from the museum world; groups of artisans, schools of art, cultural associations are engaged in the effort of keeping alive the know-how, the skills and craftsmanship. They indeed sustain the activity by supporting who runs it and by teaching youths.

However, even if it is not frequent to find a museum hosting workshops addressed to the local community or to the generic public for the transmission of traditional skills, the Italian museum world can offer a valuable contribution to the field of the heritage communication and of the mediation with the visitors. A right communication is a very important step in the process of safeguarding intangible heritage, because only the true comprehension of a cultural expression allows it to keep living through people's mind. Thus the survival of intangible heritage in our world is highly dependent on its same knowledge, which is the first way to preserve it. Many interesting experiments are nowadays being made to this aim, especially through the use of modern and interactive technologies in museum.

Some good examples can be found in Italy over how new media could really help intangible heritage to be enhanced and transmitted in the respect of its very essence. If rightly employed, videos are not mere documentaries, but they can on the contrary offer themselves as instruments able to keep intangible cultural practices, know-how, and experiences alive. Considering this aspect, the artistic group named "Studio Azzurro" should be mentioned, since it is working very well with regard to the enhancement and transmission of the material culture in Italian regions. In the last years, this group has been creating numerous museum-like experiences in geographical and cultural areas where oral traditions, material culture, craftsmanship, know-how and historic memories are vanishing, owing especially to the fragility of intangible heritage in our contemporary society.

As we can see, for instance, in the case of La Fabbrica della Ruota in Biella, Studio Azzurro aims at making objects tell their histories and stories through the immersion in people's lives. New media in this occurrence are means intended to allow things to narrate, things that would otherwise remain mute. Sounds, videos, interviews, interactive devices are all meant to bring to life a particular kind of

heritage, which is now disappearing. The museum is indeed located in a traditional industrial working area, which is very famous for the production of wool yarns. The ancient art and know-how of carding and spinning wool, its mechanization in the modern era, as well as life's histories of people involved in these activities, are the subject of the display. The museological intervention is not limited to the exhibition of tools, documents and products: starting from the presented objects, the museum succeeds in giving life and in conveying to the public a heritage composed of know-how, art, experience, activities, human memories, thanks to technological interactive devices. It is a matter of recovering memories of spaces and objects through the mediation of human experience. In that case, new media aren't simple videos good at recording a collective heritage, but they are true means able to keep it living; storytelling is indeed a very powerful instrument, which is able to bring objects to life.

A further example of what can be a positive union between the new communication's technologies and an intangible cultural collection is the quite recent (2006) Museum of the Alps near Aosta , located in the beautiful landscape of the Western Italian Alps. The museum's collection deals with topics of both natural sciences and anthropology. The main theme of the anthropological display is about how local people during the centuries have managed to live in a quite inhospitable habitat: the cultural forms they've produced, their knowledge system, their tools for their activities and everyday life, their legends, their symbolism, their arts and craftsmanship. The exhibited objects and the museum's environment aim at immerging the visitor in the animating principle which originated such a rich culture.

For example, the stall is not simply reproduced as it can be found on the ground of the Alpine houses; in the museum's room there is a place where, thanks to technologies, visitors can hear and look at virtual local people telling about the real meaning of that environment, as well as their histories about moments lived in there. Within the Alpine tradition, the stall has always been the warmest place of the house, given to the animals' presence. For this reason, during the long lasting winter, families slept there: the breath and the warmth of the bodies of both animals and people made this place very comfortable. But it was a special place for other reasons too: after a hard working day, in the evening the family gathered there in order to tell tales and histories about the happenings of the day or more generally about life. The elderly used to teach to the youths the mountaineers' wisdom as well as their know-how and craftsmanship. It was a place of education and apprenticeship for the youngest ones, they learned the Alpine life's rules: it was there that they grew up. Therefore the stall was not simply a place hosting animal's manger, a table and some beds, but rather the favourite place for the transmission of the knowledge, for living oral traditions and for storytelling. How many stories, legends, customs, know-how have been handed down through generations in the stalls! It was a space where intangible cultural heritage truly lived. Today this use of stalls has nearly disappeared, there is no point in gathering in such a place, and consequently that background of intangible cultural heritage has been partially lost. The Museum of the Alps can contribute to the preservation of this heritage that is so fragile because of its bound to human beings. Its aim is to present to visitors a stall lived by histories of people who really were the actors of intangible cultural expressions that originated there.

In such an environment, videos, sounds, and interactive devices can work very well, because they are intended to give life to objects and to environments that would otherwise remain partially mute. If the museum didn't operate this way, its way of acting would be very misleading, because it would concentrate the attention mainly on the tangible and visual forms displayed. This being the case, it could be said that new media's application is successful and desirable when it becomes a way of giving life to the human presence who carries an intangible culture; in this case collected objects receive a new and wider meaning. Differently, videos, as pointed out earlier, can just be employed as a simple way to record a cultural expression but not as a way of real preservation of it. Comprehensively speaking, these considerations can be easily addressed to the museum in general.

Conclusion

In conclusion, it could be maintained that only by becoming a people-centred museum will the intangible cultural heritage's museum be successful in its aim to contribute to the safeguard and transmission of its collection. It is vital for the museum to dismiss the Western traditional attitude of an object-centred museum: it is urged to renew itself by putting the human being, his culture and his life, as its core. The human being's presence in the "museum of the intangible" is both the key actor and the subject of the museum, as well as a vital element for its safeguard: it is the nucleus on which new museum reality shapes itself. As indeed the 2003 UNESCO Convention recalls us, the intangible cultural heritage is a living one, and, as a consequence, it has to be safeguarded rather than being protected. Among the various available means of safeguarding, the museum can be chosen as an effective opportunity to preserve the living character of intangible cultural expressions. This is obviously possible provided that it redefines its traditional structure and its way of functioning –by

becoming a storyteller and a place of workshops and experiential learning-, as this essay has tried to illustrate.

Bibliographical References

[1] CIRIFINO, Fabio, GIARDINO PAPA, Elisa, and ROSA Paolo, eds. 2011. Studio Azzurro. Musei di narrazione, percorsi interattivi e affreschi multimediali. Cinisello Balsamo (Milano): Silvana Editoriale.

[2] CLAVIR, Miriam. 2002. Preserving What is Valued. Museums, Conservation, and First Nations. Vancouver: University of British Columbia Press.

[3] GASPARINI, Lucia. 2013. The Intangibile Cultural Heritage. New Conceptual, Artistic and Museological Perspectives. PhD dissertation, Università Cattolica del Sacro Cuore di Milano.

[4] GASPARINI, Lucia. 2007. Il patrimonio immateriale. Una nuova sfida per i musei e la didattica. In Educare attraverso l'arte. Ricerca, formazione, casi di studio, ed. Cecilia De Carli, 89-93. Milano: Edizioni Gabriele Mazzotta.

[5] KREPS, Christina. 2003. Liberating Culture. Cross-Cultural Perspectives on Museums, Curation, and Heritage Preservation. London – New York: Routledge.

[6] KREPS, Christina. 2009. Indigenous curation, museums, and intangible cultural heritage. In Intangible heritage, ed. Laura Smith and Natsuko Akagawa, 193-208. London – New York: Routledge.

[7] KURIN, Richard (A). 2004. Museums and Intangible Heritage: Culture Dead or Alive? ICOM News 4:7-9.

[8] KURIN, Richard (B). 2004. Safeguarding Intangible Cultural Heritage in the 2003 UNESCO Convention: a critical appraisal. Museum International, Special Issue 221-222: 66-76.

[9] MUDENDA, George. 2008. On the road to cultural preservation. Emerging trends in Zambia. In Preserving the cultural heritage of Africa. Crisis or Renaissance?, ed. Kenji Yoshida and John Mack, 64-74. Tokai: James Currey Press.

[10] SIMPSON, Moira. 1996. Making Representations. Museums in the Post-Colonial Era. London – New York: Routledge.

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Some thoughts about conservation and enhancement of archaeological heritage in France

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Abstract
French archaeological heritage of the classic age has been subject, over the centuries, to phenomena that have caused either its abandonment or the continuation of its use, its transformation or the loss of its integrity. In particular, the sites for entertainment such as theaters, amphitheaters, circuses, stadiums and hippodromes are now often in ruins (as a result of either destructive events or the interruption of their use) after knowing seasons of transformation, conversion to new uses, repairing of damage of various kinds, restoration, adaptation to new stylistic canons: processes that have ensured the survival of these buildings through a continuous integration in urban activities. Today, these goods, mostly located in relevant urban contexts, are part of a landscape whose transformations guided by illusions aimed to make them attractive for tourists, are creating sharp separations between these monuments and the contest in which they are. Based on these premises, the paper presents the results of a research aimed the preservation of this heritage, suggesting strategies for its valorization that, in accordance with the requirements of the contemporary world, propose a project for tourist fruition which must be compatible with such goods that are architectural and parts of a landscape. In particular, the paper analyzes some interventions of enhancement on the archaeological heritage in comparison with those cases in which development strategies have proved compatible effects with the demands of conservation.

Keywords: conservation, enhancement, archaeological heritage, theater, amphitheater

1. Memory values and current French archaeological heritage*

In France, the interest in archaeological remains dates back to early years after the Revolution. At the time, within the first activities for the protection of monuments considered as national treasures, Vitet, Merimee, Hugo and Viollet-le-Duc exalted the heritage's documentary value, studied its processes of transformation and took over the architectural consistency proposing, in some cases, restoration projects. In particular, the young Viollet-le-Duc, during his training years, drew few archaeological ruins and some proposals for intervention which are considered as interesting documents about their state of preservation: the aqueduct of Gard, the theater of Orange, the amphitheater of Narbonne, the main Roman buildings of Arles and Nimes
This attention and the following measures of restoration and protection especially, have ensured the survival of monuments such as evidence of a rich historical and architectural heritage. The above-mentioned scholars, considered the Roman monuments with an original and revolutionary point of view: not only for their aesthetic value, but also for their material consistency and their specific qualities, their successive layers, their relationship with the town and landscape. This idea resulted out of the Victor Hugo's letter, sent in 1883 to the President of the Municipal Council of the arena in defense of *Lutèce* in Paris: "*Il n'est pas possible que Paris, la ville de l'avenir, renonce à la preuve vivante qu'elle a été la ville du passé. Le passé amène l'avenir. Les arènes sont l'antique marque de*

la grande ville. Elles sont un monument unique. Le conseil municipal qui les détruirait se détruirait en quelque sorte lui-même. Conservez les arènes de Lutèce. Conservez-les à tout prix. Vous ferez une action utile, et, ce qui vaut mieux, vous donnerez un grand exemple" [1].
With these words, Hugo emphasizes the importance of amphitheater in Paris as a document that ideally connects the city of the future with the one of the past, giving to the monument a significant historical value, as an example of gallo-roman architecture. According to the writer, in fact, its preservation would have been an example for future actions of protection of the archaeological heritage of France. The arena in Paris became, therefore, the symbol of the past in the contemporary city, assuming a focal role about the social neighborhood and the cultural activities.
The "obligatory" protection of the archaeological heritage also characterizes the choices made in previous years when Mèrimè and his staff visiting Nîmes and Arles. For those cities, regardless of the work already undertaken for the liberation of the amphitheaters in the both cities, he expressed interest to all the ruins, even the smallest ones, which can be related with a more complex and articulated classical ruins web. From these ideas, took place the first excavations and early restorations of the *Maison Carrée*, the temple of Diana at Nîmes and the *Castellum Aquae*, the *forum*, the *cryptoporticus*, the theater, the city walls and the *Champs Elysées* in Arles [2].
The will to place each fragment in a broader context, in fact, is not limited to the urban fabric but it includes the surrounding territory involving, in these specific cases, the infrastructure system such as aqueducts. In particular that case of Gard which, with its numerous branches, supplied the major hinterland cities and coast. A network of classical buildings then that lies ahead, in the early decades of the 19th century, as a base from which extended protection that would cover both major centers and the less important gallo-roman urban realities.
Viollet-le-Duc drawings represent restorer attention to landscape and cultural heritage. In these paintings is possible to see how the architect, starting from surrounding contexts and ruins description, lingers later in relation of ruins with respect to urban fabric, and then describes accurately monument and its construction and decorative details. An interest, therefore, that suggests a love for an *ante litteram* modernity because the documentary value of the archaeological heritage is enhanced, thanks to its surroundings, and in some cases, thanks to what hides it. In this sense the different architectural and urban transformation are perceived as added value [4].
However, some drawings in which Viollet-le-Duc does not only show the real size but also "the hypothetical original monument condition", give rise to the subsequent proposals for liberation and integration, which, during the 19th and 20th centuries, deprived the archaeological heritage of any character of authenticity. The categories most affected by these interventions, result of a misinterpretation of the early spirit of preservation of the archaeological heritage, are: the triumphal arches and the city gates, the temple buildings, the theaters and amphitheaters. For examples: the arches of Orange, Saint Remy de Provence, Saintes; the city gate of Saint Andre in Autun, and the martial one in Reims; the *Maison Carrée* in Nimes and the Temple of Augustus and Livia in Vienne; the theaters of Orange, Autun, Lyon, Arles and Vienne; the amphitheaters of Saintes, Bordeaux, Arles and Nîmes.



Fig. 1: the Lutèce arena, Paris

However, the enormity and declared importance of the French archaeological heritage of Gallo-Roman period suggest a discussion limited to a specific geographic context and to a specific group of

ruins. This, in the belief to simplify reflections on the protection, preservation and enhancement of the entire heritage of the classical era present in France, is limiting the research to a selected territory. The choice fell on those southern territories, bordering the Mediterranean Sea, corresponding to the historic region of the Roman Empire called *Gallia Narbonensis*. This territory, which extends from the Italian border to the Spanish one, still retain considerable traces of monuments of ancient urban infrastructure that are still an integral part of a landscape full of cultural ruins.

Entertainment buildings in particular (theatres, amphitheatres, *odeia*, circuses, stadiums and hippodromes), due to destructive events or simply because of the discontinuation of their use, have lead us to a state of ruin often through transformations (conversions to new uses, reparations of various kinds of damage, restoration or consolidation interventions, adaptations to new stylistic standards) processes which on one hand delay the recognition of classical architecture characters, but on the other, have guaranteed the survival of these buildings through continuous integration.

Nowadays, these monuments, mostly located in natural or urban environments, are particularly an important part of landscape. Their continuous changes, dictated by those illusions designed to make it attractive for tourists, are relentlessly creating clear separation between these buildings and the landscape mosaic in which they are inserted. The context/architecture relationship, in fact, persevered for centuries while with the change of use entertainment buildings became a reference point for agricultural activities or points for the territory defense.

This function, although with subsequent transformations due to the well-known urban and regional organizations of the modern age, remained mostly unchanged, with the rediscovery of classical antiquity, until the archaeological excavations and subsequent restoration, undermined that existing *symbiosis* between human life and the ongoing regeneration of nature.

For example, the substantial “liberations” that have affected the amphitheaters of Nîmes and Arles during the 19th century, caused the consequent loss of historical-documentary data: the Middle Ages residential buildings, living accommodations arose in the stands. Moreover the system of small squares formed within the arenas; inputs fortified and equipped with towers, born in correspondence of the *vomitoria*; commercial and rural agglomerations that near the arches of the ancient Roman gave to the ancient cities a new life, in the centuries following the fall of the Roman Empire, defining the current plan metric patterns and urban settings. For another example, the “liberation” took place in the theater of Orange showed, even up to the mid-19th century, the houses and shops of those who had used the building as a fortress during the wars of religion, during the middle Ages.

The paper presents, therefore, the results of a research that aims to conserve this heritage suggesting enhancement strategies which (although in compliance with the requirements of the contemporary world) propose a project of compatible tourism with such buildings. This is achieved through strict observance of the dynamics of transformation that have always ensured a close relationship between building and environment. The research on this topic, therefore, proposes some thoughts about the consistency of archaeological heritage by analyzing current state of conservation, suggesting advanced techniques of investigation and finally proposing new tools for development.

Ancient entertainment buildings can be found today in many cities of *Gallia Narbonensis* but also throughout the territory and can be, in our opinion, divided in four categories at least based on not only the historical events that have determined their conservation, but also on their use throughout history, and on the degree of interest that they have raised in the past, especially in the decades between the 20th and 21st centuries: in the first group are those structures found in locations or archaeological sites well known to critics; to the second group belong those buildings that can be formally recognized in urban areas boasting Roman or Greek foundations; in the third group are entertainment buildings still present (in urban areas but also other contexts) but only recognizable through traces or whose structure corresponds to current building or urban systems; the fourth group, finally, gathers those structures (mostly not adequately researched) which are located throughout the landscape: these are more or less preserved, frequently prove to be abandoned, and are almost never the object of valorisation strategies [4].

Furthermore, these buildings show subsequent stratifications that on one hand have guaranteed their survival, but on the other, by not showing the typical classical architectural characters, haven’t raised enough interest even while representing a potential cultural resource as much as the other categories. Up to now valorisation practices have in fact favoured structures located in traditionally acknowledged archaeological areas which have maintained, even though in ruins, an authentic “classical” character by not showing stratifications owing to reuse.

The same cultural influences have also too often suggested restorations and operations of “liberation” from stratifications on theatres and amphitheatres (both in archaeological sites and in urban contexts of roman foundation) in order to recover the original image of the monument, thus endorsing the loss of valuable layers of history which had been collected on these structures. On the other hand, those complex elements resulting from successive stratifications haven’t yet been through a recognition process, mostly because of the lack of understanding for these same centuries-old processes.

Considering then the growing interest for cultural heritage conservation in Europe and in extra European countries, and the new initiatives in the field of archaeological heritage conservation, there follows a need for improved instruments for its study and valorisation. This includes, after the identification of the structures inside urban aggregates and the analysis of their transformation processes, the development of instruments for the interpretation of these classical testimonies in the landscape, and the creation of befitting promotion strategies.

2. Consistency and state of preservation of the Gallo-Roman entertainment buildings**

The past studies [5] researching the French archaeological heritage are certainly useful as a starting point to define correct conservation strategies and enhancement programs. Plus, precisely because of the high reputation of these monuments, they appear as less vulnerable ones, in fact these buildings are often protected by national and international committees, such as UNESCO.
However, it is necessary to include, within those programs, a safety measure that should also be extended to those ancient entertainment buildings lesser known. Especially for them, in fact, when it was done, the researchers used to apply knowledge tools related to traditional detection systems and graphic rendering ill-suited to highlight those aspects that most easily make this vast and interesting heritage understandable. Moreover, in almost every case, among those investigated, it was found a particular interest in urban or landscape in which the facilities are located, but often the program strategies for tourism led to the devastation of the landscape as well as the isolation of the monument and its consequent desertification. In fact the study of the ancient entertainment buildings requires a very complex knowledge process from the origins of the monument shall consider all stages of the history including the most recent ones.
So, firstly it is necessary to identify, through topographic maps, all the known buildings within urban context, including also those which show later stratifications. It is necessary to verify the state of the legislation and the existence of conservation policies extending to the archaeological structures, their context and especially to their stratifications. The existing graphic documentation must also be verified and, if inadequate, integrated with new surveys carried out with current systems and technologies.
The identification of classical permanence in historical cities is also essential, together with the study of their later uses and integration with political, economic, social dynamics. A historical register of buildings must be compiled identifying the transformations owing to functional adaptations, and exposing the more recent incongruous elements. There follows, unavoidably, the study of architectural elements and technological solutions pertaining to later additions, and a verification of their efficiency. Furthermore, for those theatres and amphitheatres which are still in use, an analysis of current functions and urban context is essential, and must focus on the compatibility between conservation of the structures, landscape preservation, and fruition.
Another determining factor is the creation of thematic tables related to the state of conservation of the structures and, in order to facilitate their study, the identification and cataloguing of possible finds kept in museums and ascribable to these urban systems and architectures. Finally, for the development of a correct conservation policy, it is necessary to consider the drafting of a Charter with both methodological guidelines (in order to define a reference point of typologies, requirements and priorities for analysis procedures), and conservation and valorisation procedures. The Charter will contain recommendations on conservation – including restoration, consolidation and maintenance projects – but also programmes for urban and territorial redevelopment and proposals for compatible reuse.
This document, with reference to the indications contained in the more recent national and international Charters on archaeological and urban heritage restoration (in particular the international Siracusa Charter for the *conservation, fruition and management of the ancient theatrical architectures* of 2004), will focus on different specific questions, as for example the recognition of the cultural value of these structures, operating procedures on materials and architectural elements, permanence of formal and functional characters, relationships with the urban and territorial context, connections with the current socio-economic realities.
Following the division suggested in the previous paragraph, the study will analyze for first the theater and recreational facilities found in archaeological areas, well-defined and known to the experts, starting geographically from the eastern border of *Gallia Narbonensis*. The paper will describe the state of preservation and architectural consistency, referring to the next paragraph any proposals for enhancement and management.
Firstly substantial traces remain of the amphitheater of *Cemelenum*, within the archaeological area of Cimiez, in the town of Nice, though, after the disposal, in the Middle Ages, it was partially destroyed by the construction of a road. However, it is precisely the interventions of urban enlargement on the hilly area of the city of Nice, in the late 19th and 20th century, that stress a new interest in the structure

through the first systematic archaeological excavations and the first restoration. These focus on a portion of the outer north-east with the restoration of some parts dismembered and reconstruction of several arches. These measures have not altered the authenticity of the monument that still looks like an interesting ruin that characterizes the entire archaeological area.
The additional archaeological excavations, dated on the threshold of the third millennium (2007-2009), have added helpful information to the monument comprehension, while strengthening interventions and maintenance have affected the amphitheater since 2008. Such actions have ensured a favorable conservation status, although it is found the need to date tools both monitoring of development that may affect the entire archaeological area. But the largest concentration of entertainment buildings can be identified within the existing urban context of what were the most important Roman cities of *Gallia Narbonensis*.



Fig. 2-3: Cimiez archaeological site and part of the amphiteater of *Cemelenum*.

Forum Julii, now Frejus, has both a theater and an amphitheater, studied since the early years of the 20th century. In particular, the theater is easily recognizable thanks to the presence of the substructure of massive walls that once supported the *cavea* and the stage building is perceptible through the lower parts of the proscenium. Nevertheless, the size of the ruin is strongly affected by the presence of intrusive structures deemed necessary for use as a theater for cultural events and performances of various kinds. These structures insist on the archaeological sediments and prevent the perception of the ruins in respect of which there is not a special interest aiming at improving the state of conservation. The only action concerned to the structures monitoring and maintenance, are carried out rarely only for specific events and are closely linked to the latter.
In addition, the constant presence (almost throughout the year) of temporary structures invades the entire area, which, on the contrary, would have rich cultural potential. It is, in fact, inserted in an urban environment with buildings of architectural quality, it is rich in typical Mediterranean vegetation and it is walled by structures minimally that prevent man-made invasive actions and damages.
It seems more problematic the question related to the amphitheater whose history is linked to age-old collapses and looting, most recent damage caused by natural events (Malpasset-Reyran flooding dated 1959) and recent work of "restoration". These actions have irreparably destroyed the ruins trapping it in heavy reinforced concrete structures. The concrete structure spanning and invading the entire building, has been designed to allow new functions such as shows and bullfights, and affects the outer perimeter, the ambulatory, the stands and the arena.
Inaugurated in June 2012, the "new" amphitheater has, ironically, a bad state of conservation that mostly affects the few authentic structures still visible. These are attacked by weeds and show, in several places, signs of structural failure caused, of course, to the concrete structures that rely heavily on the ancient ruins. The amphitheater of Frejus no longer presents today any historical value or antiquity, accounting rather only an example of myopia in the management of the French archaeological heritage.
The management of the amphitheater of *Nemausus*, better known as the Arena of Nîmes seems unattractive too. The touristic reasons and the needs related to various events have now the upper hand on the value of authenticity that the building had preserved for centuries. In this case we find that the choices aimed at the preservation and enhancement have not always respond to the international directions especially for what concerns the sustainability between new function and ancient monument: the latter, in order to satisfy the pressing touristic demands, allow new functional adaptation interventions hardly compatible.
For example, the structures (present almost all year) covering the arena's lower part to allow many viewers to attend bullfights: they block the view of the steps (both the original and the ones result to

the 19th-century restoration); of the annular corridors; of the separation barriers between the stands and the arena and of the original functional elements of the latter.
But the damage is not only aesthetic and formal as the need to accommodate, during these events, a large number of viewers has led not only the safety of the ancient structures, but the complete replacement of those items that would be able to survive only if it was respected a less consistent load of users. To all this it must be added the creation (between the arches of the ambulatory outside the ground floor) of new functional spaces for the accommodation of spectators and visitors: ticket office for sightseeing, book shop, box office for events related to shows, toilets, information points.
Ultimately the amphitheater of Nimes is only felt from the outside, while the interior is now an "amusement park" where everything is placed in the foreground (bullfights, the fantastic tales of the fights between gladiators and wild beasts, gadgets, audio guides unnecessary for the purposes of historical knowledge of the archaeological heritage) except for the documentary value of the monument. Farther the building along with the entire town is UNESCO, an organization should not only ensure the enhancement but especially the preservation of the values of uniqueness, authenticity and integrity.
A similar situation, although with less devastating results, can be found in the amphitheater of ***Arelate***, the current Arles. The questionable restorations (done several times) that have now almost entirely replaced the remaining original elements and not result of 19th-century additions, are alongside to enhancement measures that disfigure and make it difficult to see the outer ring of the structure such as the great platform that collects information from a number of devices on the one hand, the functional elements, almost identical to those for consistency and number of Nimes, on the other.
Even within the arena and stairways are hidden by the necessary facilities for the performance of the shows entertaining. Finally it appears as chilling the inclusion of toilets (still under construction) between the arches of the lower ring: these new toilets in brick masonry area related to the ancient walls, hinder the readability and affect the value of antiquity; enhancing only a misunderstood and vulgar value in use or topical.
On the contrary, still in Arles, the conservation and renovation of the theater are compatible and sustainable: these are constituted by lightweight structures, which are necessary for today's theater but they do not invade or hide the structures of the original building. They fit in a but evoke distinguishable, admittedly in a modern key, the structural elements of theater: they are the service spaces (constructed entirely of laminated wood) placed between the radial septa of the auditorium where they have lost the vaulted structures of coverage. The new architectural elements are detached from the original structures and follow the trend oblique to the ancient times of substructure.



Fig. 4-5: *Forum Julii* theater e a view of the *Arelate* one.

Rrenovation of *Arausio* Theater, the current Orange, also in Gallia Narbonensis, deserves attention as compatible with the old building. Here the necessary facilities for the manifestations performance are minimally invasive: they exploit modern coverage (which is essential in its sole function) which protects the original front stage, do not hide the original fragments of decoration; do not overlap the old architectural setting used indiscriminately as a scenic backdrop for any event. This decision shows respect for the original monument as it places at the same scenic backdrop a value that cannot be compared to any contemporary setting. In addition, maintenance and structural health monitoring are constant and the structure presents an excellent state of preservation. However it might regret, in this as in previous contexts of Nîmes and Arles, the loss of stratification occurred with the releases dating back to the 19th and 20th centuries.
The roman entertainment buildings of the ancient *Colonia Julia Viennensis*, current Vienne are fully in the middle of today's cultural city activities, although preserved in ruins. The theater, for example, was

discovered in 1909 and the restoration work begun in 1922 and were completed in 1938, the works concerned mainly the area of the auditorium where they were rebuilt much of the bleachers. The theater today presents a balance between conservation and upgrading work to ensure the performance of cultural activities within the building. Much like the Roman theater in Lyon by type and especially for the restoration work carried out, it will keep track of the stage and the orchestra and almost the entire auditorium. In it, the temporary structures allow the execution of events without completely hide the original plan metric shape of the ancient theater.
The same cannot be said referring to the odeon. It is in a state of abandonment although it is located in the neighborhood of the theater and may help to define, with the circus, a "system" of entertainment and recreational buildings of ancient *Colonia Julia Viennensis*. The circus remains in fact are represented only by one of the elements that decorated the central spine, while the rest could be traced, in the urban fabric where it is clear the mark left from the classical building, like the one found in Arles.
The presence, only as urban trace, left by the two circuses just mentioned, is also manifest in the city of *Baeterrae*, current Bezier, where the amphitheater is still an integral part of the fabric of the medieval city. The building, on which stands was built in the Middle Ages a neighborhood and the church of St. James, is now recognizable paragraph in curvilinear facades of the houses and the radial shape of the land parcels. In addition, a series of excavations and interventions of consolidation of the ancient structures still evident today, allow to better perceive the shape and size of the original.
However the authenticity of the monument (found only in a few other cases such as the amphitheater of Tours and Paris) is guaranteed by the functions attributed to the arena today: a public garden where the ruins of stands, *vomitoria*, columns and other elements that became apparent during the excavations of recent decades.



Fig. 6-7: *Baeterrae* amphitheater, e a view of present Tours where the Roman amphitheater it was located.

Finally, it's important to mention those buildings less known by the scientific community need further studies and investigations or additional conservation actions. Among these it seems important to mention the amphitheater located today in the neighborhood of Toulouse Purpan between the city of Blagnac and Toulose. The first excavations were carried out between 1837 and 1899, while the first restoration dates back to the sixties of the twentieth century. Unfortunately, until 1983, the building (abandoned) becomes a city dump and the structures previously restored were irreparably compromised. Currently, it is the easily identifiable in its floor plan, but the facilities need further routine maintenance and consolidation. However, it retains the charm of a ruin set in an urban setting.
Nowadays, no visible trace remains of the amphitheater of *Narbo Martium*, the current Narbonne, although they were visible at least until the mid-19th century, the years in which Viollet -le-Duc detects the significant tracks along the road that leads to Narbonne Gruissan modeled on the ancient Via Domitia. Today the building remains in memory only the topography of the area and thanks to some buildings and urban projects that are modeled in part on the track.
Similarly for the roman buildings as the theater of *Massilia*, the present Marseilles: discovered in the early decades of the twentieth century was partly destroyed and covered up until 2005, the year in which it began a campaign of excavations for the purpose of recovering the few tracks. Currently some steps and part of the orchestra can be seen in the courtyard of the Vieux Port. The theater, the amphitheater and the circus present at *Valentia*, the current Valence, whose historical and literary sources testify to the presence.

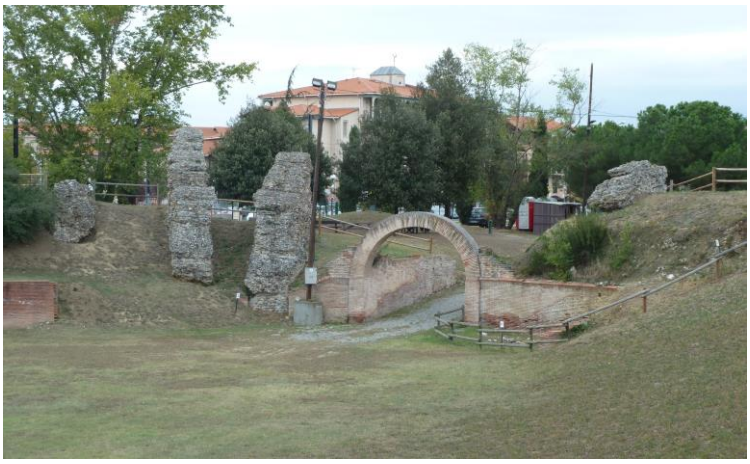


Fig. 8-9: *Tolosa* amphitheater and part of the Roman theater of *Massilia* ruins.

3. Enhancement tools: the approach to the systemic episodic***

A last objective, in terms of valorisation and promotion, for the paper could be that of creating a series of guidelines (scientifically correct but accessible to everyone) to support the interpretation of this widespread heritage, with strategies that can be relevant on a national (for each single country) and international (for the whole Mediterranean basin) level. Particularly it would be useful to: plan themed itineraries for the fruition of archaeological remains; publish maps, historical data, virtual reconstructions of theatres and amphitheatres that can highlight the different transformations and an abacus of reemployed elements found in the structures or in the wider urban context; create interactive cartographies connecting the diverse fields of study and promoting the accessibility of data and information at different scales.
Thus, the use of technologically advanced instruments, combining ease of use with scientific precision, seems unavoidable: a useful medium could be the GIS systems which, by mapping a remarkable quantity of data and proving to be easily consulted through the internet, would enable every kind of user to access historical and territorial information.
From this statement we understand how important it is to suggest a not-so-much as episodic but systemic approach regarding the inclusion of such goods within specific contexts of reference: among the different entertainment architectures, among the different urban realities, inside an area strongly influenced by infrastructures (roads, ports, water, etc.) to serve different individual monuments.
In fact this approach, which was characterized, as seen above, the first studies on the archaeological heritage of *Gallia Narbonensis*, is based, first of all, on a series of spatial references through which the playful and entertainment buildings are born, have been used originally and during the period of their disposal and reutilization focused on urban or residential use. The Roman road network represents the major point of reference, which connected along the coasts of the Mediterranean and inland the urban centers, united by an osmotic system of military and commercial connections as well as socio-cultural exchanges. This road network, for example, linked the major cities to the minor realities and all were connected with the capital of the empire.
In this sense, the greatest role was delegated to the Via *Julia Augusta* (built from 13 BC) starting directly from the Aurelia one, joined, along the coast, the cities of *Cemenelum*, *Forum Julii*, *Aquae Sexstiae* and *Arelate*. In it hooked the *Via Domitia*: built in 118 BC connected the *Cisalpina Gaul* with the *Hispania Tarraconensis* across the entire province of Narbonne connecting *Arelate*, *Nemausus*, *Baeterrae*, *Narbo Martium*, the capital of the province. From *Arelate* departed, heading north, the *Via Agrippa* that after going through *Avenio* (Avignon), *Arausio, Valentia Julia, Julia Viennensis Cologne*, reached *Lugdunum* (Lyon). Finally, the *Via Aquitania*, built around 14 BC, starting from *Narbo Martium* through *Toulouse* reached *Burdigalia* (Bordoaux) [6].
Even nowadays, the main playful and theatrical buildings insist along these roads and could be the starting point for a systemic enhancement that not prefers the most important and most well-known buildings only, but also the smallest one, poorly studied and currently less promoted by the tourism systems. In fact, the success of these buildings is also due to the capacity of the road network to transfer the population of the surrounding countryside in the big cities where they organized games and theatrical performances, as well as the same elements of communication played a vital role when, during the final years of Roman Empire, especially the amphitheater became a fortified collection point for the inhabitants of the rural districts.
Another infrastructural system that now deserves to be related to the preservation and enhancement of theaters and amphitheatres are port facilities: in particular, *Forum Julii*, whose playful buildings were

built on the edge of the great commercial port, as well as in the case of *Narbo Martius* amphitheater, built at the marina, or the theater of *Massilia*: nowadays the few ruins are incorporated in the buildings along the old wharf. Finally, a fundamental role for the functioning of these buildings was covered by the network of aqueducts as shown by the water systems of Gard, Nimes, Arles and Frejus .
A series of actions aimed at the enhancement and a more integrated management of these archaeological sites could further consider the coexistence of several buildings (and not only the playful and entertainment one) in the same urban reality. If in Nîmes, the amphitheater and the *Maison Carrée* are worth a visit, they could be put in relation with the traces of the urban fabric of the Roman city (in some places very evident, though little known) and other monuments such as the temple-nymph of Diana, the Roman tower (probably a *castellum aquae*), the ruins of the fortifications, the city gate. Similarly in Arles, where the acts of exploitation may create two thematic itineraries.
The first could create a system of the Roman buildings still existing: such as the traces of the *forum* with the underground structures of the *cryptoporticus* (whose careful visit would let to understand the real extent of the area at the *cryptoporticus* delimiting the boundaries) and the exedra annexed to the forum and visible inside the Hôtel Lavan-Castellane, the Baths of Constantine, and the city walls and towers are still visible and partially embedded in the urban present, the burial area of the Elysian Fields. The second should correlate with the amphitheater near the theater (generally excluded from sightseeing), emphasizing formal characteristics and similar decorative, but especially the common fate tied to abandonment, reuse as medieval fortresses, the rediscovery and restoration eight - twentieth century.
Most interesting would be to relate these buildings to the circus, whose ruins are barely perceptible. However, traces of it remain in the south-western urban fabric on the banks of the Rhone. Recent studies and excavations carried out between 1974 and 1989 showed some portions of the substructures and a good part of the arena also in those years it was finally determined that the obelisk at the center of Place de la Republic, originally decorated the plug of the Roman circus [7].
The simultaneous presence of three entertainment buildings may also be seen in Vienne, where, however, only the theater is advertised and is subject of constant maintenance works. It is in contrast to the nearby *odeon* which is little known and looks abandoned, virtually unknown, finally, the circus which is apparently only the obelisk that decorated the monument. However, further excavations may trace the structures embedded in the urban fabric.



Fig. 10: *Colonia Julia Viennensis*: Roman theater and odeon

Even in this case, a systematic approach could be related the playful and theatrical buildings with the other monuments of the Gallo-Roman town (Temple of Augustus and Livia, the Sanctuary Pipet, the sanctuary of Cybele, the remains of the city walls) and with the extensive archaeological site of Saint-romain-en-Gal which contains some ancient Vienne residential and commercial districts. Interesting, would be ideally reconstruct the monuments and the city of *Valentia* based on available literary and documentary sources: from them we learn that the Roman city had a theater, an amphitheater, a circus, an *odeon* in addition to a large forum and a basilica.
More attention deserves the amphitheater of Toulouse, while in-depth studies and excavations would put out the ruins of the amphitheaters of Narbonne and Orange. The latter, in particular, might merit the same attention given to the theater and the arc de triumphed in honor of Tiberius if only actions for the protection and conservation (such as to prevent the complete cancellation as archaeological and historical evidence) would be encouraged. It, situated near to the edge of town (across the street from

Caderousse) occurs below a large car park and it has neither studies nor tourist signs, although the place names (avenue des Arenes) are mindful of the existence and location.
Finally, it needs to be put in direct relationship (network) as it is reported in the literature or documentary sources relating to these playful and theatrical buildings, and especially that there are real connections and virtual museum institutions (local and national) that contain fragments belonging to these monuments.
Concerning the virtual reconstructions, they must always be guided by the severity of the disciplinary restoration (the so-called Virtual Restoration, which in the field of archeology, it called the *Virtual Archaeology*), so it will not have to incur in the pre-eminence of a suggestive impact of a virtual reconstruction more than to their accuracy, or even in an excess of technicality at the expense of the content (the so-called "Cinecittà" and "Star Wars" syndromes). Is it clear how the digital recreations have an inherent educational and informative role, which allows the reconstruction of monuments, cities and territories with the aim of communicating the ancient cultural heritage in an effective, fast and repeatable way, but also to be an instrument of verification and synthesis of analytical data (derived from the findings, or the analysis of erratic fragments of the architecture, for example) [8].
Whenever the wishes to follow a correct preservation, it is therefore necessary that the aspect of advertising will parallel the stringency historical-scientific and, consequently, the tools to support the knowledge are also the basis for the enhancement: in this sense, applications and virtual restoration of the Virtual Archaeology is the right balance between fairness and potential disciplinary layman.
In conclusion, the old buildings for the show, thanks to their transformations and reconfigurations, following these strategies, can renew and strengthen the interrelationship between the land and the landscape, becoming accumulation points of the memory of centuries of historical events, economic processes and social structures of people and society as a whole.

Bibliographical References

* The chapter "Values of memory and actuality of the French archaeological heritage" is written by Emanuele Romeo

** The section "Consistency and state of preservation of the buildings show the Gallo-Roman" is written by Emanuele Morezzi

*** The chapter "Tools development: the approach episodic systemic approach" is written by Riccardo Rudiero

[1] RECALCATI, Roberto. *Hugo, Boudelaire e Parigi.* In ΑΝΑΓΚΗ, n°33, marzo 2002, p. 38-48.

[2] FRANÇOISE, Bercé. *La passion des Monuments*. In AA.VV. *Mèrimèe*. Connaissance des Arts, n° 200. Paris: Editions du Patrimoine, 2003, p. 18-43.

[3] ROMEO, Emanuele. *Memoria e percezione dell'antico in Viollet-le-Duc.* In AVETA, Aldo; DI STEFANO, Maurizio, Roberto Di Stefano. Filosofia della Conservazione e prassi del Restauro. Napoli: Arte Tipografica Editrice, 2013, pp.159-164.

[4] ROMEO, Emanuele; RUDIERO, Riccardo. *Ruins and urban context: analysis towards conservation and enhancement*. In XXIV International CIPA Symposium, Strasbourg, 1-6 September 2013, p. 531-535.

[5] CIANCIO ROSSETTO Paola; PISANI SARTORIO Giuseppina (edited by). *Teatri greci e romani*. Roma: Sud Grafica Editoriale, 1994, p. 328-502.

[6] BERTRAND, Albert; MICHEL François. *Via Domitia et autres voies terrestres de la Narbonnaise*. Toulouse: MSM, 2006, p.9-31.

[7] BASTIÉ, Aldo. *Arles.* Aix-en-Provence: Èdisud, 1995, pp.11-30.

[8] LIMONCELLI, Massimo. *Il restauro virtuale in archeologia.* Roma: Carocci editore, 2012, p. 194-195.

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Archaeology and Architecture, the Stagnum Neronis of Baia

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Abstract

The area of Campi Flegrei presents an overabundance of geological resources as Fondi of Baia, unique union of two craters in the world; cultural resources as Campi Flegrei's museum in the castle of Baia; archeological resources as the underwater site of the Stagnum Neronis and other important sites along the coast. The area is under the Aragonese Castle of Baia, 4 meters underwater. It is an important ROMAN FISHPOND of the *I sec. A.D.*, built on the ancient road called "*via Herculanea*" that linked Pozzuoli and Miseno. Due to *bradyseism* the coastline reduces of 40 meters, so all buildings are underwater but in the same time we can assist to the birth of the underwater archeology culture.
Thanks to new and unpublished multibeam images, we can understand the real situation of the ruins and propose a method to preserve and develop the area. This research on the Stagnum Neronis tries to trace a scheme adaptable to other sites along coastline with structures fused with the landscape and with the underwater ruins, a method to restore the area with a sustainable approach choosing functions adaptable to various sites. The architecture could be the starting key of a development process in the area to give new life to this great and abandoned underwater heritage.

Keywords: underwater archaeology_stagnum neronis_Baia_center of underwater archaeology

1. Underwater heritage of Baia

The area of the phlegrean fields is one of the areas with greater presence of archaeological ruins and natural resources , Baia in ancient Rome was the place where the wealthy romans were staying and spent their free time at the thermal bath which were numerous due to the presence of volcanic springs. The volcanic nature of the area meant his ruin with the phenomenon of bradyseism buildings constructed along the coast ended underwater, today the coastline is retreated to 40 meters compared with the Roman shoreline. Underwater Roman buildings have been rediscovered only in the mid 900's, before then the landscape painters put the focus on small parts of the ruins emerges from the sea as the views of Brambilla (1586), Francesco VillaMena (XVII century) , Van Aeslt and Quenquelair (1696). The oldest map of the area is represented by glassy flasks from Odemira , Prague and Pilkington, on the glass surface there was the topographic image of Puteoli and Baiae with the main monuments arranged on several levels.
After the renewed interest at the beginning of the '900 resumes since 1984 the rilief program by Maiuri[1] and Lamboglia[2]. Based on surveys and direct observations of the archaeologists have played a submerged archaeological map of the bay including the most famous areas as the site of the Baianus lacus, the nymph of Claudio and the less famous site as the roman fishpond under the Aragonese castle of Baia. The area was densely built erased by shipyards that are implanted on a giant concrete slab operated in the early '900. Fortunately, as recent investigations have established, the rests are not totally lost, we can see a small group of *pilae* (breakwater) that represent the extreme limit reached on this point by the ancient coast.

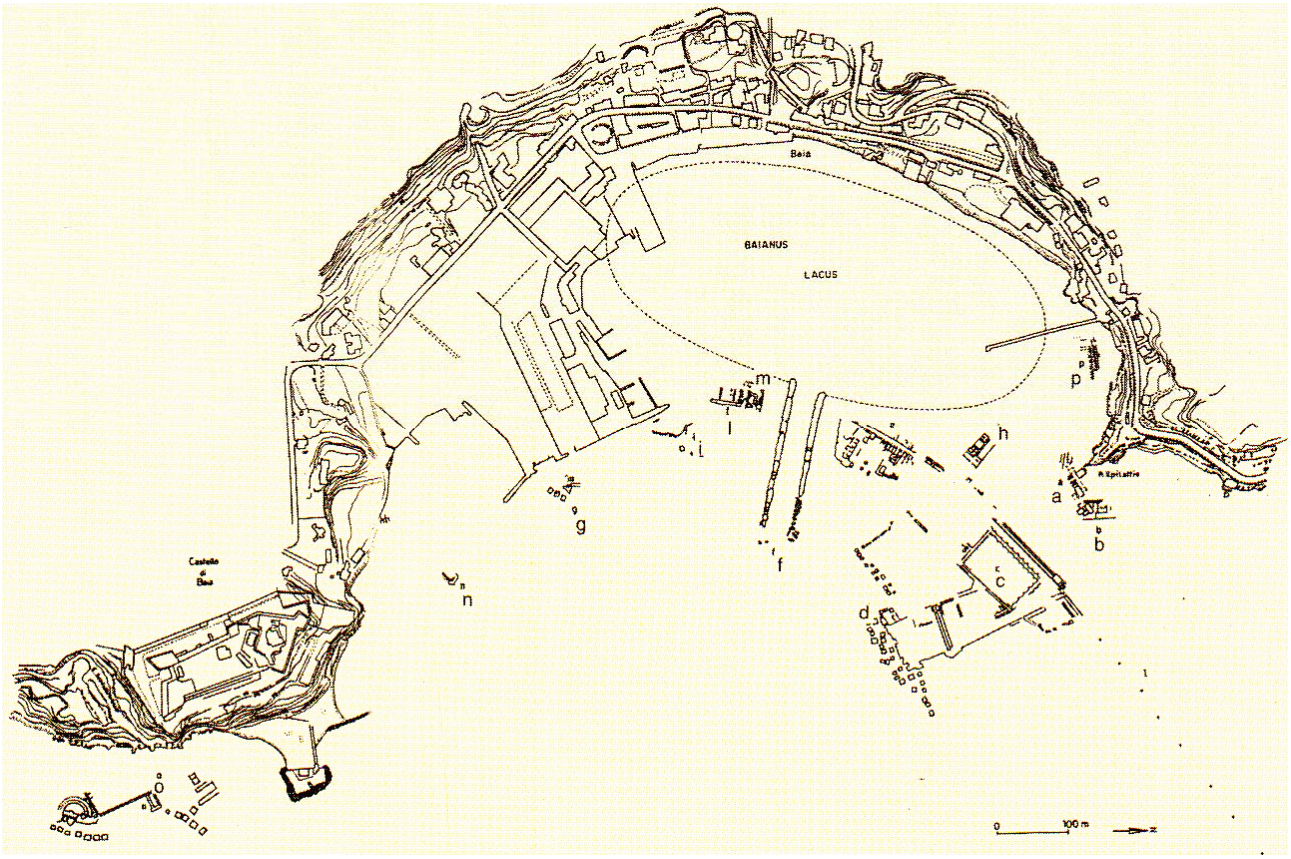

Fig. 1: Tav.A – Archaeological map of the phlegrean fields; a_nymphaeum of emperor Claudio; b_thermal bath; c_palace of Adriano; d_fishpond and breakwater (relief: E.Scognamiglio [3])

2. The site of the Stagnum Neronis

The project area is under the Aragonese Castle of Baia, 4 meters underwater. It is an important roman fishpond of the 1st century AD , built on the ancient road called "Via Herculanea" that linked Puteoli and Miseno, in the 1579 Mario Cartaro shows in a map a *"via selicibus strata sub acquis"* (underwater road). This stretch of road is identified as an extreme offshoot of a seaside villa and shows an elaborate succession of ponds, porches and scenic pavilions occupying an area of approximately 300m x 80m, 300m represent 1.000 roman feet (1 roman feet = 29,65 cm), a measure that in Baia not even billionaires could afford at the time.
The monumental area and the great deal for the realization, the desire to impress at all costs was an exeption, the palatium built over the stagnum was the residence of Nerone, as shown by excavations recently conducted by Dr. Paola Miniero[4].
The villa occupied the best position from which it was possible to observe all the Phlegraean area, a monumental building that had a direct connection with the sea, yet the tunnels dug into the tuff and pozzolana has been partially destroyed with the construction of the Aragonese castle in 1493-1495.
The term *stagnum* indicates an artificial lake surrounded by arcades, may also designate a stretch of sea sheltered and enclosed by quays[5].
The big structure in the sea to the south has a nucleus with a large semi-circular tanks having 55 meters in diameter and protected by a pier of 85 meters, today remain only seven *pilae* (breakwater) erected in *opus reticulatum*. The great oyster fishpond had multiple compartment with a scenographic porch in the background, a structure in pillars and roof tiles. There was first an external protection, the pier long 85 meters, then a concrete protection crossed by four channels for the water exchange, finally the fishponds a series of big oyster tanks built directly into the sea, *in litore constructa*.
The semi-circular area is connected to a huge rectangular body divided into different adjoining oyster tanks, to which are added porches and indoor spaces identified from elevated platforms facing in front of the sea.
In the rectangular body there was the *suspensurae*, the architectural term given by Vitruvius to piers of square bricks (about 20 cm X 20 cm) that supported a suspended floor of a roman bath covering a hypocaust cavity through which the hot air would flow.
The channel leading into the basins is protected by seven external breakwaters. Everything is on big scale as the concrete wall border that has a thick of 6.5 meters.



Fig. 2: Plan of the site with ancient shoreline

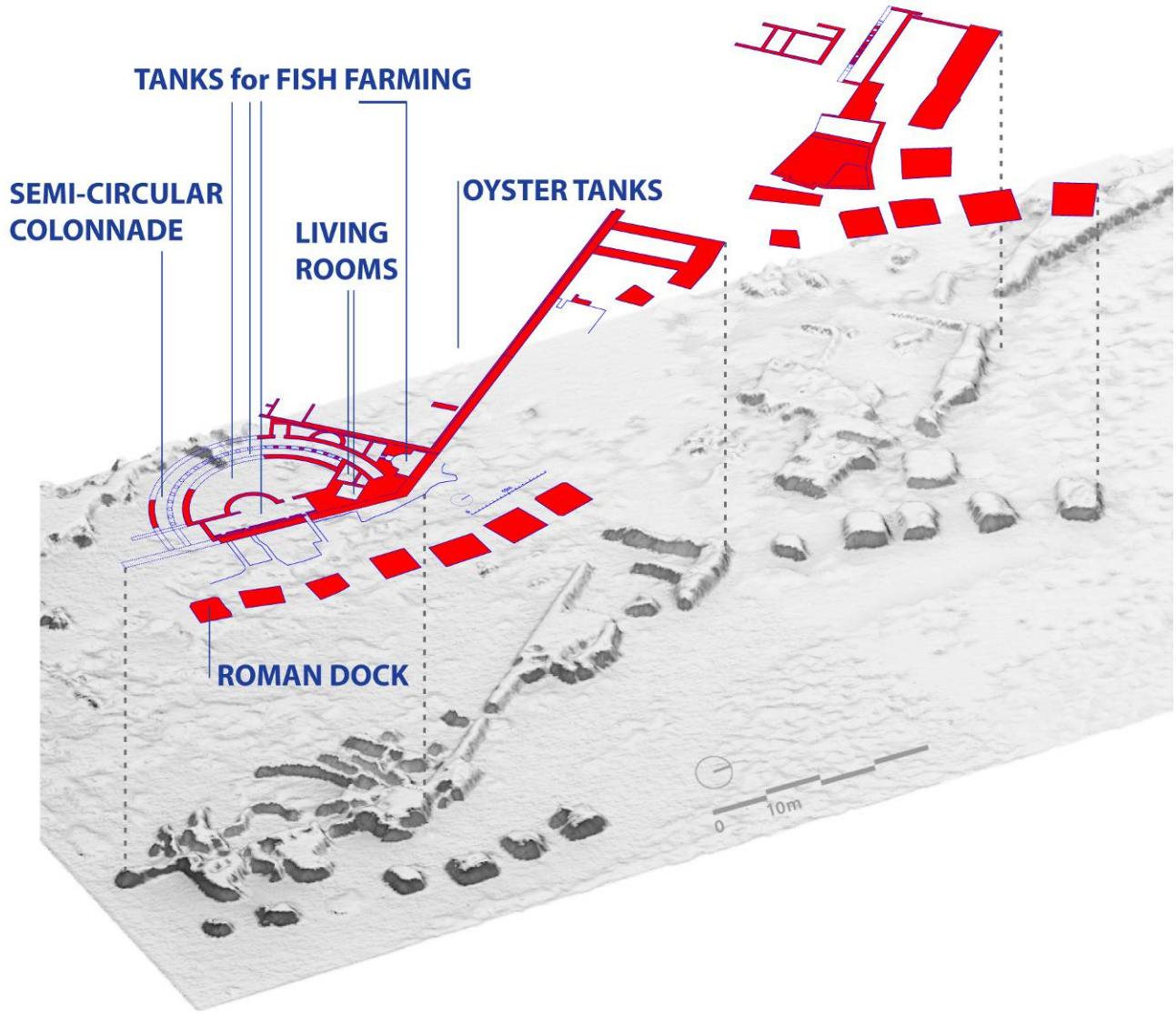

Fig. 3: Virtual reconstruction of the roman fishpond – *Stagnum Neronis*

Through the *multi-beam* image, recreated with computer graphic, it has been possible to take a careful look to the real situation of underwater rests, this is unpublished images important also for the underwater archeologist for an immediate and clearly view of the site.
This technology is very important for this research because all the reliefs and historical maps were produced with the traditional techniques of relief in the years 1980-1990, the samplers hadn't satellite images or 3D reconstructions, they have not been able to benefit of many other information that these technologies offer us.
The first job was to redraw the building plans crossing the information from the old reliefs and new 3d images and satellite images, the fig. 3 synthesizes the work on the area, have been important the written sources describing very well the internal organization of the spaces and in some cases even the patterns and materials used.
It would have been interesting with the help of an archaeologist reconstruct the ancient structure to have a 3d image and a 3d model of stagnum Neronis not to understand what remains today what it was in the past.
How many underwater archaeological sites have been looted statues and decorations, this structure had to be full of ornaments as the area of the semi-circular colonnade had to be quite a sight.

3. The project

The theme of the project derives from the desire of people to *rebuild* the ancient bond with the sea, which was destroyed by the neglect and constructions in breach of planning control.
The area presents an overabundance of *geological resources* ("Fondi of Baia", unique world union of two craters); *cultural resources* (the castle of Baia is the museum of the phlegrean fields with over 2000 years of history); *archeological resources* (the site has important buildings along all the coast).
Due to *bradyseism* the coastline reduces of 40 meters so all buildings are underwater but in the same time we can assist to the birth of the culture of the underwater archeology.
It's unbelievable that the Museum of Campi Flegrei is of the last museum in Campania forasmuch as its amazing heritage.
The museum contains exceptional evidences with over 2000 years of history, the art installations are dated and do not promote the interest of visitors, a museum that is not in line with the times, very interesting and educational is the reconstruction of nympheum of Claudio which is almost always closed to the public.
The idea is to insert in the territory a function that can be integrated with the economic and social fabric of the area, were important talks with the local people to understand the needs and requirements of a place that has suffered the economic crisis in recent years. Speaking with some of underwater archaeologists in Baia and with the various associations concerned the exploration of the sea and archaeological sites was clear the need for a structure able to satisfy the growing demand for courses on the topic, this debate has been going on for 10 years and for economic reasons it has not been possible to realize a similar structure.
Important was the decision to include the museum function, most of the building is destinate in virtual exhibitions and sculptures installations to offer a unique experience to visitors.
From these considerations and numerous visits to the museum of the phlegrean fields was born the idea to reconnect the area of the museum with the sea, providing an exhibition inspired by new ways of museumification, by providing in the first section of the building a large hall of statues where it will be exhibited in glass cases many artifacts stored in the warehouse of the museum while in the heart of the building is situated the center of underwater archeology.
The area is perfect to accommodate an *Off-Shore building* (we are in a bay in the gulf of Naples). The weak sea currents and low deep (4 mt) make possible the study of the site. The building will not face strong water pressure on its walls, something that makes this idea more possible.
The project involves a floating building completely overlapped on the underwater rests, so as not to alter the roman monument, the choice was to design a building according to the 2001 UNESCO convention for the protection of the underwater cultural heritage[11], the convention decided that submerged artifacts should ideally remain on the seabed out of respect for their historical context and, in some cases, because water actually preserves rests.
An **"***Architectural Shell* [6]" with some spaces opened on the landscape and other underwater spaces where the inside pressure is constant (completely immersed to allow the watching of the rests).
The principal references are *"Floating Archaeological Center"* [7] (golf of Giens_1976/77) and *"Underwater Archaeological Museum"* [8] (Alexandria, Egypt_2008) designed by the French Architect Jacques Rougerie[10]. Some ideas comes from the art installation *"Liquid Door"* [9] (a threshold between the indoor environment and the sea produced simply by air pressure) inspired by Jacques Cousteau's dream of living underwater.

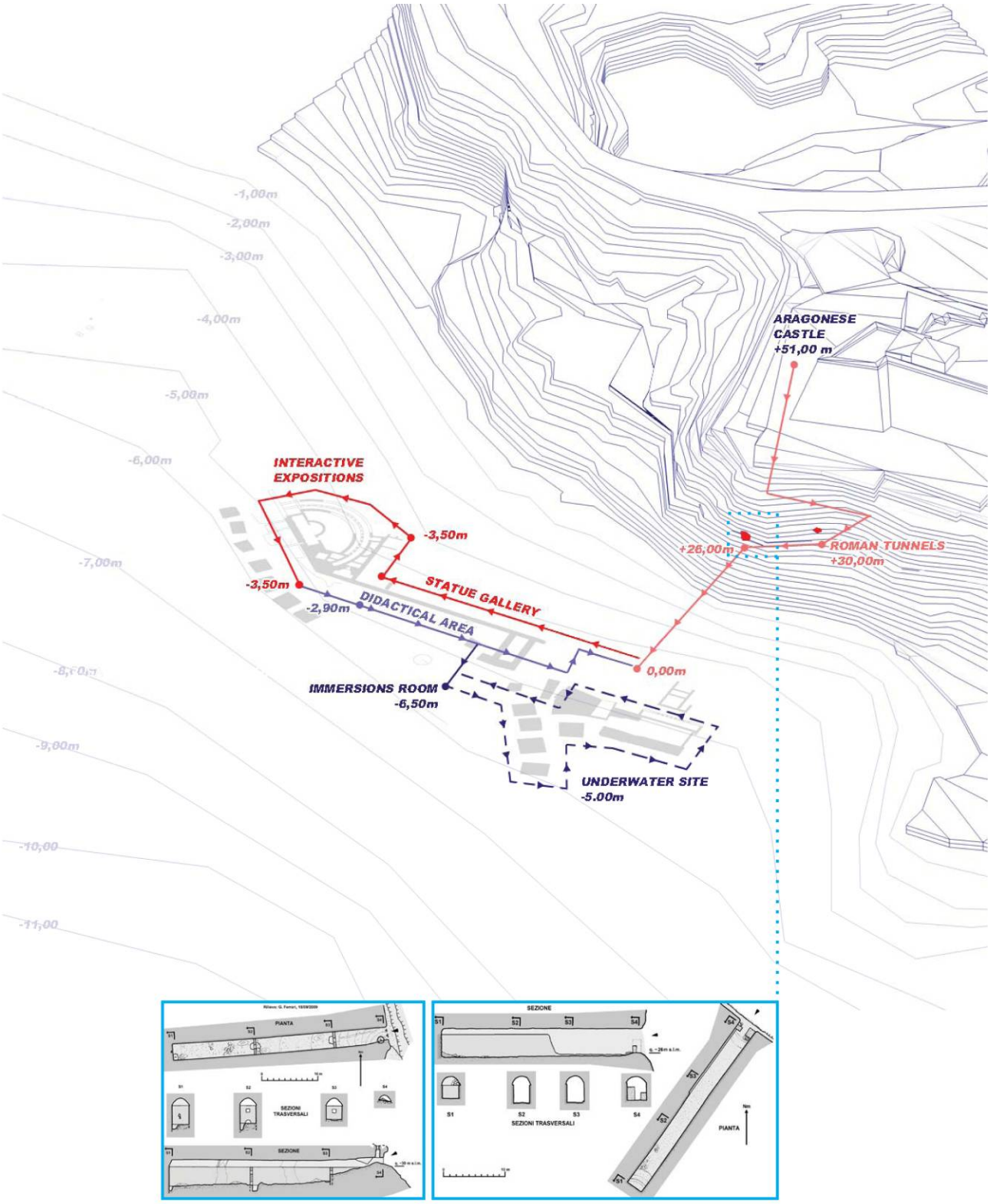

Fig. 4: Diagram of the functions with path and draw of the roman tunnels under the aragonese castle

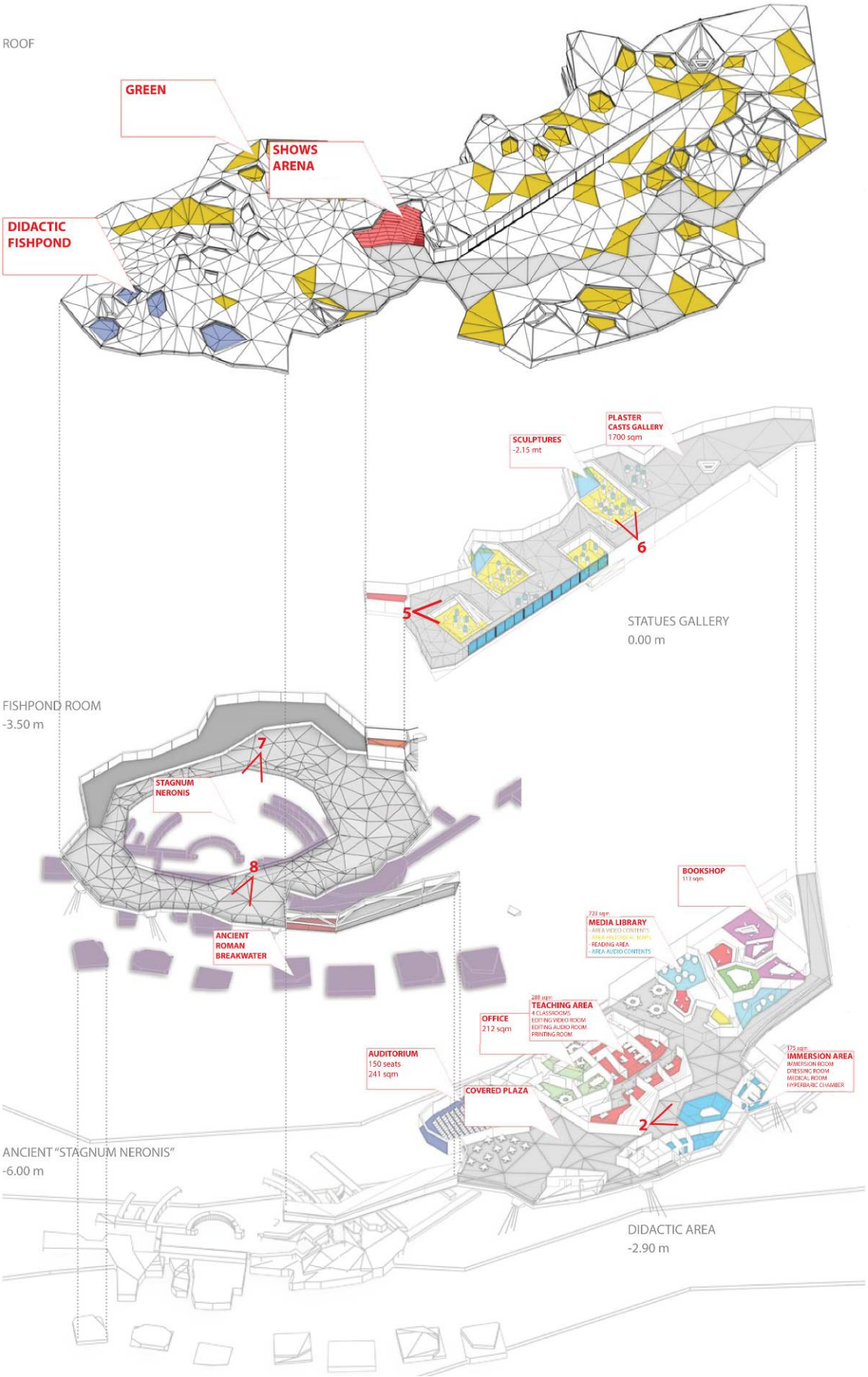

Fig. 5: Exploded axonometric view of the building

The project is based on a modular structure. The scheme chosen is not anonymous but is a scheme in relation with the roman building. It's the *Voronoy scheme*, starting from noted points of the ancient fishpond is possible obtain a series of *"cells"* in relationship among them. Note that the final scheme is fused with the ancient structure and not adapted to it. Modular scheme is used to design the spaces, tracing the shape of the roman fishpond.
After a first dimensioning of the structure has been necessary calculate the *Archimede's principle* to know the effect as a result of the immersion of the volume in the sea. It has been necessary to provide a ballast tank to increase the weight force of structure to stabilize the building. This ballast volume is located under the pavement. The building position is ensured by steel cables.
Indoor spaces have various heights, the roof is designed to join all this different levels. The final configuration of roof derives from the modular scheme. Some "cells" go up to let in the natural light and ventilation, another "cells" that go down are the vertical supports. The work on the roof allows having a lightweight component that permits to reduce the visual impact on the landscape.

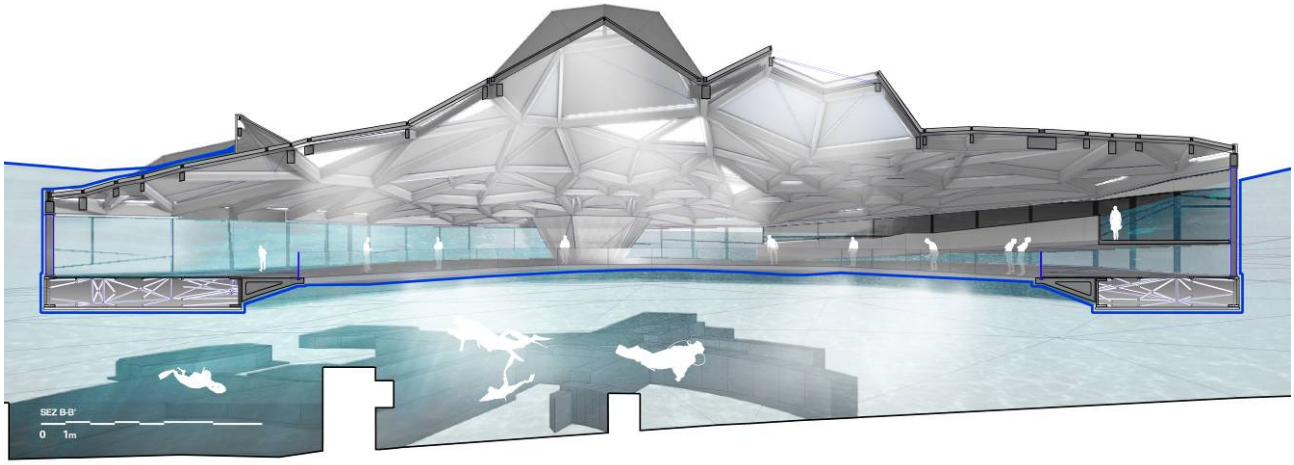

Fig. 3: Section of the fishpond room

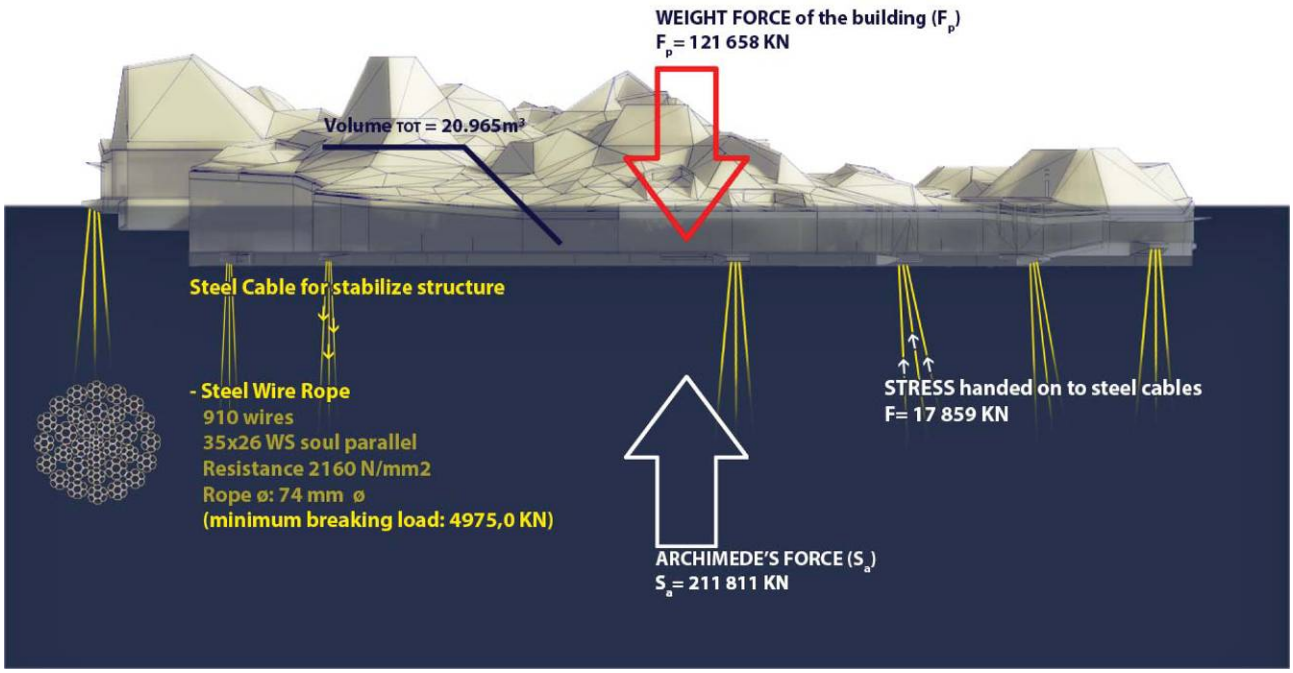

Fig. 6: Scheme of the principle of Archimede

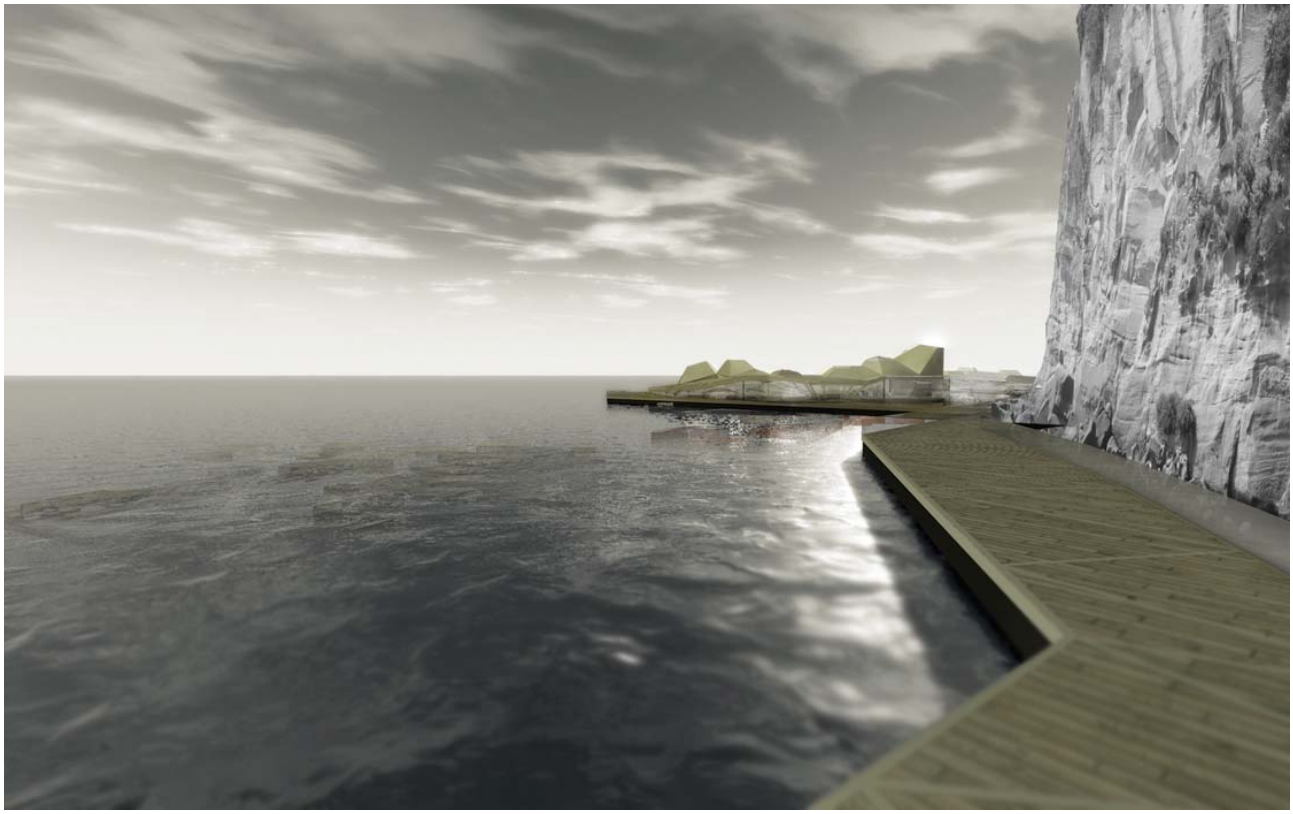

Fig. 7: View from the beach of Baia under the Aragonese castle

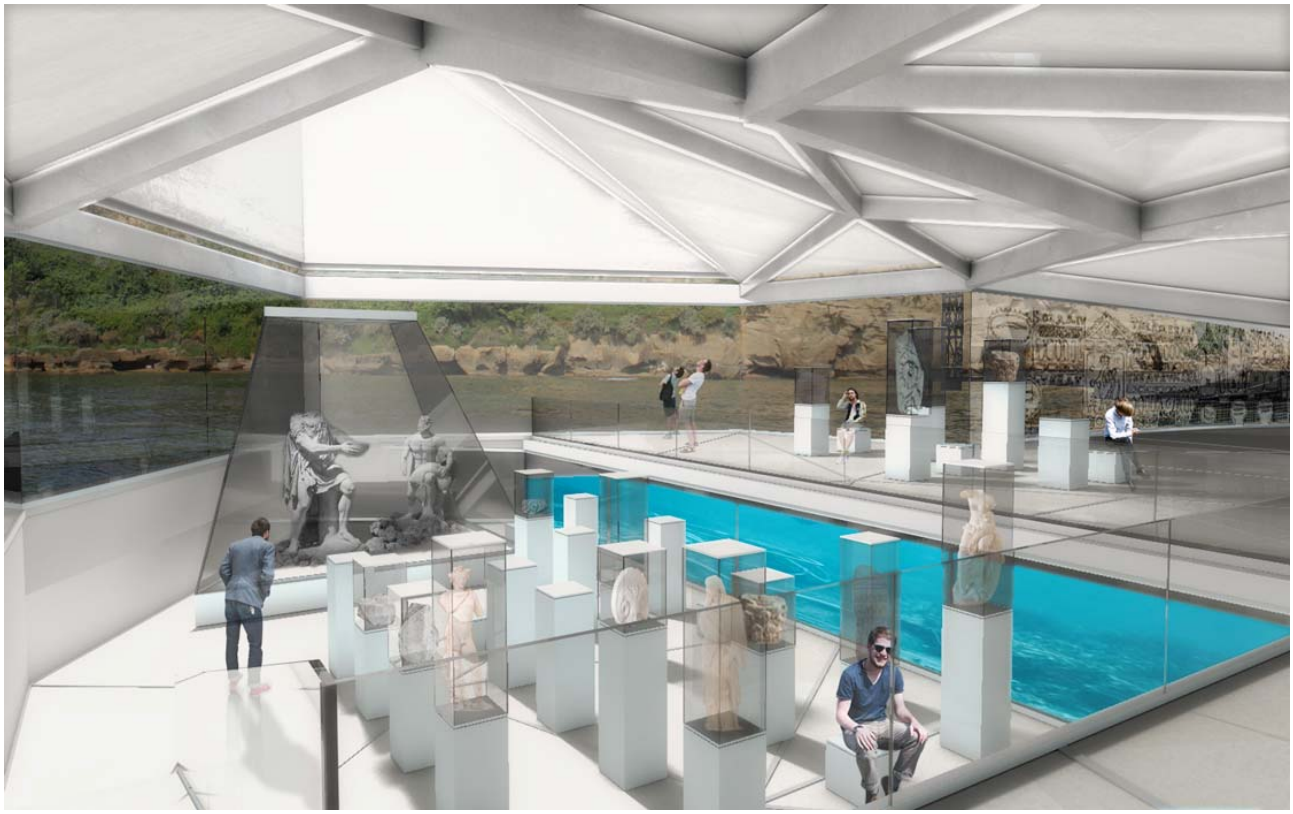

Fig. 8: View of the gallery of statues with the glass cases inspired by roman *suspensurae*



Fig. 8: Plan of the *Stagnum Neronis*

4. Conclusion

The project proposes an experimental architectural language that doesn't conflict with the landscape or with the ruins, also the building remains in contact with the preexistences and tries to integrate them, such as the coastal path that leads to inside of the center of underwater archaeology, a lightweight element that intersect all historical elements of the area as the roman tunnels[12] on the rock face.
This study tries to trace a scheme adaptable to other sites along coastline to design structures fused with the landscape in order to give new life to this great and abandoned underwater heritage.
The architecture could be the starting key of a development process in the area as in other parts of the world such buildings are made with great response from the public.
Start to protect and use the historical-artistic patrimony as an economic and social engine, in this precarious and variable economic situation find the funds for this type of intervention is very difficult but would ensure a better future.

Bibliographical References

[1] MAIURI, A. *L'esplorazione archeologica sottomarina di Baia*. In III congresso internazionale di archeologia sottomarina, Barcellona, 1961, da p. 108.

[2] LAMBOGLIA, N. *Inizio dell'esplorazione di Baia sommersa*. In III congresso internazionale di archeologia sottomarina, Barcellona, 1961, da p. 225.

[3] SCOGNAMIGLIO, Eduardo. *Aggiornamenti per la topografia di Baia sommersa*. In Forma Maris, Forum internazionale di archeologia subacquea, Pozzuoli, 1998, p. 43–50.

[4] MINIERO, Paola. *Il castello e l'area archeologica di Baia.*
Milano: Mondadori Electa, 2000. 100 p. ISBN 9788843587698

[5] DI FRAIA, Gennaro. LOMBARDO, N. SCOGNAMIGLIO, Eduardo. *Contributi alla topografia di Baia sommersa*. In Puteoli, Napoli, 1985-1986, p. 219-299.

[6] ZEVI, Bruno. *Il linguaggio moderno dell'architettura.* Torino: Einaudi, 1974. 287 p.
ISBN 8806377965

[7] ROUGERIE, Jacques. *Abitare il mare*. L'arca, 278. Milano: Arcadata, 1986 – 2014.p. 78/79
ISSN 0394–2147

[8] ROUGERIE, Jacques. *Museo di Archeologia sottomarina in Alessandria d'Egitto*. L'arca, 278. Milano: Arcadata, 1986 – 2014.p. 80/83
ISSN 0394–2147

[9] BASTA, Sarina. GRAHAM BURNETT, D., HICKEY, Adria. *Isola and Norzi: Liquid door.*
Milano: Mousse publishing, 2010. 128 p. ISBN 9788896501313

[10] ROUGERIE, Jacques. CIVARD RACINAIS, Alexandrine. *De vingt mille lieues sous les mers à sea orbiter.* Parigi: Democratic book, 2010. 215 p. ISBN 2361040026

[11] MAARLEVELD, Thijs. GUE'RIN, Ulrike. EGGER, Barbara. *Manual for Activities directed at Underwater Cultural Heritage - guidelines to the annex of the unesco 2001 convention.*
Parigi: UNESCO, 2013. 100 p. ISBN 978-92-3-001122-2

[12] NORMA, Damiano. FERRARI, Graziano. LAMAGNA, Raffaella. TEDESCO, Rossella. *Roman water tanks under Baia castle* (*Cisterne romane sotto il castello di Baia*),Campania Speleologica, atti del II Convegno Regionale di Speleologia, Lerici in corso di pubblicazione.

[13] Le vie dei mercanti Web Page: http://www.leviedeimercanti.it/2013eng

[14] Online presentation of the project: http://presentationmarcorusso.altervista.org/

[15] Online presentation of the project: http://www.archiprixitalia.it/index.php/esiti

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The subtraction architecture

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Abstract

The hypogeal aspect of the architectural project has not to be interpreted as the evasive folding into the nostalgic and symbolic dimension that has crossed the civility and culture of the human history, not even as trying to deprive the architecture of his alter and different presence inside its natural setting. The subtraction architecture consists of the way of the environmental transformation that does not look at the architecture as independent object, but it works on th e elements complexity and relations that enclose itself. Choosing to talk about the subtraction architecture instead of "passive architecture" or "negative architecture", it underlines the intent of the subtractive act in the same way as building out of the soil becomes the additional act that is assembly work and the addiction of hand - made materials. The first is born from sculpting the natural landscape, and in the landscape it blurs because it is an essential part of that landscape, so it is not a different universe relegated to the depth, but it talks with the superficial life of which it is the natural extension ; the second is identified with the environmental contest as additional object and so recognizable.
The subtraction architecture then brings us back to the archetype of the crypt, the excavation of the cave: the return to the womb.

Keywords: subtraction, hypogeal, passive architecture.

1. Le Corsubier and Utzon, architecture comparison.

"Ognuno di noi, pensando ad una prima forma di costruire,pensa allo scavare."**Francesco Venezia**
Conceiving a building as a cave is a highly unusual attitude in modern architecture. The massive, opaque condition involved in the construction of an underground building seems to directly contradict the principles that the Modern Movement had defended most strongly. The cave archetype as the presumed origin of the earliest human shelters had previously been replaces as a model by the Enlightenment's treatise writers, for whom another metaphor, the primitive hut, was a much more precise representation of the fundamentals of the art of building. Abate Laugier' s canonical image was an optimistic substitution for the dark myth of the cave, and heralded, two centuries early, Domino structural icon which for the Le Corbusier had to synthesise the new way approach to architecture which was to mark the entire 20th century. Paradoxically, Le Corbusier was also the author of the unusual proposal of a building that was the antithesis of almost everything he had defended so strongly :el project de La Sainte Baume.
Sainte Baume conceived as architecture sculpted into the mountain to hold the grotto where the biblical Maria Magdalena was supposed to have came; a succession of hidden spaces linked by corridors that perforate the mountain to open finally to the sea. In this case, the lines which had hitherto defined Le Corbusier's architecture plan almost without exception were transformed into a black corporeal silhouette that revealed the interior section using mechanism of figure-background opposition.

Another project is an example of architecture of the subtraction is Silkerborg Museum of Jorn Utzon. Utzon conceived the project as a buried grotto that would only emerge from ground level to seek light and permit access from the outside from the exterior world. The Silkeborg project is also a sunken building, represented on its plans and sections with expressive density and rotundity. However, in contrast to Le Corbusier, Utzon conceived the large sunken vessels in a sculptural sense rather than as the result of the desire to carve away the ground. Beneath the ground, the orthogonal geometry loses its constructive purpose, and the forms that are used respond freely to the solicitations that are transmitted to the underground building by the surrounding mass of earth.

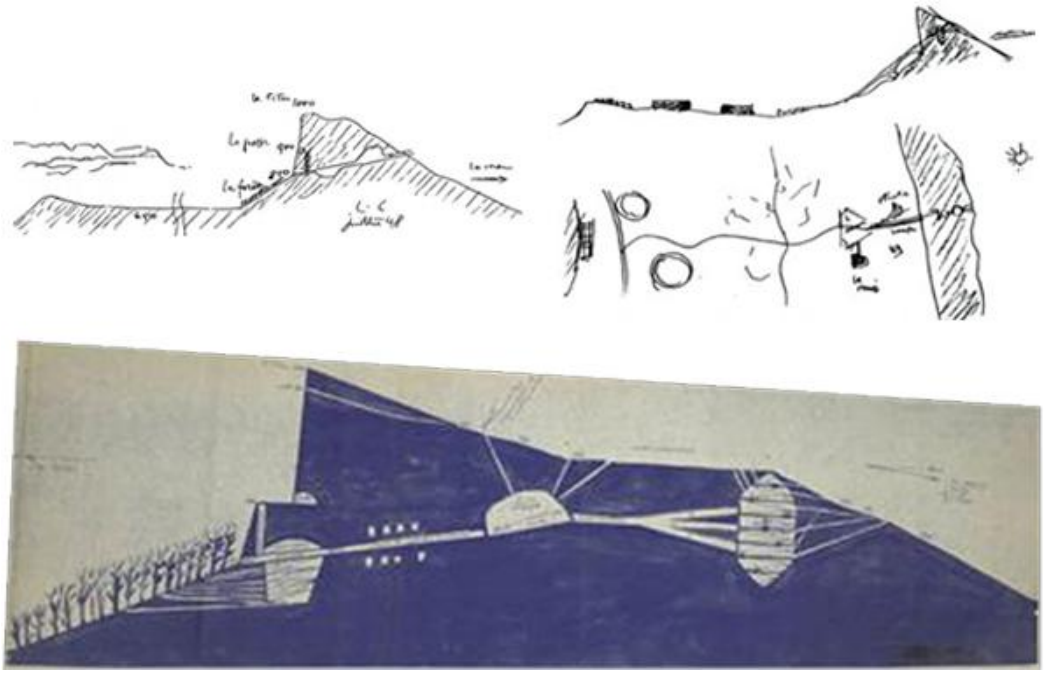

Fig. 1: Le Corbusier, Le Sainte-Baume Basilica 1948.

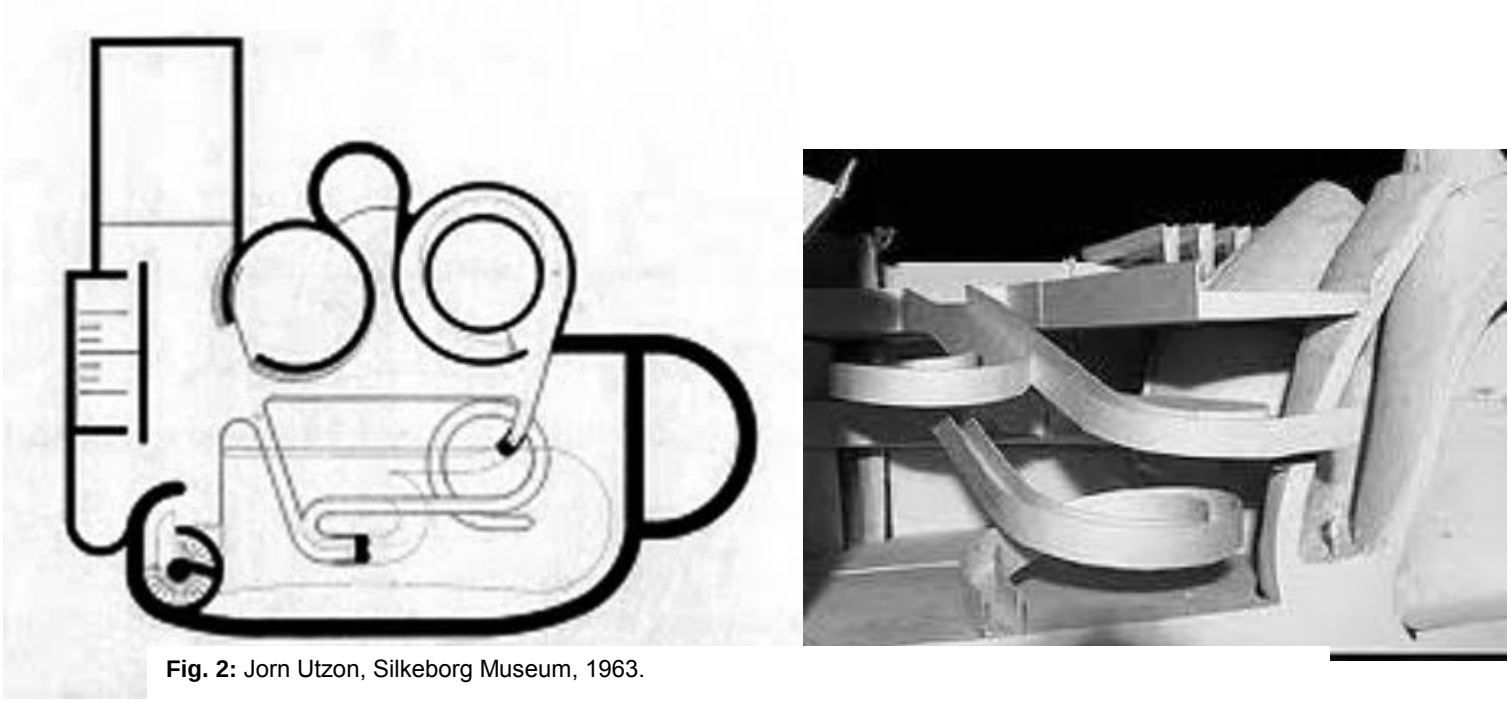

Fig. 2: Jorn Utzon, Silkeborg Museum, 1963.

2. Case-Study: International Museum of Volcanoes.

The project, presented as a demonstrative example, is a thesis developed by Stefania Di Donato within the Planning Workshop at the Department of Architecture and Industrial Design Luigi Vanvitelli. It is a “International Museum of Volcanoes” located in Lanzarote (Spain). The project is a particular and drammatic experience :a path inside the earth that then rushes towards the landscape. A portion of the project is cantilevered over the landscape, because the landscape to go inside the museum. Then the observer arrives at a lower altitude through the exhibition halls: the circular room is designed like a mother's womb, the metaphor that indicates the origin return. The Observer does not lose the link with the sky which enters in the room through two large skylights, one of which is completely open and allows water to invade the room.

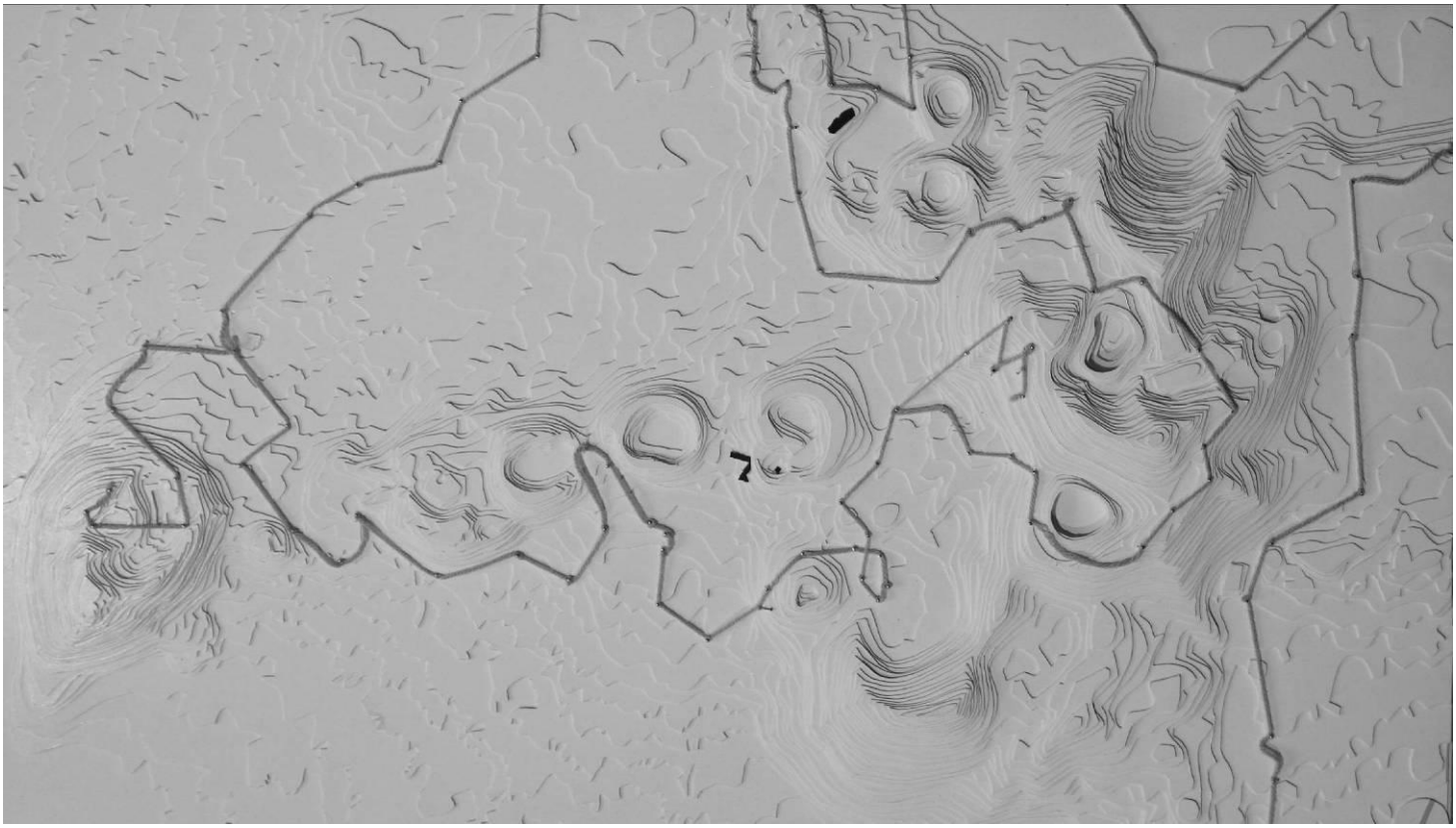

Fig.3: Maquette 1:5000, Lanzarote _ Timanfaya National Park

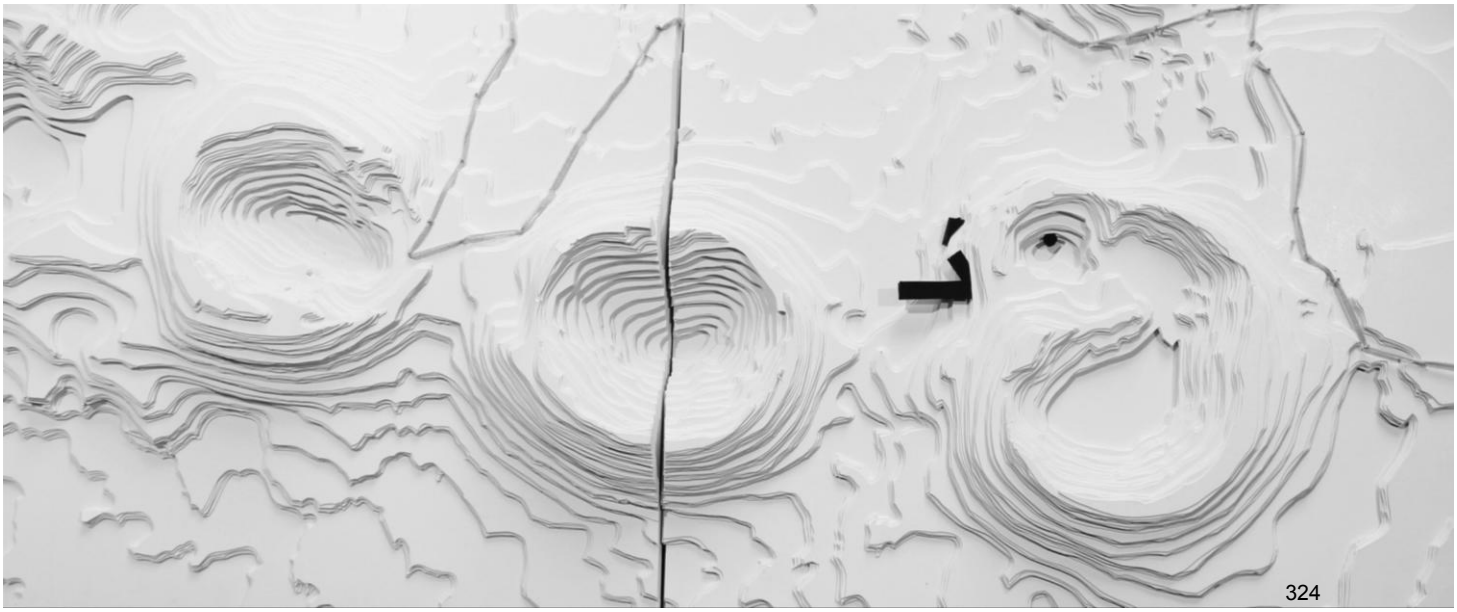

Fig.4: Detail maquette 1:1000, Lanzarote_Tymanfaya National Park

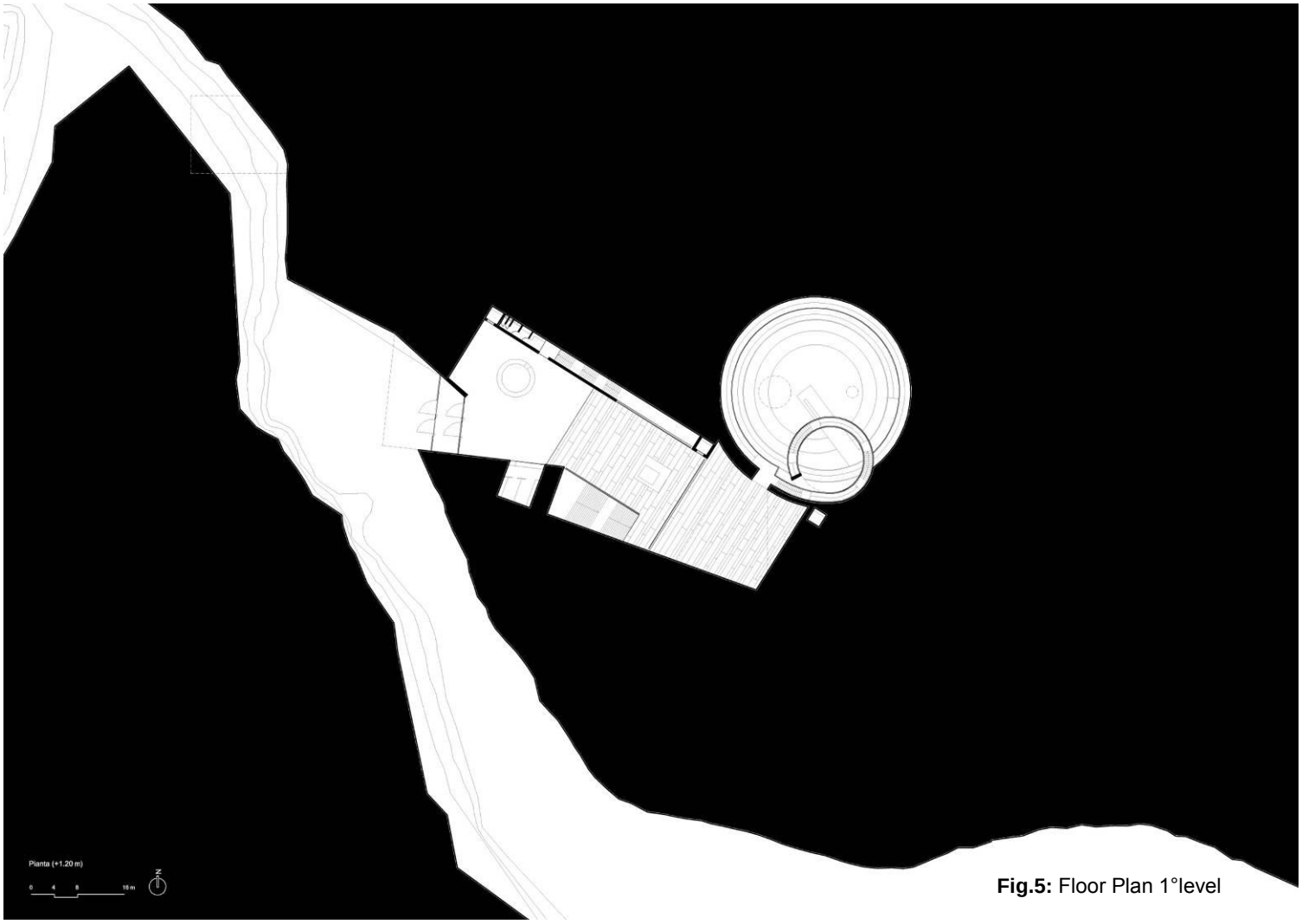

Fig.5: Floor Plan 1°level

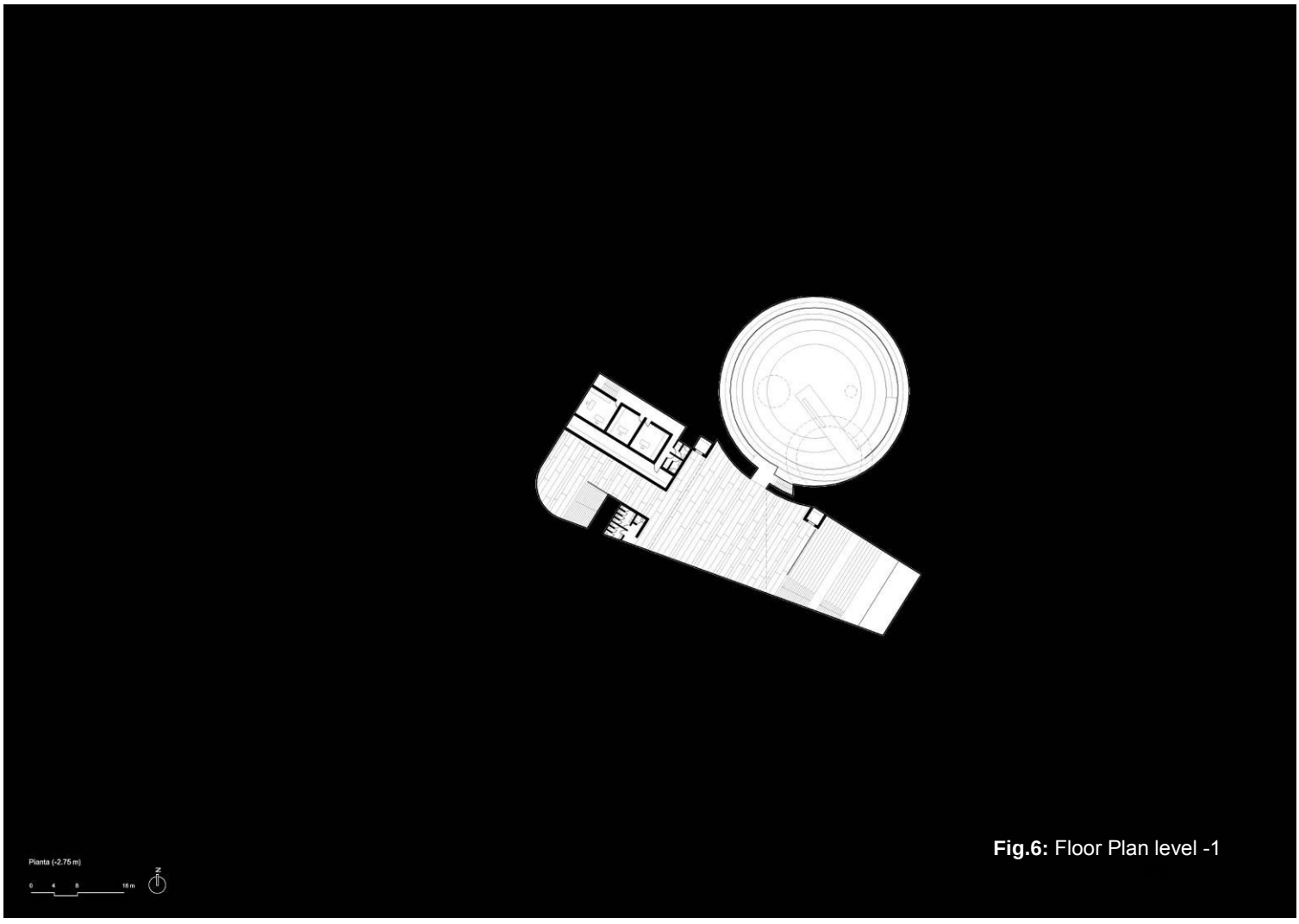

Fig.6: Floor Plan level -1

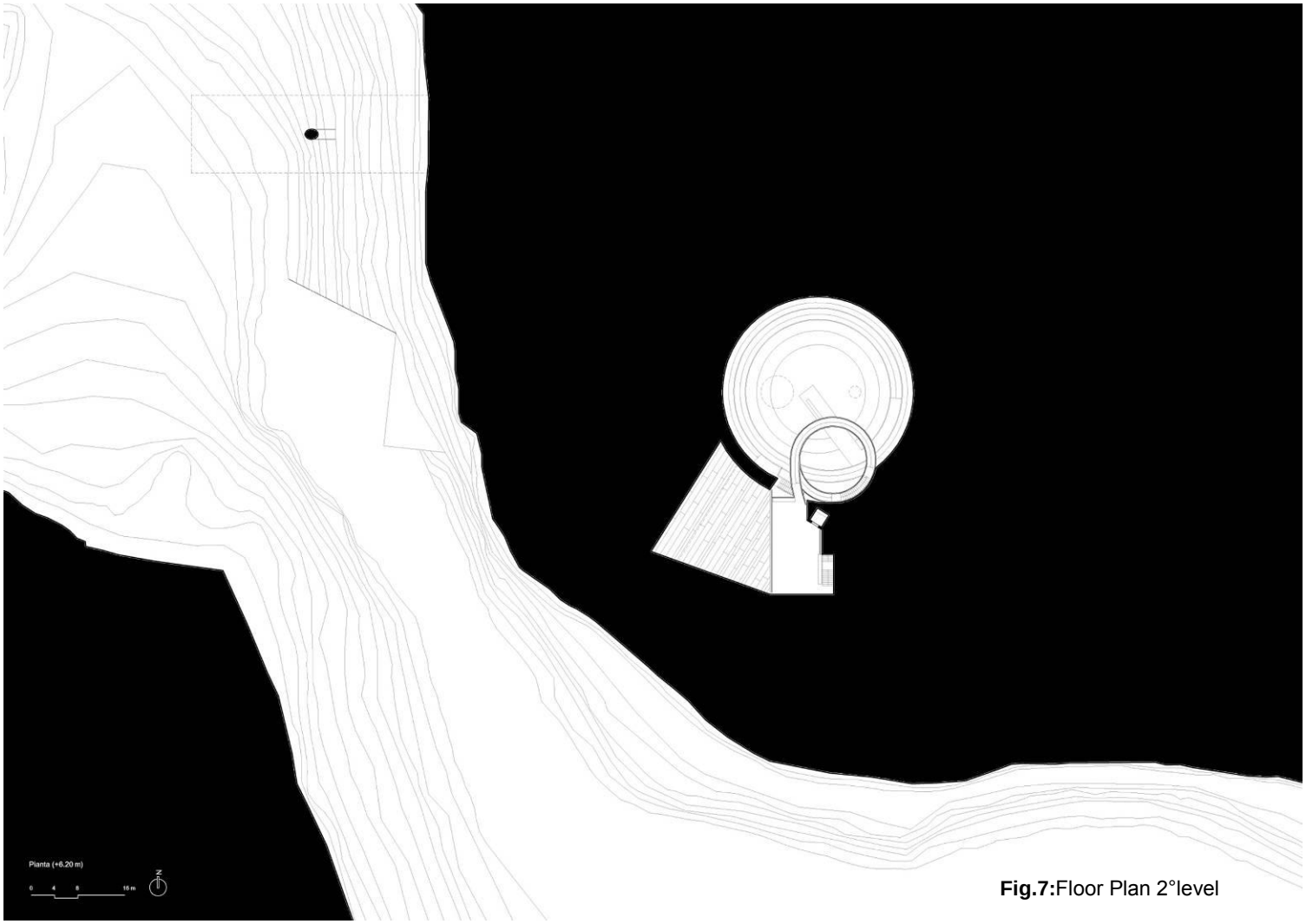

Fig.7: Floor Plan 2°level

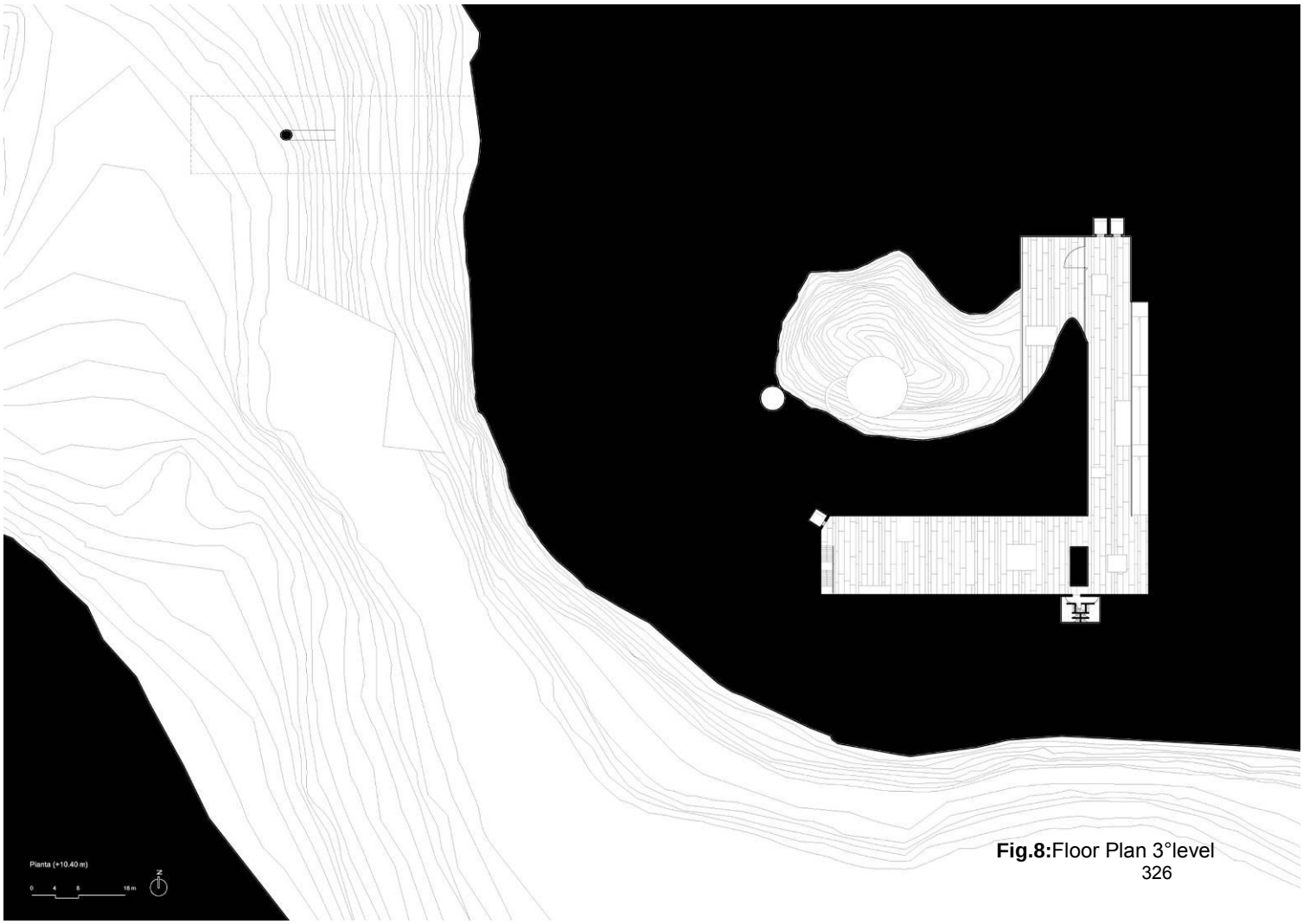

Fig.8: Floor Plan 3°level

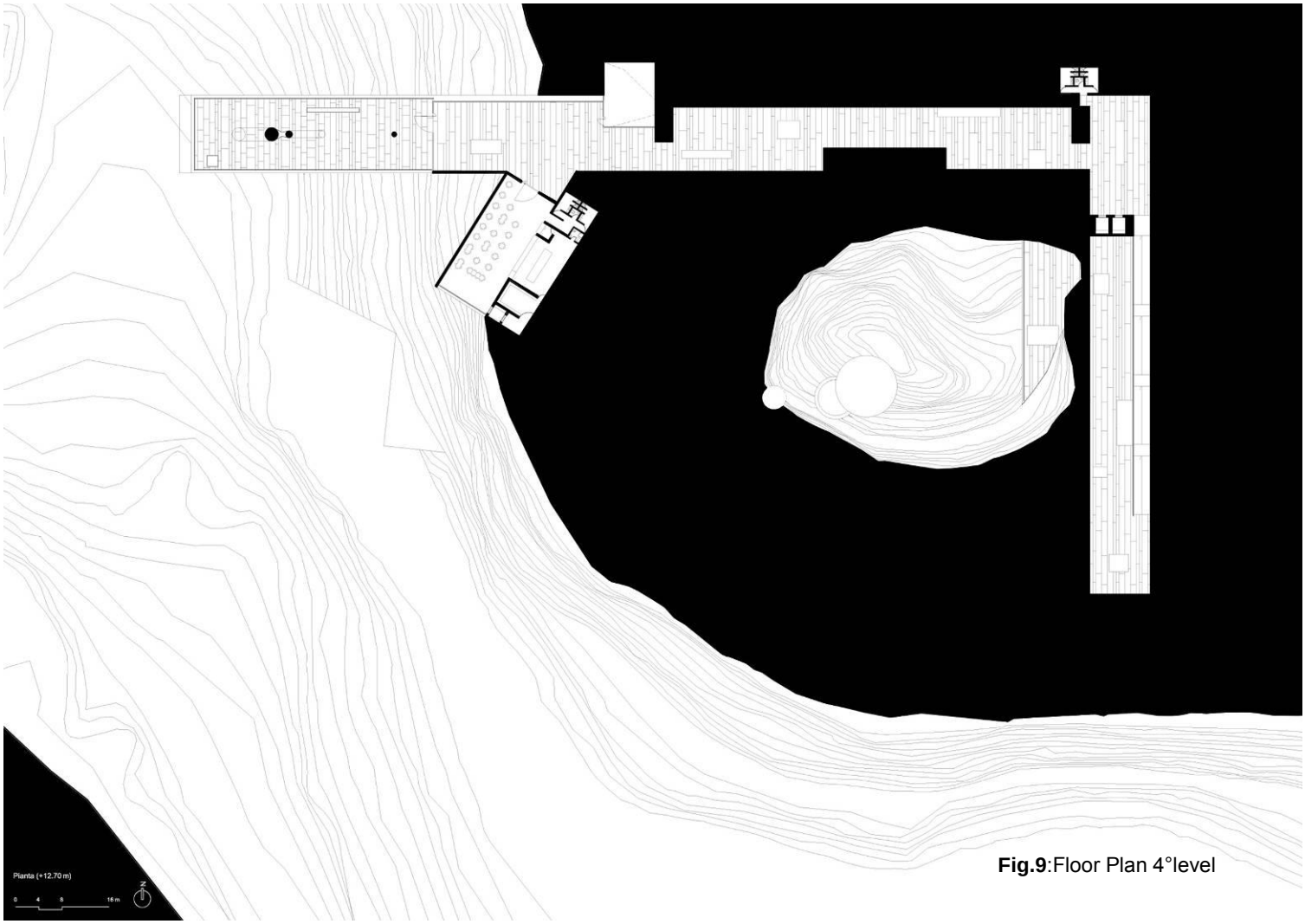

Fig.9:Floor Plan 4°level

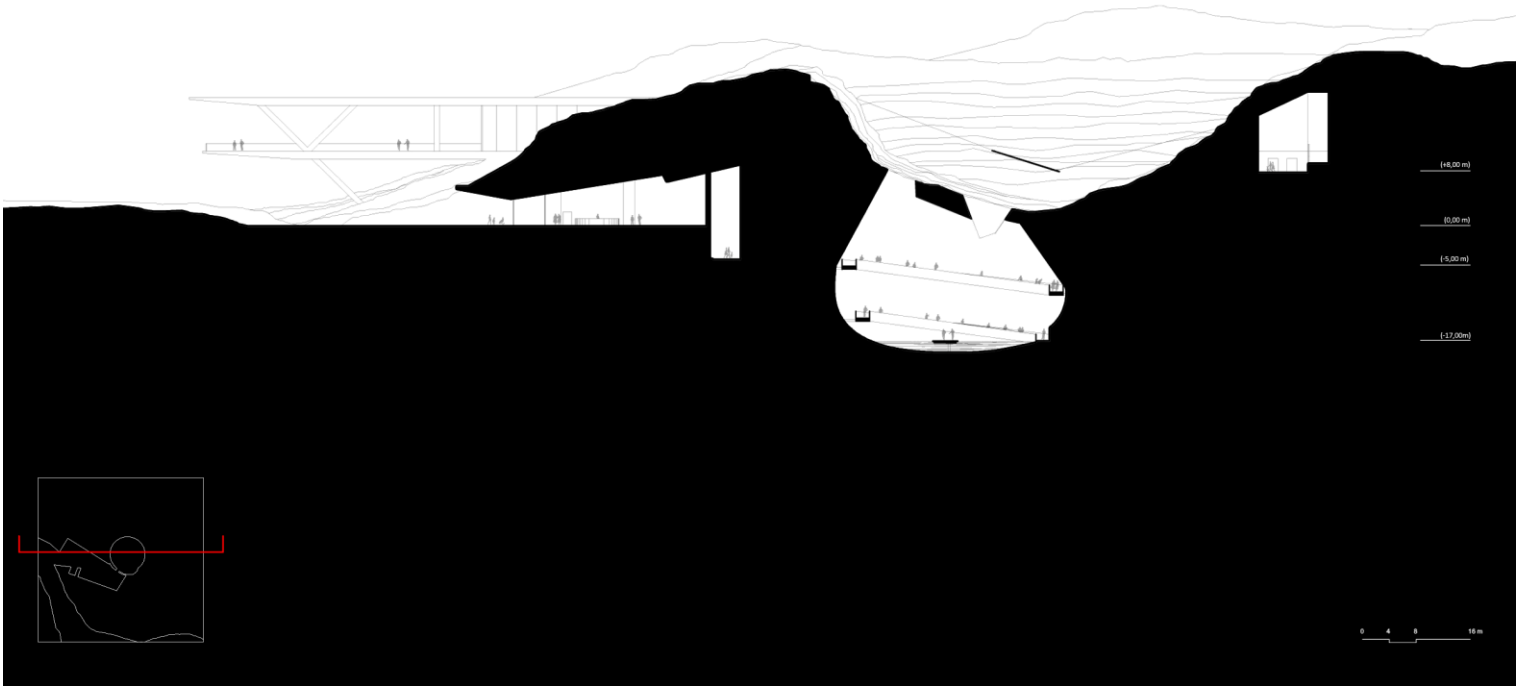

Fig.10: Section A

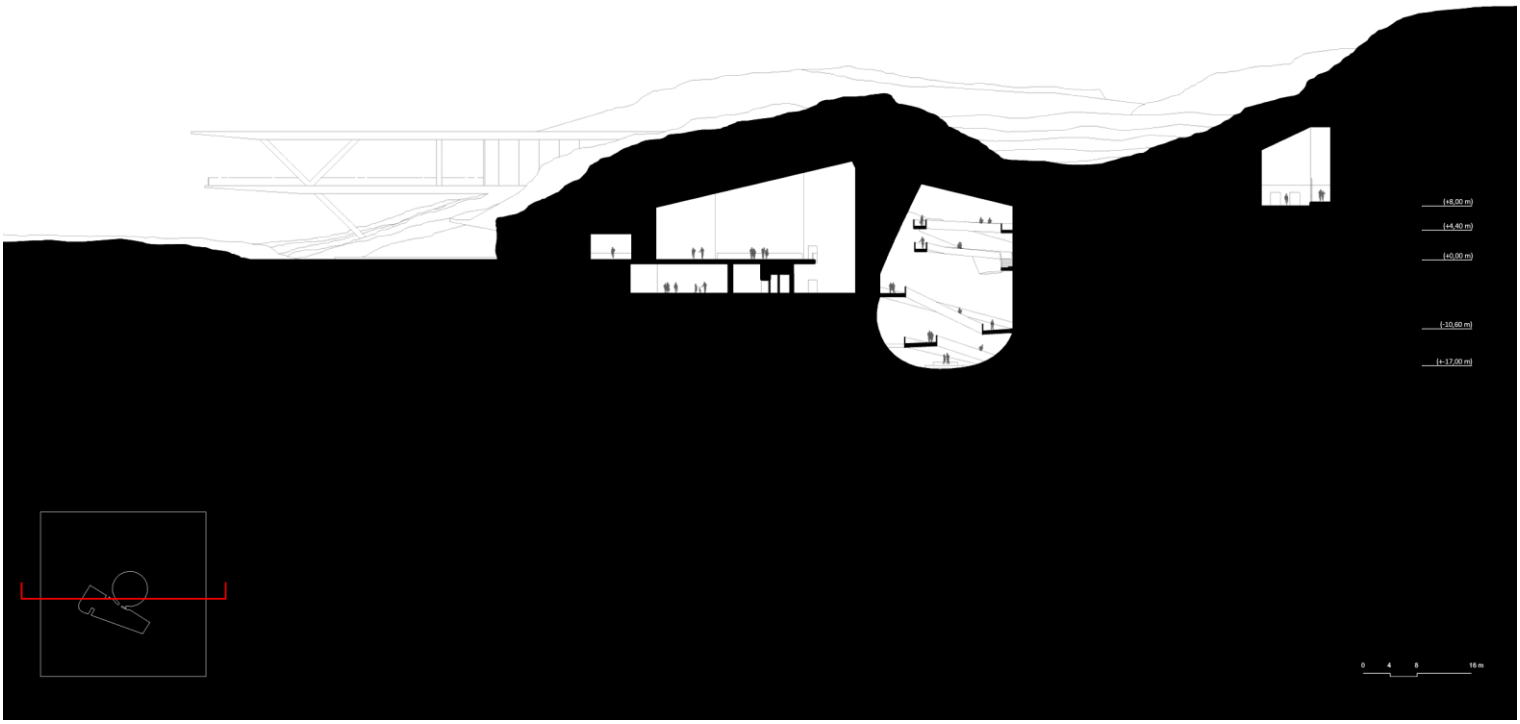

Fig.11: Section B

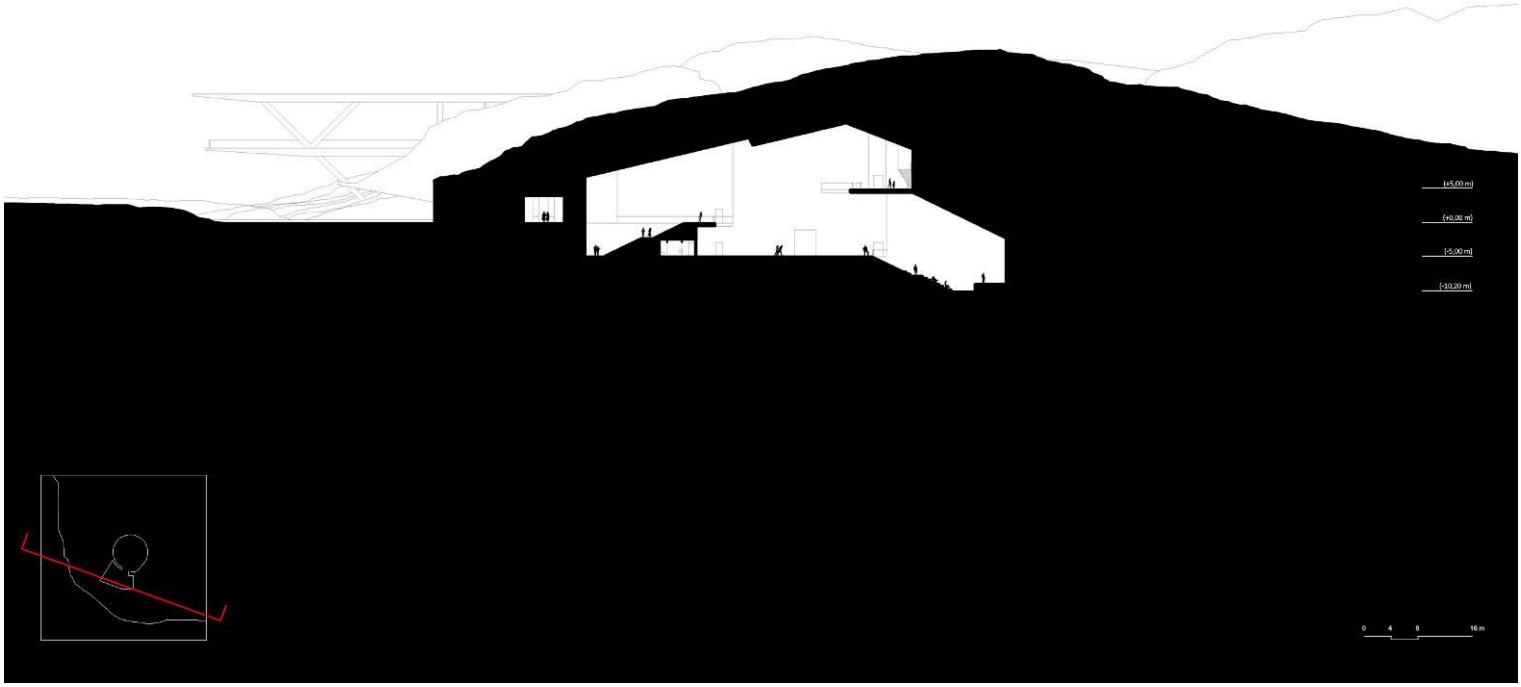

Fig.12: Section C

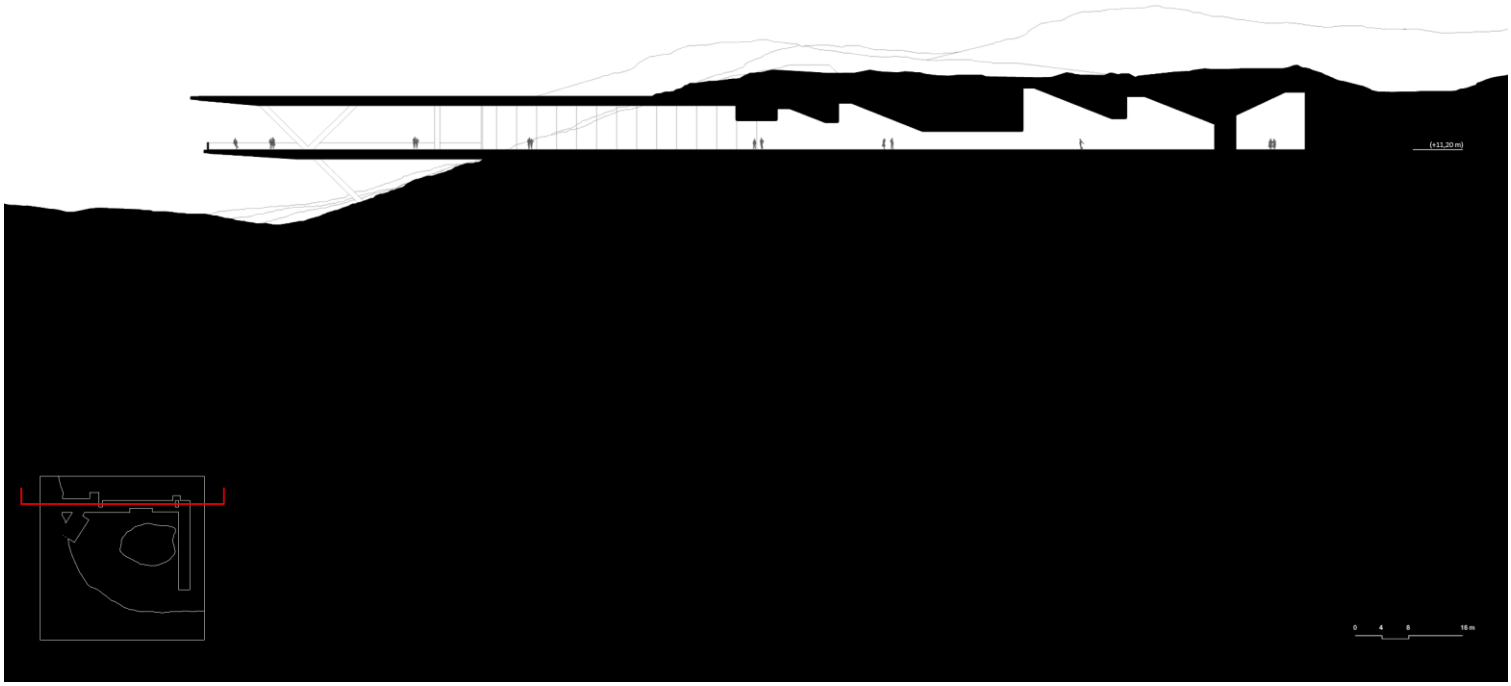

Fig.13:Section D

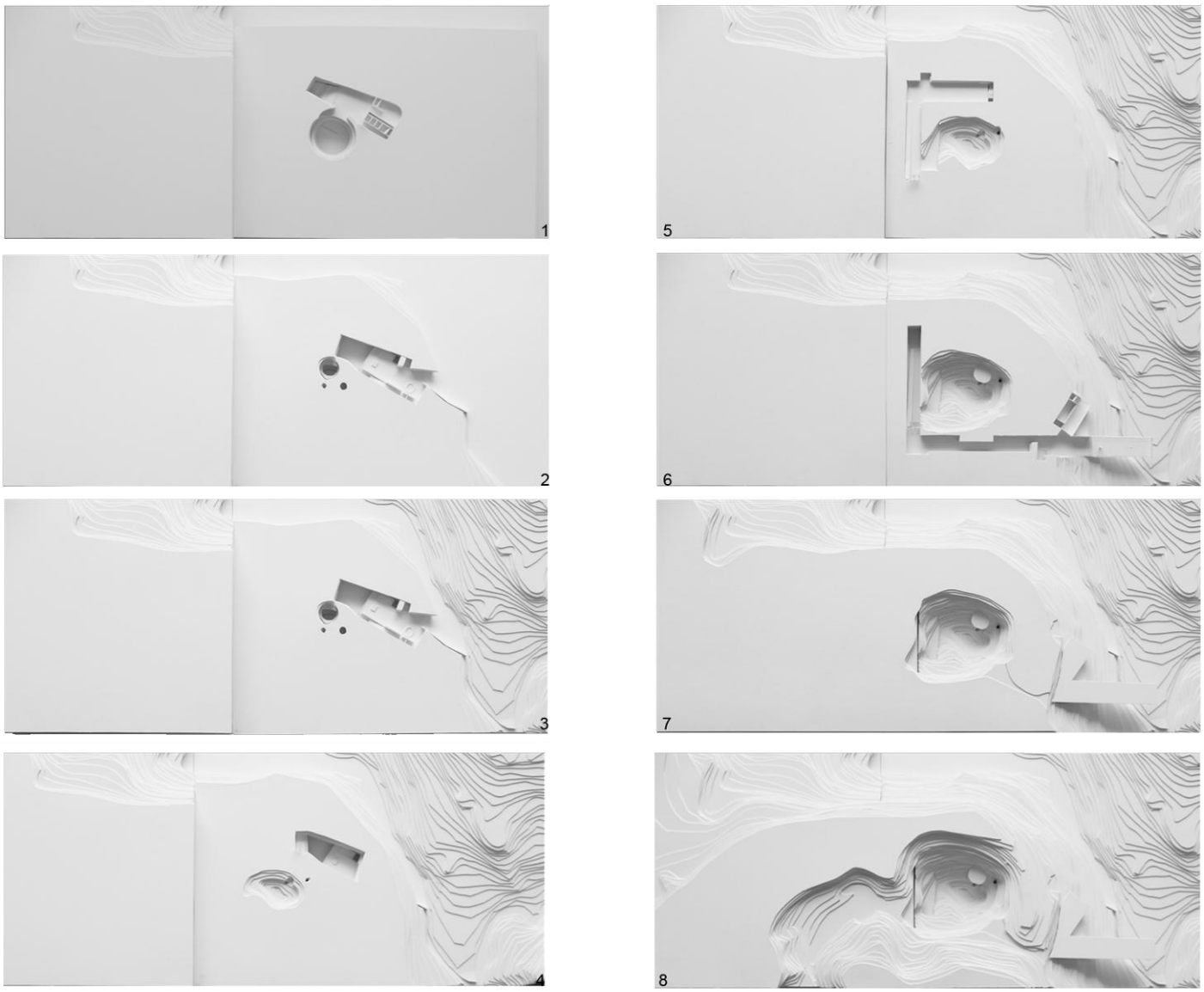

Fig.14: Maquette 1:500 _Chronicle maquette

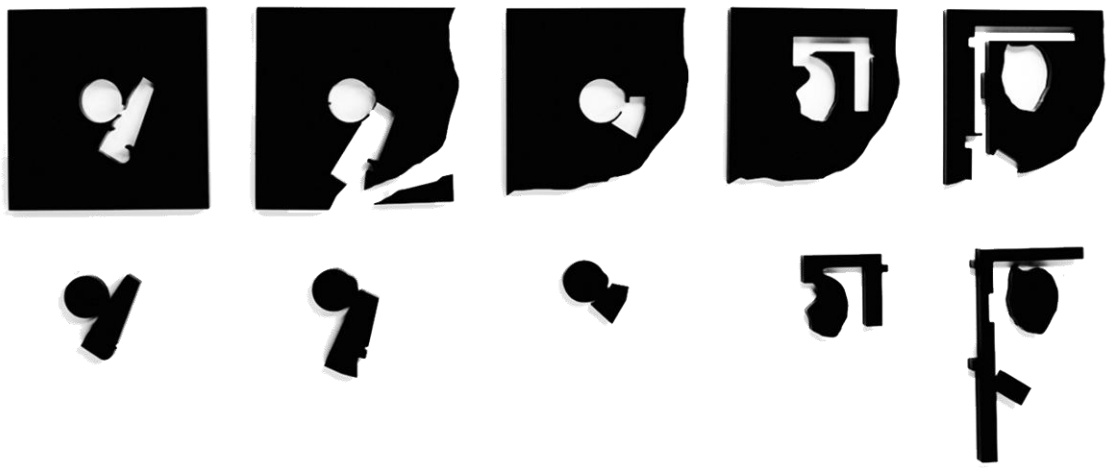

Fig 15: Concept maquette

Bibliographical References

[1] NIETO Fuensanta, SOBEJANO Enrique. *Utzon,Museo de Silkeborg 1963*. Madrid: Editorial Rueda S.L. 2004. ISBN 84-7207-167-7

[2] VENEZIA Francesco. *Francesco Venezia le idée e le occasioni.* Milano: Mondadori Electa 2006. ISBN 88-435-8351-4

[3] ESPUELAS Fernando. *Il vuoto, Riflessioni sullo spazio in architettura.* Milano: Christian Marinotti 2004. ISBN 88-8273-040-9

[4] CACCIATORE Francesco. *Il muro come contenitore di luoghi,Forme strutturali cave nell'opera di Louis Kahn.* Siracusa: Lettera ventidue 2011. ISBN 978-88-6242-038-9

[5] TERRANOVA Antononino. *Il progetto della sottrazione.* Roma: Croma Quaderni 1997. ISBN 88-7621-892-0

[6] VENEZIA Francesco. *Che cosa è l'architettura. Lezioni,conferenze,un intervento.* Milano: Mondadori Electa 2011. ISBN 978-88-370-8661-9

[7] UTZON Jorn. Idee di architettura. Scritti e conversazioni. Milano: Christian Marinotti 2011. ISBN 978-88-8273-128-1

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The steel in historic buildings: concealing vs exposing

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Abstract
The steel material has changed over time its role in the historic building, passing from the first one linked to the purely technical aspects of consolidation, to the second one, where it is considered a project item with specific intents in the design act. Certainly, these two roles are correlated to different way to use the steel, employed for metallic elements disguised by the existing material or, on the contrary, for components put in view.
On the one hand, the rehabilitation project uses metal components for theirs high structural performances, placing them in an hidden position; on the other hand, the transformation project uses steel as a material capable of operating the renovation, finding in the Italian tradition an important technical and formal experimentation, which shows the ability to overlay to the historic layers the ones related to the contemporary culture.
The binomial between concealment and exposure of the added elements is the investigation field of this research, which explores the delicate boundary between the visible and invisible sphere as a pretext to understand the dynamics of the Italian design for the built heritage, known for ranging from conservation to transformation: the duality between these two poles gives to different levels of evidence the task of defining the steel role.

Keywords: Steel, Consolidation, Transformation Project, Concealing, Exposing

1. The role of steel in the built heritage
The steel use in the built heritage has ancient origins and has gone through a constant evolution in terms of role, technologies and meanings.
The need of the post-war reconstructions in the Twentieth Century introduces unusual operating scenarios: the extension of the concept of monument from the single architectural object to the ordinary urban plot, requires the experimentation of innovative design strategies, best suited to operate on the common heritage. The search for appropriate functions for older buildings, combined with the need of conservation, makes the metallic material not only the technical tool with which preserve the built, but also the formal mean for make it new, allowing the reuse.
The adoption of a critical distance towards the built heritage is the main prerequisite for the recognition of the values to be preserved [1]: the role of the steel, and of the technique in general, is therefore defined through design choices that, in the Italian tradition, range between the historical instances of preservation and the architectural ones of change.
The historical approach to the built supports the thesis of conservation and the necessary knowledge of the historical processes that have generated the urban plot in different eras. The attitude towards the technique is of cautious distrust: in fact, it consists essentially in the technique of restoration and structural rehabilitation, making the technical act at the service of preservation [2]. The steel, therefore, plays a role exclusively linked to the technical-structural aspect: this added technological component tries to reconcile the needs of the iconic and material preservation of the buildings with the structural safety, without imposing substantial modifications of architectonic elements of which this approach wants to preserve the integrity.

This attitude, which is widespread in common practice, is supported by the same Charters of Restoration: the first one, edited in Athens in 1931, admits the use of all the means of modern technology, provided that the new materials are disguised as not to modify the image of the historic building on which the project operates. The consolidation act is implicitly described as a neutral and indifferent operation, because it is hidden by the ancient structures, considering legitimate any operation placed in the not-visible sphere [3].
After the II World War, the Charter of the Italian Restoration of 1972 represents an important reference for the practical use of modern materials, emphasizing the need to operate in the invisible sphere: the new materials appear qualified "for changes with a static and conservative purpose in the internal structure or in the substrate, provided that any distortion or discoloration of material is not evident on the surface" [4].
Only at the end of the 80's, the previous principle is put beside an attitude of distrust towards the concealed insertions in steel "because of their invasiveness, poor durability, irreversibility and relatively low reliability". Therefore, the means of traditional type for rehabilitation are preferred as verifiable and easily replaceable, even if they have a showy foreignness to the historic building [5].
The principle of dissimulation of modern materials is the leitmotif of the Italian Charters.
The character of visibility, defined as the ability to interact with the existing from the point of view of the figurative forms, is one of the main aspect to be checked in the project on the pre-existence, even when the value of the old material is recognized and the operations for addition, rather than by subtraction, are preferred: next to the direct dissimulation through existing materials, the concealment of the added resistant elements is achieved through the design of their shapes, that carefully minimize the perception of their presence.
The architectonic approach holds up the instances of change, adaptation and revitalization. It is based on the full legitimacy, if not the necessity, for the contemporary project to work in the dialectical between a rooted tradition and an attempt of innovation: simply, in order to place the work in the contemporary natural historical flow [1]. Technological innovations, adapted from the culture of new buildings, are transferred to the historic fabric and adequate to it, assuming the forms of an handcrafted production, which is very close to that of the old building. In this context, the steel is used as a material skilled to interpret the reasons of the project from a structural, technological and formal point of view, becoming an instrument capable of effecting the transformation and define the elements of a different formal configuration.
While the historical approach is substantiated by the suggestions of the Charters, the architectonic one is based on less coded principles, which are not allowed to be systematized: in fact, the resistance of the ancient buildings to any act of conceptual simplification and the shared theory of "case by case", makes any attempt impossible.
Transferring the principle of visibility in this second approach, the concealment of the added resistant elements turns into expressed forms that operate a significant transformation: the steel, along with the ancient material, contributes to a renewed formal configuration, showing itself "in the first person rather than through metaphorical figures" [1].
The combination between concealment and exposure of the metal material is the investigation field of this research, which proposes a new key to the interpretation of the operative dynamics on the Italian built heritage and, in particular, of the role of steel technology that, in some project, becomes the co-star of the architectural scene.

2. The levels of concealment

The character of concealment belongs to the technical operation of consolidation: the concealment denies to the simultaneous production the right to participate in a direct, immediate and visible way to the structural rehabilitating act, allowing the coexistence of the past and the present only through the cancellation and the sacrifice of one for the other [6].
The concealment is justified by considering the rehabilitation moment as a scientific act, independent from the project on the pre-existence, that is turned to take care of the aesthetic of the building: the main goal is identified in giving back the maximum security to the structure, with the minor, or better, with no one impact on the aesthetics of the building [7].
The architectonic form takes, therefore, the value and the function of a decorative finish with no relationship with the reality of the structural body, establishing a distinction between form and structure: the denial of the evidence of the added resistant elements contrasts, however, with a wide freedom of action in turning the invisible, also working for replacement strategies.
The subsequent recognition of the value of the existing material as document and deposition of civilization, introduces new principles for planning the rehabilitation, defined as a "culturally conscious act" [8]: the respect for the old matter and the principle of reversibility introduce the possibility of working for additions, through visible prosthesis, aimed to the integral conservation of the building.
The design strategies for consolidation, whether they operate by subtraction or by addition, prefer in each case the size of concealment, allowing the identification of different levels of not-visibility, aimed

to investigate the multiplicity of relations that the steel technology is able to establish with the historic heritage and its materials.

2.1 Total concealment

The total concealment of the added resistant elements subtends to a definitely irreversible subtraction of matter. The image of the building is kept intact from the point of view of the formal configuration; constructive elements, however, are deprived of their structural function, so as to cause a split between the form and the structure of the architectural organism.

Repeated subtractions of the stone material from the perimeter walls, make possible to insert a new metal structure frame in Rione of Capodimonte in Ancona, damaged by the earthquake of 1972. The load-bearing function is transferred from the perimeter wall, reduced only to a casing, to the new structure of steel columns (HEA or pairs of C-profile), that are connected to the horizontal elements, also in metallic carpentry. [9]

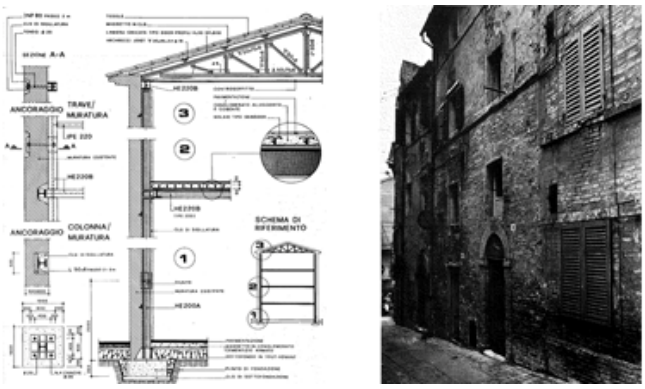

Fig. 1: Rione di Capodimonte, Ancona (Project: Vittorio Mosco, 1973)

The total concealment of the added elements is reached not only by the subtraction of matter but also through the use of the existing constructive elements as a mean for obscure the new steel work. Therefore, this strategy doesn't entrust to the ancient material the task to conceal the presence of the addition, but it justifies the new metallic elements because they are covered by another part of the building, which prevents their participation in terms of formal configuration.

The decision to replace the existing roof with metal structures put in view coincides, therefore, with the presence of an attic floor that conceals its presence: the replacement of the wooden roof of the apse of Naples Cathedral, with a metal structure consisting of a dome with ribs of 70 mm rectangular section of 5 mm welded sheet, fixed to the base to a concrete curb and joint in a drum on the key dome, is justified by the fact that, for the presence of the ceiling, it is not visible from the inside of the Cathedral. Similarly the project proceeds to the replacement of the nave roof with a metal structure, whose presence is justified by the coffered wooden ceiling that denies its visibility [10].

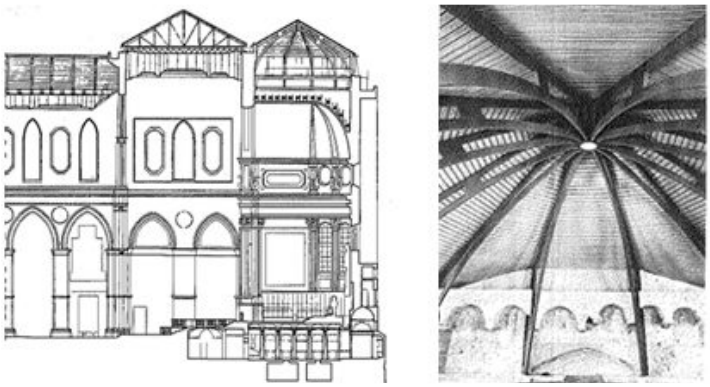

Fig. 2: Apse of Naples Cathedral (Project: Roberto Di Stefano, 1972)

2.2 Partial concealment

If the new resistant elements are exposed, the reasons for the revelation must be sought in respect for the integrity of the existing matter and of the principles of reversibility and recognition.
"Apparent, but not flashy, visible but not ostentatious, different but not brash" [11], the new is characterized by its neutrality, so the metallic items can be placed in the visible sphere just because they are in addition to and not because they are fitted of a formal and meaningful autonomy.
The consolidation of the walls of the Castle in Trezzo d'Adda is made according to this strategy: the metallic elements added in support of the vertical wall consist in guyed cables of small thickness, which don't allow to lose a complete sight of the monument. The technology, which employs a double set of diagonal cables, that hold up the wall on both sides, responds to a principle of minimally invasive action and of totally reversibility. According to Lorenzo Jurina, the intervention thus shows itself "to those who want to see" but remains "subdued for those who prefer the previous image": the project is contemporary but it doesn't contrast with the material and the nature of existence. [12]

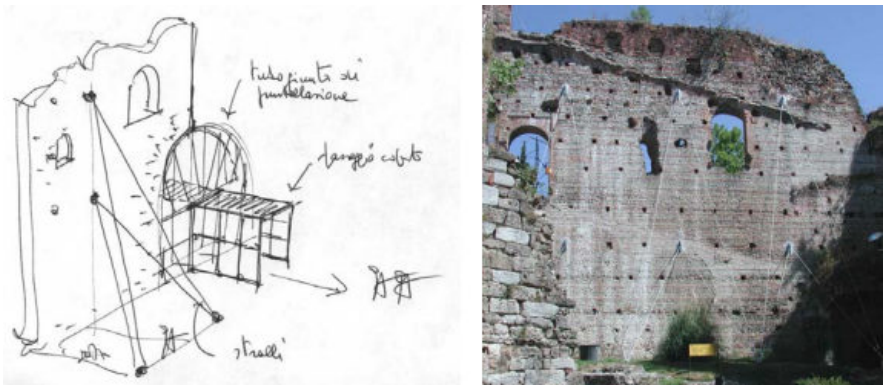

Fig. 3: Castle in Trezzo d'Adda (Project: Lorenzo Jurina, 2003)

2.3 Denied concealment

Finally, there are uncommon experimentations in which the added metal elements are employed at the same time to rehabilitate and formally renew the existing building: the visible prosthesis denies the concealment of steel, and the rehabilitation actively participates in the transformation process of the building. The advantages of showing the added metal elements are attributable not only to the reversibility of the methods, the ease of controlling the efficiency and economic benefits, but also to the ability to summarize in a single moment every action on the existing, from static recovery to the formal feature.
In the consolidation project of the porch of Villa Casati in Muggiò (1984), the inability to pierce the columns for the excessive brittleness of the stones, determines the testing of a design solution aimed to combining the stone colonnade with a fully exposed steel frame, which, in addition to take the weight of the timber floor, gives to the porch a new formal configuration. The choice to work in this direction is suited to respect the material authenticity: the metallic system, in fact, is entirely readable, but at the same time it is perceived as subordinate to the existing for size, texture and color. In this way, the architecture of the porch is modified through a consolidation act: the steel, no longer disguised, is used by exploiting its structural features, but also the material and perceptive ones [13].

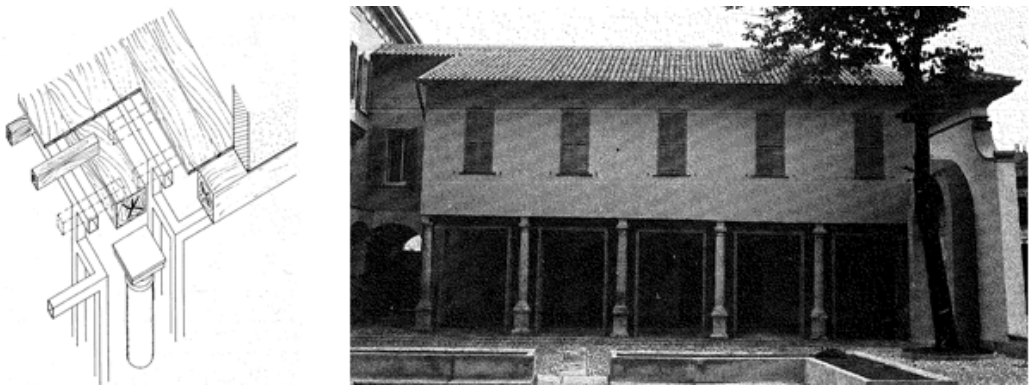

Fig. 4: Villa Casati, Muggiò (Project: Alberto Ferrari, 1984)

3. The levels of exposing

The exposure of metallic elements belongs to the transformation project: the exhibition of added items implies an active participation in the spatial and architectonic construction of the existing. The focus of the project is the research of the properties and the linguistic-syntactic meanings of steel, taken as the first element of the design act, only later substantiated by a technical act: as the protagonist of a detailed project, the steel claims an handcrafted design, very close to the construction methods of the ancient buildings, becoming a qualifying feature of the restoration project.

If in the concealed sphere the reasoning is limited to the quantitative aspect of dissimulation, in the exposed one the question of steel requires an additional level of reflection linked to the formal and technological choices: the figuration of the metal elements lies, in fact, not only in their visual – tactile formal values, such as surface smoothness, structuring, brightness and weight, but also in the discontinuity points of the components (joints and connections), since they are used in composite systems.

The quantitative aspect is then combined with the qualitative form of the addition, not considered as independent and self-sufficient, but an integral part of the architectural object in which it is inserted: the grafting of contemporary design on the historic building takes place more effectively if it's involved in the started speech rather than disengaged from it. The project is proposed as a dialectic dispute in which old and new are compared on equal terms, in the same "perceptual ring" [1], reconciling disparate and multifarious instances and seeking a precise balance point designed to express the dialectic between past and present.

In Italy, the exposure of steel finds its antecedents in the exhibition settings: the premise of temporality constitutes the basis for testing different expressive forms, which operate on the contents of the historic building. The configuration by analogy of the new elements determines the transformation of the spatial content of the Museum of Palazzo Bianco in Genoa, where the art- works support are designed by lightest steel profiles thesis to the neutralization of the space. The technique of suspension is limited to minimal contacts with the building, with which it establishes a dialogue with harmonic and moderates tones [14]. In contrast, the dialectical contrast created in the Museum of Castello Sforzesco uses steel to define the art-works supports in a vehemently expressive way, evident in the unusual profiles and support plates of the stone works: metallic elements are designed with the awareness to draw expressive effect by combinations of contrasting shapes, rather than by an inert stylistic affinity [15].

The use of steel for change the content of the historic buildings allows to recognize its expressive potential as bearers of innovative instances without compromising the reading of the old values. From the contents to the container, the steel transfers its transformative potential directly on the architectural complex of the ancient building, taking on a distinct role according to the different levels of evidence with which the project proposes the inclusion of the new items.



Fig. 5: Museum of Palazzo Bianco,Genoa (Project:Franco Albini, 1949-1951) and Museum of Castello Sforzesco, Milan (Project: B.B.P.R.,1954)

3.1 Exposure through punctual elements

A full and punctual visibility characterizes the inclusion of vertical connections: the constructive element, since it’s circumscribed in a defined spatial area, acquires in its space the maximum degree of expressive freedom, adopting linguistic codes skilled to affirm the identity of contemporary work. This design strategy, diffused in the Italian tradition, is used in the refurbishment project of the Museum of Palazzo Rosso in Genoa: the formal solution of the steel stair with an octagonal geometry, contained in a detached position respect to the crossed floor, coincides with the technological choice

to suspend it to metal rods positioned both inside and outside, next to the corners that define the octagon. The strategy of highlighting the added elements, with their formal and technological choices, is a way to leave the mark of contemporary interpretation of the ancient material: the perception of a vibrant and dynamic space, that lives in the Baroque palace, is reflected in the screwing movement of the stair, designed in order to recover the fluidity of space, inherent in the original architectural system [16].

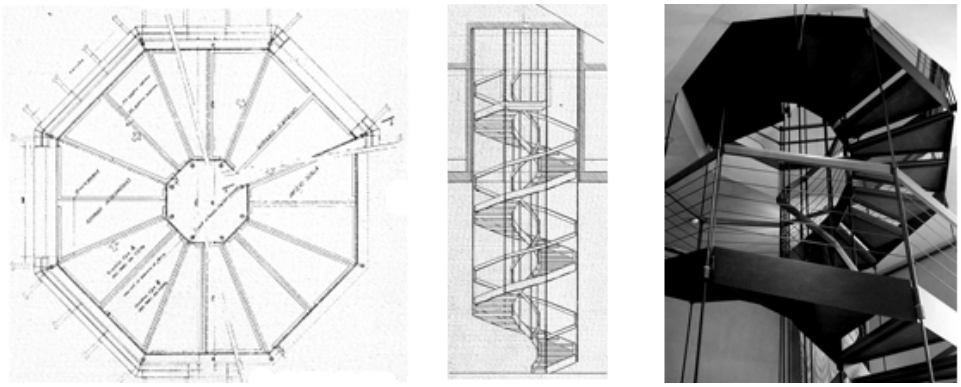

Fig. 6: Museum of Palazzo Rosso, Genoa (Project: Franco Albini, 1952-1962)

3.2 Exposure through isolated elements

Otherwise, items proposed in an isolated position request a formal design which is more careful to the relations with the ancient walls, involving singular constructive components rather than whole elements: the metallic items probably have a less effective visibility than the last category, but definitely more widespread, quietly weaving a dense web of relations with the old building. The dialogue between past and present is established on isolated episodes that employ steel for structural components or not, quite diverse. In Castelvecchio Museum in Verona, in fact, steel is used for the long iron beam inserted with the intent to overcome the stiffness of the original spatial system and reconnect the rooms from the cubic volume in a single body; the metallic material becomes, along with original wooden beams, the protagonist of the construction of the roof, carved out according to orthogonal lines who follow an irregular profile; the steel finally participates in the configuration of the walkway below. The expressive power of the added elements is reduced to an handcrafted design, that pays attention not only to the relations between parts of the same nature, but especially those that have to be instituted with the old: in this context, the long iron beam rejects the use of standardized solutions preferring C-profiles with steel plates bolted to an angular profile, to the upper and lower ends; the detail of the intersection of the beam with the existing partition walls is resolved with the reduction of the resistant section of the beam and the subtraction of the material of the walls in the contact point. Similarly, a detailed design characterizes the complex system of coverage, in which the steel defines the support beams of the ridge, and the walkway below, in which metal double T profiles hold up the prefabricated concrete slabs [17].

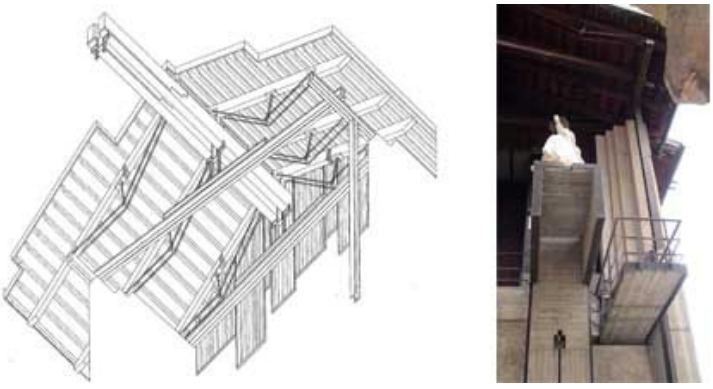

Fig. 7: Castelvecchio Museum, Verona (Project: Carlo Scarpa, 1956-1964)

3.3 Exposure through diffused elements

The role of steel acquires other meanings if it's used for items of the same nature placed in the historical architecture with a fixed rhythm. From isolated to diffused elements, the metal components affirm unequivocally their identity establishing a double system of relations: the first is settled between items of the same nature, and the other with the existing elements. The continuous presence of metal allows to create a dialectical relationship with the old structure, characterized by balanced tones, using steel as a real means of contemporary historical layering.

In the coverage of the Manica Lunga of Castello di Rivoli in Turin, the steel takes on this meaning: in fact, it is employed to define the metal arches of the roof, arranged in spans of 2m to a total length of 140m. The shape of the metallic trusses is mixtilinear, as result of formal and technological requirements. The trusses are composed of a first straight portion near of the outer walls, and of a second curved portion on the centerline. The project defines an internal relationship in the beam through the design of L joints between the different sections and the strengthening shear consisting of a pair of metallic plates. The relationship with the existing masonry is instead established at the concrete curb, designed to a back position from the line of the internal perimeter; over the curb, the metal trusses rest through a sliding constraint. [18]

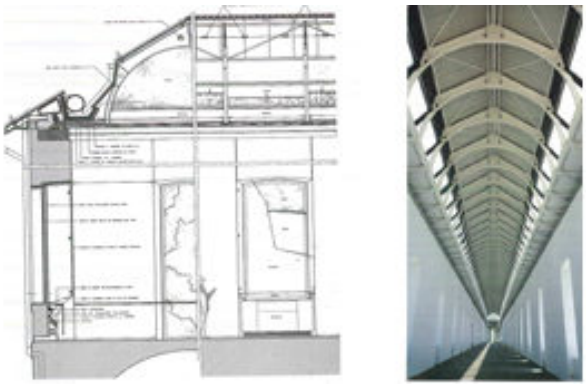

Fig. 8: Manica Lunga di Rivoli, Turin (Project: Andrea Bruno, 1974-1999)

3.4 Exposure through assembled elements

In conclusion, the steel exposure through elements assembled in a whole volume defines the last level of visibility. The transformation project acquires absolutely recognizable characters through a declared addition, setting up a complex system of relationships: these, in addition to set the connections between the new elements and the ancient material, are related with the urban context in which the volume is inserted. In contrast with the minimal intervention, the contemporary project is decidedly dominant, making steel the hierarchic element that governs the architectural addition. The building that emerges is at the same time old and new, because it respects the historical nature of the existing and also it doesn't reject the modern character of the restoration project.

The metal structure of the Museum in Convento di Sant'Agostino in Genoa proposes once again the volume destroyed by the war, with a figurative language that uses opaque elements for the outer casing, and transparent walls facing the internal court.

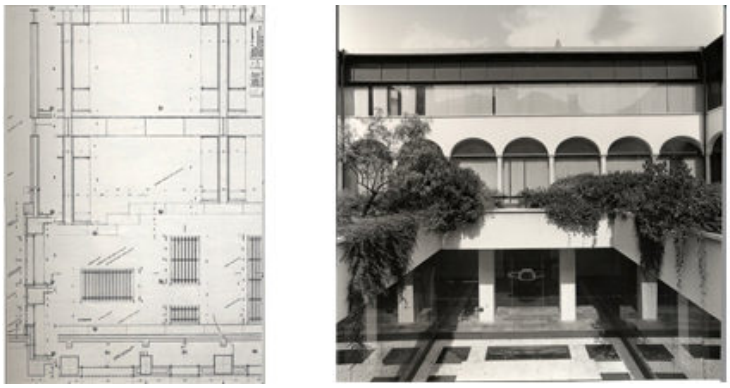

Fig. 9: Museum in Convento di Sant'Agostino, Genoa (Project: Franca Helg, Franco Albini, 1978-1985)

The attention to preserve the old sign is reflected on the reconstruction of the colonnade with the technique of anastilosi and in closing the porch by a vertical glazing set back from the edge of the columns. The steel also defines the external stair that connects the entrance floor to the upper, as well as the interior connective and the roof structure.
The steel disclosure, both in a general vision that in the detailed one, is suited to the need to recover the historical memory through contemporaries technological systems. "It's our opinion," write the designers, "that every time needs to express its language in the most characterized terms of expression and technology which best adapt themselves to the contemporary requirements, and, at the same time, are respectful and reinterpret, when and where they can, the meanings, the shapes, and proportions of pre-existing context." [19]

4. Conclusions

The role of steel in historical structure has gone through various design strategies, that are related to the size of visibility, understood as participation in the configuration and conformation of the old building The interpretation of the rules and meta-rules, that substantiate the built, legitimizes the technical act, whether the project operates in the concealed sphere or in the exposed one: in the first field, however, the design choices are limited to the technical aspect, while in the second one, technological options are so closely related to the formal ones to entrust the solution of a lot of conservation features to this material, from the spatial and functional assets to the technical and constructive ones.
The constant research for a formal compatibility with the old, unusual for a material normally hidden, is the uniqueness of the Italian approach, that is balanced between the purpose of conservation, coming from the historical requests, and the aim of revitalization of the contemporary age: the renounce, for the project on the pre-existence, to industrial production techniques, in favor of an handcrafted design, aims to create a singular and unrepeatable building like the original historical one.

Bibliographical References

[1] DE MATTEIS, Federico, *Architettura in trasformazione. Problemi critici del progetto dell'esistente,* Milan: Franco Angeli, 2009 ISBN 9788856804225
[2] CATERINA, Gabriella, *Tecnologia del recupero edilizio*, Turin: UTET, 1989. ISBN 8802042586
[3] CARBONARA Giovanni, La reintegrazione dell'immagine, in PEREGO Francesco, (a cura di), *Anastilosi. L'antico, il restauro, la città,* Bari: Laterza, 1987 ISBN 8842028525
[4] Section 7, para.4, Italian Charter of restoration, 1972
[5] Section 7, para. d, Charter of preservation and restoration of cultural objects and works of art, 1987
[6] LA REGINA, Francesco, *Sicurezza e conservazione del patrimonio architettonico*, Naples: Liguori, 1995 ISBN 978-88-207-2510-5
[7] URBANI, Giovanni, Il consolidamento come operazione «visibile», in PEREGO Francesco, (a cura di), *Anastilosi. L'antico, il restauro, la città,* Bari: Laterza, 1987 ISBN 8842028525,
[8] GRASSI, Liliana, Problemi metodologici in relazione alle teorie del restauro, in ROCCHI Paolo (a cura di), *Atti del II Corso di formazione ASS.I.R.C.CO, Il restauro delle costruzioni in muratura,Venice 21- 23 maggio 1980,* Rome: Kappa, 1981, pp.9-11, National Bibliography 81-9424
[9] MOSCO, Vittorio, L'impiego delle strutture in acciaio nel risanamento e ristrutturazione nel centro storico di Ancona, in *Acciaio* n. 9, 1980 pp. 381-389
[10] DI STEFANO, Roberto, *Il consolidamento strutturale nel restauro architettonico*, Naples: Edizioni scientifiche italiane, 1990 ISBN 88-7104-209-3
[11] JURINA, Lorenzo, *La possibilità dell'approccio reversibile negli interventi di consolidamento strutturale (ovvero un inno al tirante e al puntone),* AA.VV., *Atti del IX Convegno Scienza e Beni Culturali La reversibilità nel restauro, Riflessioni, esperienze, percorsi di ricerca,* Bressanone, 1-4 luglio 2003, Venice: Arcadia Ricerche, 2003
[12] JURINA, Lorenzo, *Il consolidamento delle strutture castellane,* 2004 in www.jurina.it
[13] FERRARI Alberto, Conservazione e modifica nel recupero di Villa Casati a Muggiò, in *Acciaio* n. 7-8, 1984
[14] BUCCI, Franco Albini e l'architettura delle esposizioni, in *Casabella* n.730, 2005 pp. 14-15
[15] LABÒ Mario, PANE Roberto, Dibattito su Museo di Castello Sforzesco a Milano, in *L'architettura cronache e storia n.33*, 1959 pp. 152-163
[16] PIVA Antonio, PRINA Vittorio, *Franco Albini 1905-1977*, Milan: Electa, 1998 ISBN 8843556827
[17] MURPHY Richard, *Carlo Scarpa and the Castelvecchio* (Translated by DI LIETO Alba and RUDI Arrigo), London: Butterworth Architecture, 1990 ISBN 8877430680

[18] VAGACELO Luca, Il restauro della Manica lunga del castello di Rivoli - Torino, in *Industria delle costruzioni* n.337/8, 1999, pp.14-21
[19] HELG Franca, Il Museo di Sant'Agostino nel centro storico di Genova, in *Casabella* n. 443,1979, pp.28-34
[20] AA.VV., *Rassegna di interventi di ristrutturazione in acciaio*, Milan: Siderservizi s.r.l., 1989

XII International Forum Le Vie dei Mercanti
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ALMOHAD STAMPED JARS OF SEVILLE

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Abstract
The study of the Almohad Stamped Jars (XII-XIII century), typical pottery production of Seville , aims to highlight the uniqueness of this peculiar class of pottery untill today not much studied. The production is restricted chronologically at Almohad Empire (1147 - 1269) and its geographical distribution is attested mainly in the territory of al- Andalus with a clear predominance of material found in the Seville area , while poor or almost non-existent presence of it in the Maghreb . The research aims to give an historiographical interpretation of this ceramic class always associated at household context and possibly used for ablutions with a great sacred importance to the presence of Koranic inscriptions , and emphasize those characteristics so far not valorate , such as the strong decorative style , the big size and unusual morphology that make this production unique in the Islam world. The study of the Stamped Jars and their geographical distribution wants to identify the role played by Seville as the spiritual and political capital of Al Andalus , as emanating of cultural and artistic influences in the Maghreb and, finally, its commercial role in the Mediterranean world.

Keywords: Seville, archeology, Mediterranean heritage, islamic pottery

1. Introduction. The stamped jars, an atypical Almohad production

The research presented here is the result of several years of work focused on the study of stamped Jars from the city of Seville (Spain) , a typical Andalusian Muslim medieval pottery production . The research was carried out by me under direction of Fernando Amores Carredano, Professor of Medieval Archaeology and Heritage of the University of Seville and professional archaeologist who was the director of the most important archaeological inquiries of the city of Seville.
Denominated as " Tinajas estampilladas " (Spanish for tinaja means a large container for the storage of water or foodstuffs with no artistic or artisanal value) - in which case we will call these jars (translation of the Spanish name Jarrón , in Castilian the distinction between Tinaja and Jarrón has a stronger value , the last one designates an object that has the function of interior decoration) - are the most striking features of the Almohad material culture throughout Al- Andalus . The Koranic austerity associated with manifestations of Almohads culture (Arabic: al- Muwahhidun which means the " Unitarians ", attestators the oneness of God) agrees perfectly with the monotony and poverty decorative of the whole ceramic production of this period . The typical production is, in fact, made up of ceramic products for the transportation, refectory or kitchen, that are often presented, with simple and functional shapes, and above all without complex decorations, decoration more attested consists of three vertical lines on the body of the object and the covering of glaze is used only with functional purpose . In this situation of simplicity, the stamped jars call attention because of their monumental work. The extravagant and unique manufacturing of these jars is characterized by: big size, elegant and rare morphology with the presence of handles in the shape of wings, extreme complex decorativism (which could be defined as an almost feeling of horror vacui) based on horizontal bands of varied leaf designs , animal motifs , geometric , architectural, calligraphic and apotropaic (fig.1) .



Fig.1 Almohad pottery and stamped jar (Photo by Daniela Lallone, Museo Arqueologico de Sevilla).

In addition to the physical characteristics of these objects, it is also very important to delineate the restricted geographical distribution and chronology of them. The presence of these jars is very rich in Almohad archaeological contexts with examples of discoveries over the area of Al-Andalus as Cadiz [1], Almeria[2], Algeciras [3], located with a time span between the second half of the twelfth century and the first half of the the thirteenth century.

Regarding the geographical distribution of the presence of jars is most significant in the field of Seville and its areas of influence in Western Andalusia and portuguese regions of Algarve and Alentejo (abundant findings have been done, for example, in the Almohad archaeological context of Mertola[4]). There are also findings in Eastern of Andalusia but are scarce and they have low production quality regarding both art and craft. Everything seems to set up a situation in which the city of Seville, the capital of the empire before the Almoravid and then the Almohad in Al- Andalus, played a decisive role in the creation, use, distribution and influence of these jars. After the conquest of Andalusia by the Western Christian troops, it seems that the production of the jars continued in the Muslim world , especially in the area of Merini influence (Algeciras, Cadiz) and in Nasrid Granada , where the evolution of them comes to the exceptional jars in blue and gold among the famous " jarron de las gazelas " , dated to the fourteenth or fifteenth century and preserved into the Alhambra Palace, Granada.

Done this brief presentation about morphological characters, chronology and geographical distribution of the material under study, it would be good to mention its functionality and be able to give an historiographic interpretation. The stamped jars appear increasingly associated with the domestic environment. In excavations of noble Almohads houses, and also in buildings such as the Reales Alcazares of Seville, were found small gaps, called “Tinajeros”, made corresponding with what it was on the courtyard of the house, probably used to the placement of the jars . This is a very important information to consider since the courtyard, central space of the house adorned with vegetation, surrounded by beautiful architecture and typically had water fountains, is considered in Islamic culture as a representation of the antechamber of Paradise [5]. For this, it is reasonable to think that the jar

had relation with the water and that would serve to contain the water, that once purified, could be used for the ritual ablutions prior to prayers. To go into detail about this interpretation there is the presence of stamp in Kufic of Koranic verses, selected for their prophylactic with the purpose of protecting and purifying the liquid from any contamination.

2. The stamped jars and its historiografical question

Up to now, the studies carried out on this material, are focused on a mere presentation and description of it, as complete jars as simple fragments. There have been very poor explanations or interpretations offered about these productions so characteristic and exceptional Al-Andalus art. Analysing previous studies we realise that so many details that make this unique production have not been examined in depth or even have been almost ignored, leaving many unanswered questions and more important even today the stamped jars are still defined as simple containers for transport and storage. The first feature, not enough evaluated, is the morphological appearance of the jars: they are very big artifacts (an average of 80 cm in height and 60 cm in maximum width) , of globular form , with narrow foot and large cone neck with shaped handles of wings (fig.2). Evidently this strange form made them impractical as transport containers, just think of the wing shaped handles that make it difficult or impossible for a good grip, especially when you consider that the jars once filled had to be really heavy.

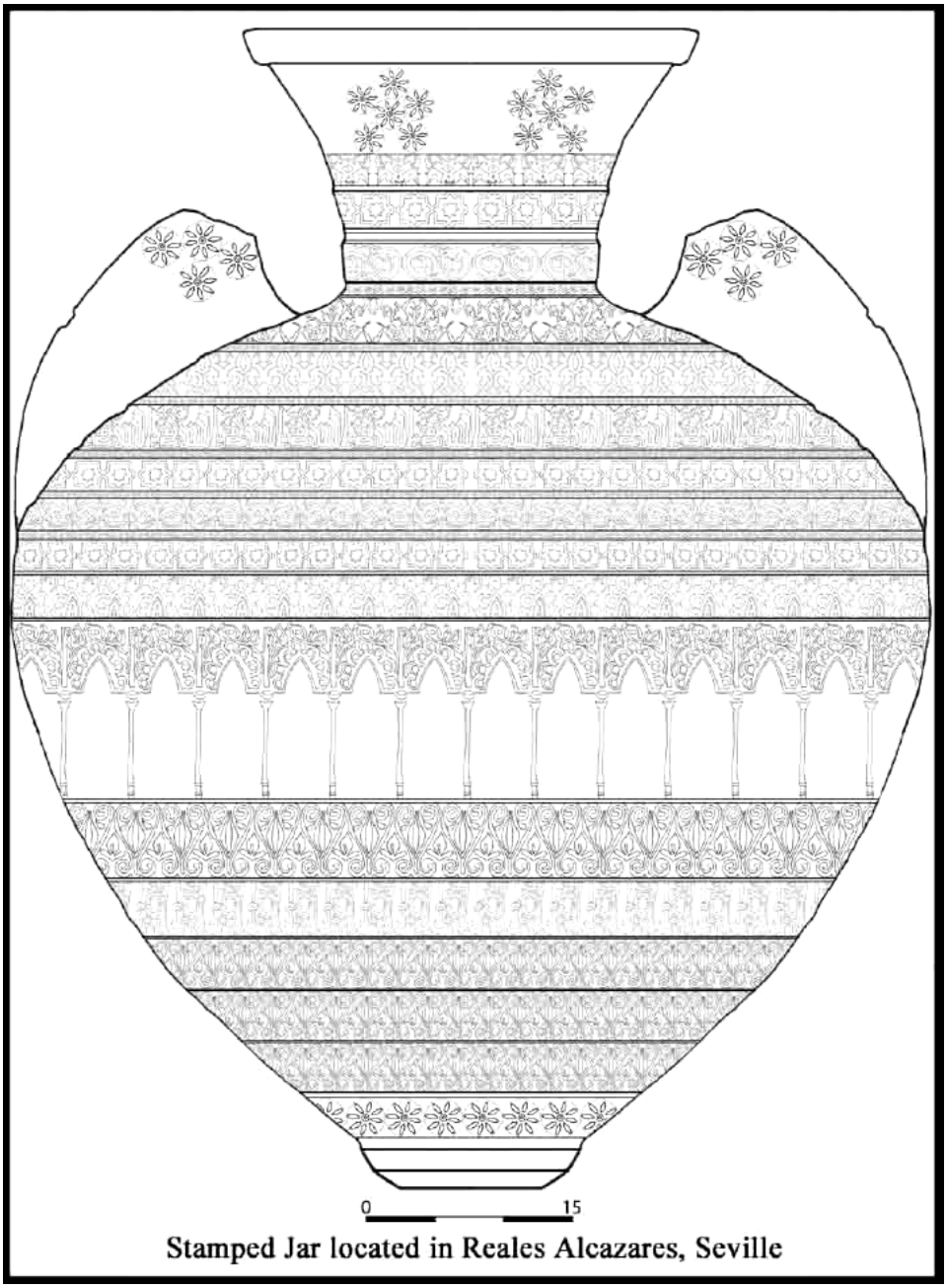

Fig.2. Drawing of a stamped jar.

The second feature undervalued, but that it is also the one that stands out most to the eye, is the extreme decorativism of jars. All the jars are covered on the outside with a decorative pattern on uncooked clay with a mould as a stamp, made in Terracotta (fig.3).



Fig. 3. Example of a stamp preserved at Museo Arqueologico de Jerez de la Frontera (Cádiz, Spain).

Decorations can be present as all over the body, as only on the top to the belly (including neck), but never the opposite. The matrix stamp is repeatedly impressed on the clay, horizontal bands of well-ordered and never in a chaotic order and it seems to respond to a pattern: the top bands (fig.8) are narrower and inscriptions in Kufic are the most common decorative themes as al- mulk (power) , al-yumn (happiness) baraka (blessing), (fig.5),motifs of plants such as roses or flowers, animal motifs such as lions , geometric motifs such as the eight-pointed star (fig.4), and apotropaic motifs as the "hand of Fatima" (fig.6). Often these horizontal bands are interspersed with bead decorations. In the central part the motif recurring is architectural arches with poly-lobed arches and horseshoe arches (fig.9). Finally, in the lower part, the motif that is the more certificate is simple or double palm and the horizontal bands are higher than those of the upper part (fig.10).
Even the wing handles are often decorated and the motifs most commonly used are the roses, the architectural motifs and the "hand of Fatima"(fig.7).

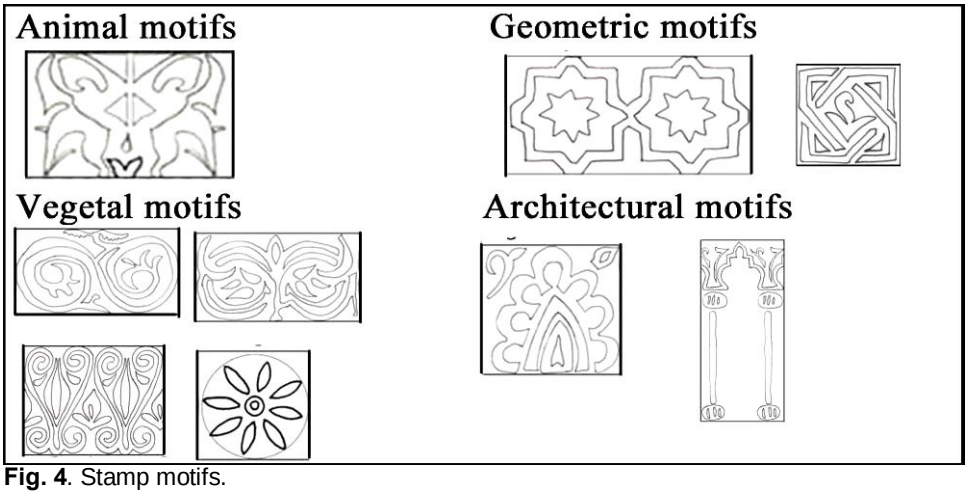

Fig. 4. Stamp motifs.

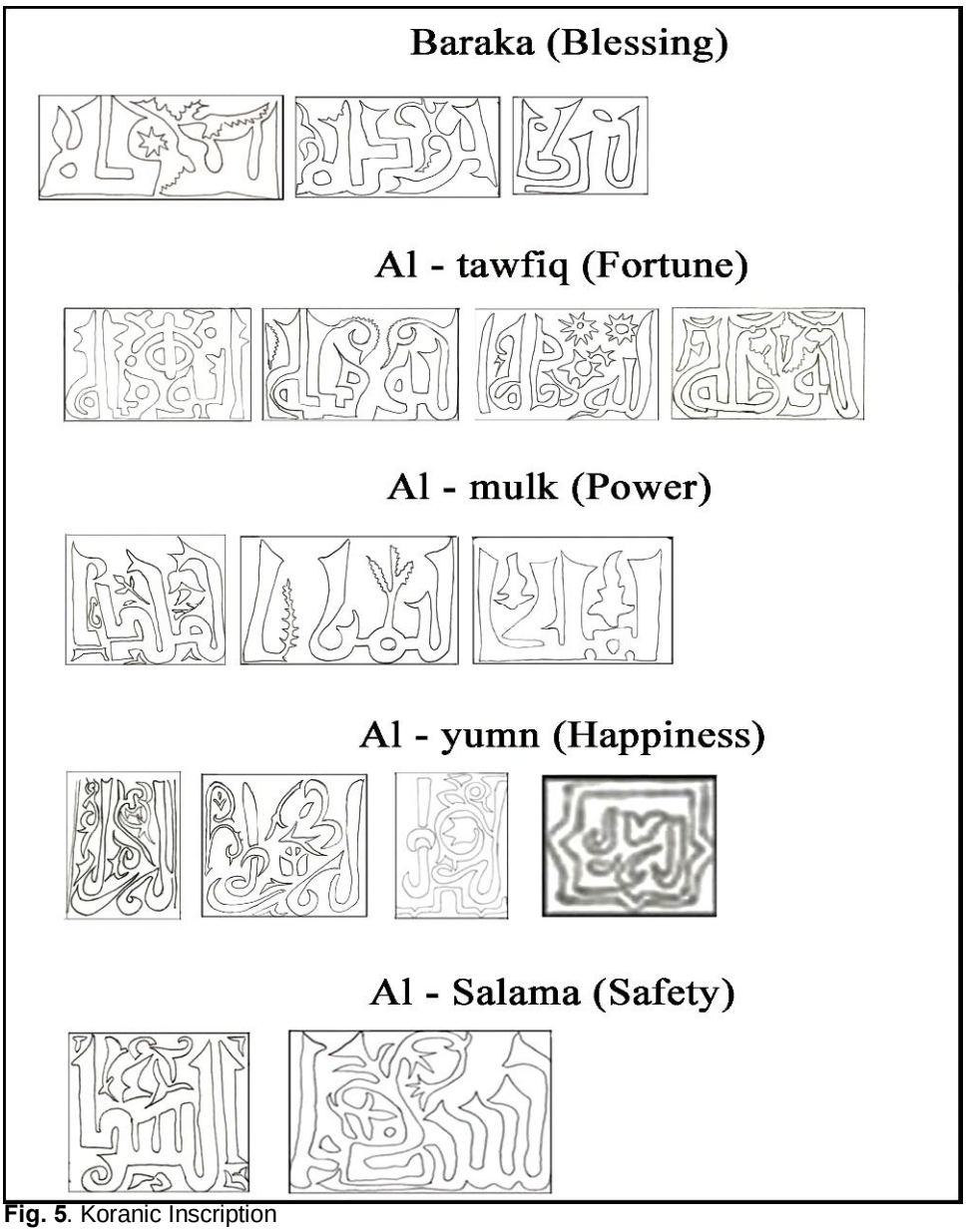

Fig. 5. Koranic Inscription

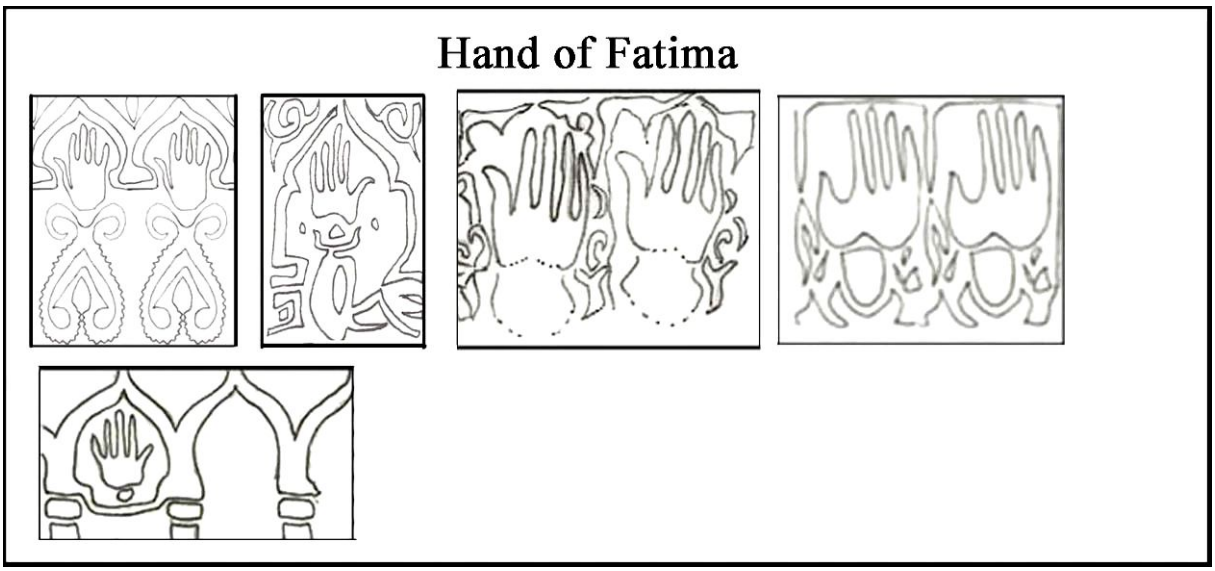

Fig. 6. Hand of Fatima

It seems clear that this complexity and careful workmanship of decoration, especially when you consider the time and cost that these artifacts assumed, is not compatible with the use in the pantry (an enclosed space in which the jars could not be seen), it is much more reasonable to think that they were objects considered precious and meant to be in a place visible to all or as ornate Andalusian patios .

Another physical characteristic not evaluated to date is represented by the covering used in the jars . It consists of , when it presents, a showcase of thick bright green color that covers the outer container or on the whole body or only on the top half up to the belly , and is always absent internally. Frequently glaze was passed above a layer of slip with the aim of making the green even more turned on. The functional technological explanation that has been given by scholars so far is that the external glaze had the task of maintaining fresh water inside the jar , logical and coherent explanation . The special feature to note is that , although in the Almohad ceramics were used in equal measure the glaze color of green and yellow honey (melado) in the covering of the jars the last one is never used .

If we focus on an analysis of the geographical distribution of the discovery of the jars stamped , the aspect undervalued is that this production is a unique expression that grows only in Al- Andalus and that is totally unknown in the medieval Arab world , except in the areas of influence in the Maghreb Moroccan and Andalusian . The city of Isbiliyya converted into capital of Al- Andalus at the time of the empires Almoravid Berbers (XI - XII century) and Almohad (XII-XIII century). His status as a port of the Guadalquivir River allowed her to connect with the Atlantic and the Maghreb which was crucial in order to achieve this new rank

and the role of Al-Andalus was instrumental in the development of Islamic art since the time of the Umayyad caliphate of Cordoba. All the experts agree on the fact that Al- Andalus was the point of creation of language and art and craft solutions that expand to the Maghreb and not the opposite , and Seville, the capital of the region, certainly is the central nerve and cultural spread. So it seems that Sevilla is precisely where the stamped jars production seems to have beginning. In fact, there is a greater shortage of this material as you move away from the capital and the shortage affects not only the quantity but also the quality of the production. Outside the Sevillian you notice a simplification of decorative patterns and impoverishment of decorative themes. The same stamps are less developed and in some cases take on a more naive .

Both productions from Cadiz and Portuguese have this formal simplification of which it is spoken.

Regarding the Maghreb area the presence of these jars is not attested but it must be said that, unfortunately, this may also be due to a lack of deep archaeological investigations on the area, the only area in which they were found at the is archaeological site Ksar Sghir (Tangier , Morocco) , positioned in correspondence to the Strait of Gibraltar, but turn out to be the import of Al-Andalus (Andalusia area and southern Portugal) .

After the overview on existing studies , the approach to research in the jars, we felt the need and opportunity to investigate the studies with the aim of abandoning the vision of these jars as simple artistic containers worthless and evaluate them as a manifestation of great craftsmanship , wealth and with aesthetic value and also symbolic.

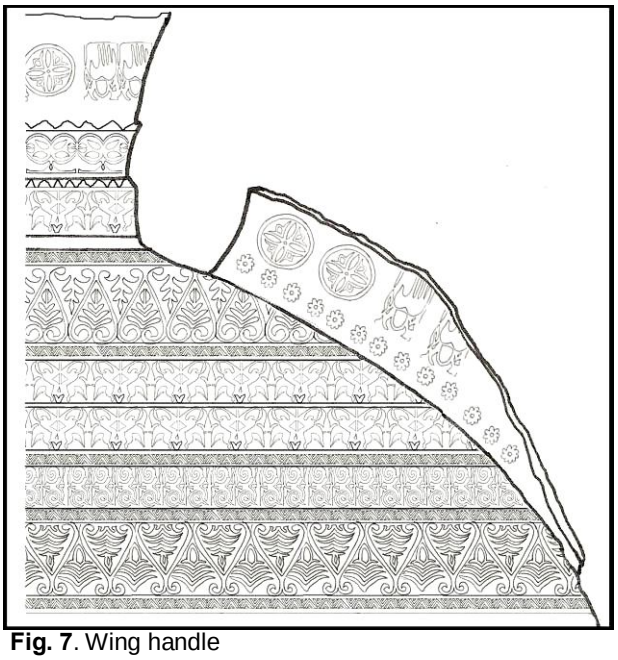

Fig. 7. Wing handle

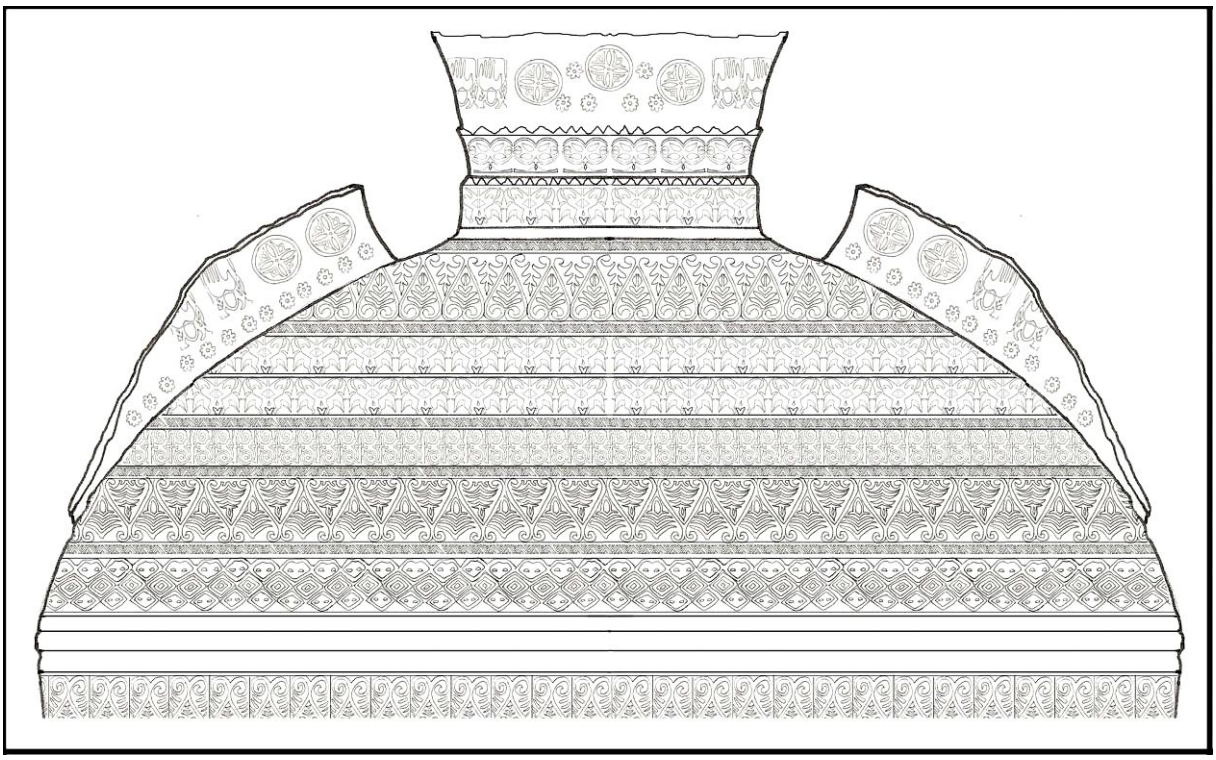

Fig. 8. Top part of the jar

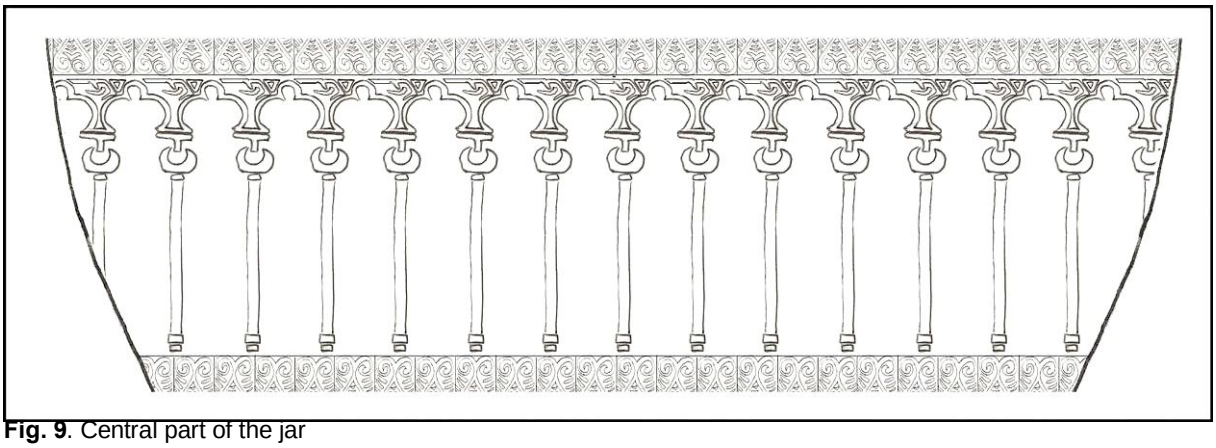

Fig. 9. Central part of the jar

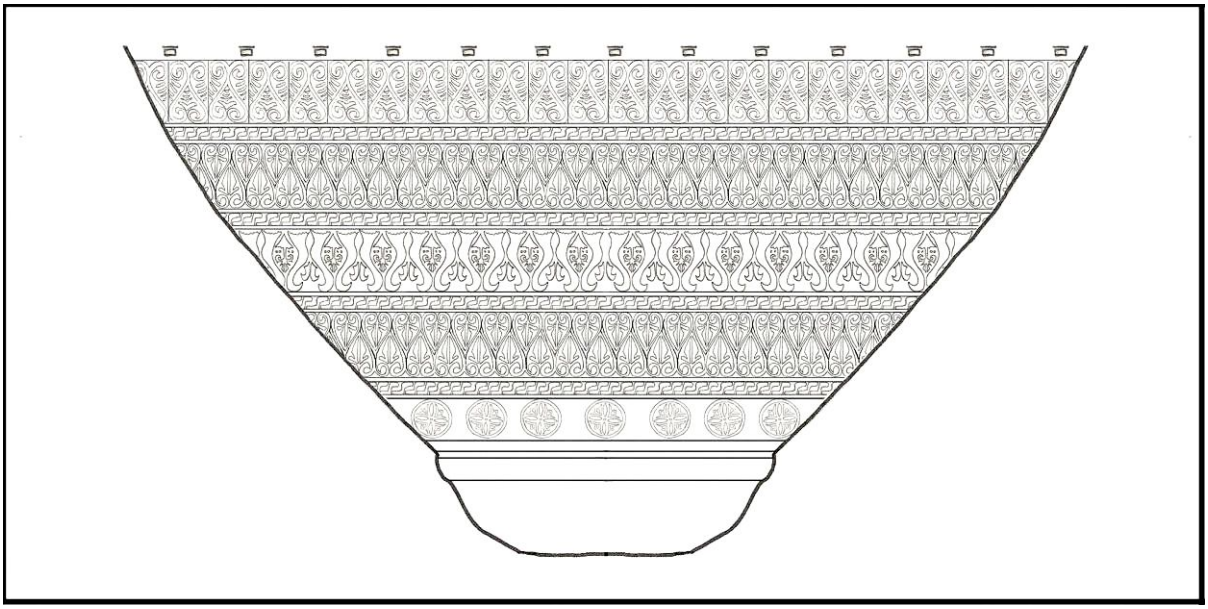

Fig. 10. Lower part of the jar

3. Study Methodology and a symbolic interpretation

The research is founded with the goal of making careful and detailed analysis of the characteristics of the jars , exactly the type and location of stamps within the decorative scheme and and use of the showcase green .

As mentioned above it seems that the decoration respond to a precise pattern , breaking away from the vision of the individual stamp in favor of a vision of the decorative as a whole , we note , first of all , like all the jars found to differ from each other . In all jars designed and cataloged so far did not find an equal to the other , this feature gives the jars a sense of exclusivity , the feeling is that every gentleman , every owner, wanted an exclusive and unique. But diversity is recognized in the language of execution, a repetition of patterns they have in common . As mentioned before you notice that the top is dedicated to accommodate those motifs with apotropaic and prophylactic significance as the "hand of Fatima" , the eight-pointed star and the inscriptions in Kufic , also motifs of plants the are different from those of the bottom half being mostly representations of flowers and fruit (typical is the representation of the pineapple) and treated in a more orderly manner . The central part is always intend for architectural motifs , that is, a serie of arches that can be poly-lobed or horseshoe shaped and be alone or supported by columns. The lower part, when decorated , is generally characterized by the presence of motif of plants and specifically simple or double palm trees . Even if , however, it always has an ordered execution , it seems that on the whole they wish to give a feeling of abundance .

The choice of this order does not seem random and does not even seem meaningless , already the very presence of apotropaic motifs and Koranic inscriptions in Kufic , means that behind these formal choices there are possible symbolic meanings .

Among the various lines of interpretation undertaken by Professor Fernando Amores and myself , which are still being analyzed , the most obvious is that they want to represent a kind of decorative garden , specifically the typical Islamic garden . Motifs such as roses, palm and fruit trees show, in fact, elements present in the typical Islamic garden and so the decoration in cord form that can be compared to water courses , a key element in this type of garden, and , no less important is the presence of architectural elements , arches and pavilions are always present in the gardens of Islamic architecture . In this perspective, also the green color in the covering of the jars relate to that interpretation . But going beyond the representation of the garden, the jar can be seen as a symbol of good luck, a gift that was made to the lord of the house to wish him wealth and abundance . The same Koranic inscriptions in Kufic significant blessing , happiness , power, luck (understood as divine assistance), safety play a protective role and a wish for prosperity for the home that host the jar , even the "hand of Fatima" , present in many of the jars studied, has a meaning of protection of the dwelling. These elements, placed in relation to the representations of vegetation , a sign of a healthy and rich environment, and the color green has always been associated with abundance , had to become the object jar in a good omen symbol designed to accommodate the water , fundamental and indispensable element for life.

The jar is stamped accordingly with not a frivolous production in the context of austerity Almohad Empire , but a production full of sacredness and symbolism which agrees well with the morality promulgated by the Empire.

The need for this research thus becomes the study of the geographical distribution of this production in order to better understand the role of Seville as the political capital but also of spiritual influence in Al- Andalus and especially in Africa , where, apart from a few points of the Strait, little is the archaeological investigation .

The work done to date on these jars has been collecting and re-reading of the existing literature on this material in order to make a point of the situation and try to fill the gaps left by the old interpretive studies . It was thus decided that a comprehensive study aimed at understanding the jars in their entirety was essential to collect, categorize and draw those artifacts complete or almost complete , putting aside , for now, the multitude of fragments present in the warehouses of the various museums . This methodological choice is due to the fact that the individual fragments do not allow to identify the decorative scheme of the jar in its entirety and for a research that will lead to a correct interpretation of the material is essential to move away from a single stamp to focus the entire decorative plant . So far they have been designed , photographed and cataloged 28 jars preserved in the Archaeological Museum of Seville, Museo Casa de Lebrija (Seville), Reales Alcazares (Seville) and the Museum of Cadiz , creating , for each of them , a purely morphological design, a list of present decorations , the design of the decorative scheme and a design that comprehend all of them including covering (fig.11).

4. Conclusion and expectation

Taking this article as a first report on the stamped jars, it is hoped to continue the work and confirm or refute the hypothesis of interpretation set out above . Interesting and essential for the continuation of the research is to go on with the cataloging and the design of the jars found both in Seville and in the area which was Al- Andalus . The purpose is to ascertain the role played by Seville in the creation of

this production and see how far it pushed his influence both in art and in culture , not forgetting the political and commercial role that the city played also due to its position as a river port. About his commercial role is right to mention the discovery of a wreck on the northern coast of Sardinia . It is a relic of a commercial boat containing Islamic heterogeneous material from the Malgreb . The study of the material, made by the underwater archaeologist Domingo Dettori , presented at the XLV International Symposium of Ceramics in Albisola (SV) ,has identified in the load , the presence of about ten jars along with stamped amphoras for transporting oil from Seville. The origin was confirmed by chemical analysis of organic material that is kept inside the amphoras and esparto grass that enveloped them [6]. In addition, to confirm the commercial relation that Al- Andalus had with the Italian west coast is the presence of findings of stamped jars also in Pisa [7] and in Liguria [8], in the near future we hope to study this material in order to determine if it is Sevillian origin and understand better the influence and weight that this city had in the past on the Mediterranean World.

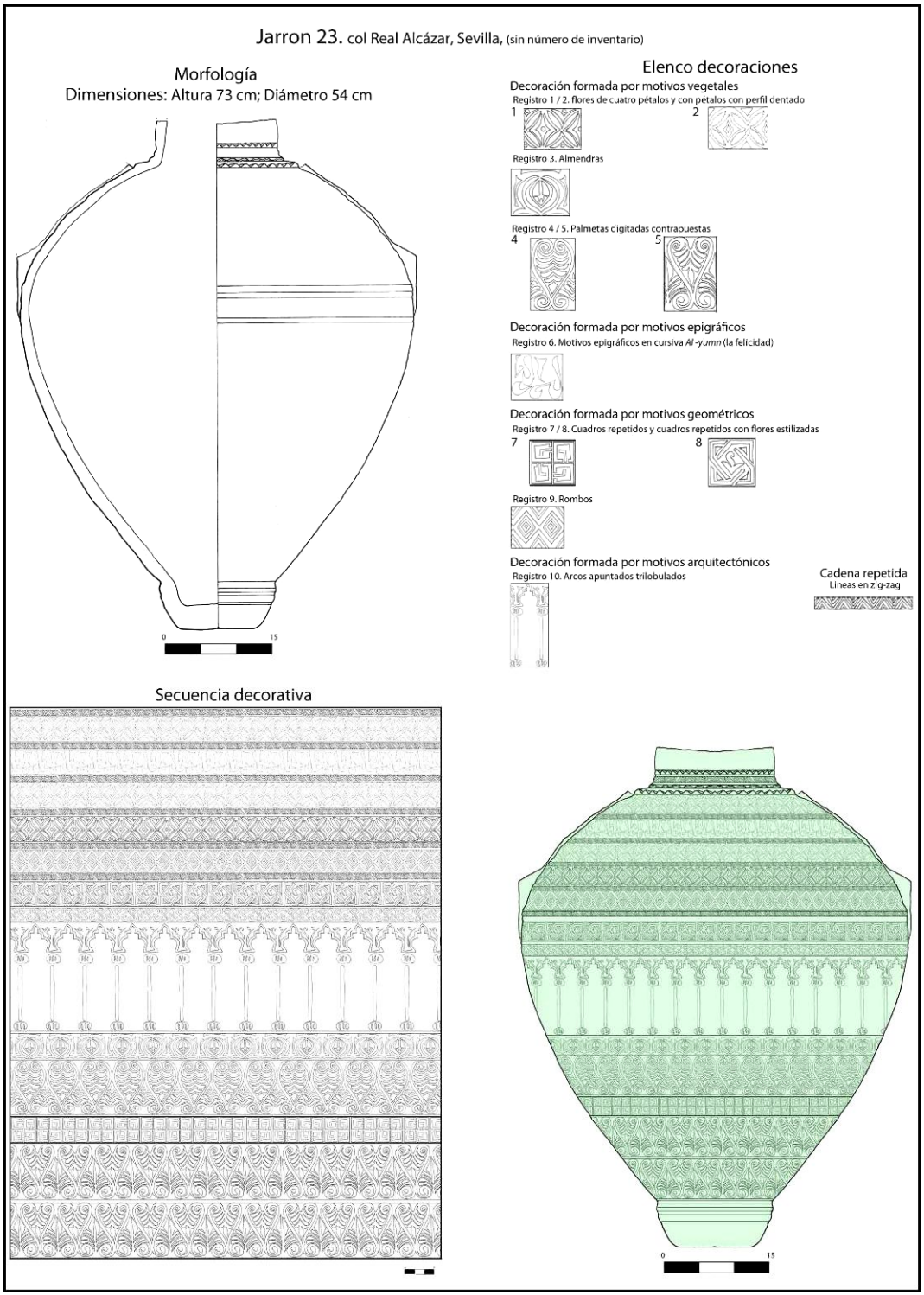

Fig. 11. Example of work.

Bibliographical References

[1] CAVILLA SANCHEZ MOLERO, Francisco. *La cerámica almohade de la isla de Cádiz (Yazirat Qadis).* Cádiz, 2005.

[2] TORREMOCHA, Antonio. OLIVA, Yolanda. *La cerámica musulmana de Algeciras, las produciones estampilladas. Estudio y catálogo.* Algeciras, 2002.

[3] ESCOBOSA, Isabel Flores. La produción de loza dorada en Almeria. In *Atti XXXI convegno internazionale della ceramica, Albisola 1998*. All'insegna del Giglio, 1999, pp. 187-194.

[4] KHAWLI, Abdallah. Lote de cerâmica epigrafada em estampilhagem de Mertola in ARQUEOLOGIA MEDIEVAL 1. Porto, 1992, pp. 7-25.

[5] FRONDONI, Alessandra et alii. Gli scavi di Piazza Santa Caterina in Binalborgo (Savona): primi dati sui reperti ceramici in Papers or presentations in Atti XXXIII convegno internazionale della ceramica, Albisola 2000. All'insegna del Giglio, 2001, pp. 177-188.

[6] DETTORI, Domingo. Relitti medievali e postmedievali dalle acque di Alghero. Il carico e i materiali in *Atti XLV convegno internazionale della ceramica, Albisola 2013*. In corso di stampa.

[7] BERTI, Graziella. TONGIORGI, Liana. Frammenti di giare con decorazioni impresse a stampo trovati in Pisa in *Faenza LVIII*, Museo internazionale delle ceramiche in Faenza, 1972, pp. 3-14.

[8] MANNONI, Tiziano. *La ceramica medievale a Genova e nella Liguria*, "Studi Genuensi", Gandia-Bordighera, 1975.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

ART PRODUCTION AS SOCIAL, BUILT AND CULTURAL HERITAGE

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Abstract
Art works and therefore art exhibitions can be promoters of debate, investigation and discussion on cultural and built heritage. Having a potential documental role, represent an investigation and assist on the development of awareness towards the construction of a collective memory. As they convoke the city, it's evolution in time, it's landscape from the 18th century's rural character, developing into an industrial society to today, mainly services, that forget its past and abandon its built environment, almost as if erasing it's hard-working and poor condition history, however, producing a disguised new low condition urbanity.
One single image has the power to take us on a journey through all the evolution stages, to introduce the past in today's present at the same time and moment, and to advert to a social reality that questions the political and urban decisions towards a specific environmental and cultural landscape, as well as its preservation. On the other hand, a sculpture that evokes an industrial past, a video of its voids and silences even when facing highways and train stations, are the starting point of a journey through, not just time but space, of tours and visits of an unknown territory though daily seen and crossed.
Photography and video are not merely technical representations of reality but explore and produce investigation today, on today's actions and reality; as to preserve and protect it is crucial to be aware of both the present and the past, in order to consciously act in the future.

Keywords: Artwork, Exhibition, memory, identity, preservation

1. Introduction
Campanhã is a neighborhood of the city of Porto, today the poorest, but in the past one of the most promising. Due to its morphology and connection to the river, it was always an agricultural area, providing for the city. Later, in the 18th century, came the farms and the *Solares* (summer palaces) of the rich bourgeois and noble families, and still today, their presence is evident on the landscape - having some been transformed into industrial places but today rehabilitated, for example *Palácio do Freixo*, with the City Hall's approval and assistance, into the biggest historic Hotel.
By the 19th century, after the destruction of a civil war and the Napoleonic invasions, the area went through a period of growth and prosperity, mainly due the expansion of the railway system with the introduction, in 1875, of the *Campanhã* train station - on the lands of the former *Quinta do Pinheiro* (Pine Tree Farm) - unquestionably one of the major factors of urban transformation in the city. It was the northern point of the train line connecting Porto (the second city in Portugal) to the rest of country, and to its capital, Lisbon. With the train station came a new phase of the industrialization of the region, new investments, and all over the region new factories and workshops appeared, dedicated to woodwork, lime production, wax matches, soap etc.
With the train station, the increase and ease of transportation, came a new phase of the industrialization representing a rapid increase of population, of jobs and therefore workers coming from the interior of the country in seek of a better life. They have settled largely in the vicinities of the train station but having such low income and economic capability, with the rapid need for housing,

have concentrated into a type of construction named *ilha* (island) - one single entrance from the street into a narrow and deep plot through a pathway and houses to one side, where several families would build small areas. The transformation of the territory imposed by the introduction of the train line represents a social transformation of the area but also, of its dynamic within the city.



Fig. 1: *Campanhã* area with a palace in the back and the railway tracks

"There's a hidden city within the city of Porto. And a world to be revealed within that hidden city. To talk about *Campanhã* is invariably that: to understand what one sees – and what is shown – is always a small part of reality." [1]

For an independent and new art gallery, dedicated to photography, born in the Campanhã area, on a rebuilt small warehouse that had been abandoned for several years, the artistic director (José Maia) and curatorial team (José Maia, Ana Carolina, Patrícia do Vale, myself and Suzana Correa) have prepared a program composed of a series of exhibitions, visits, conferences and cinema sessions. For the first exhibition, untitled *The vast space of reality (moving images and photography – Porto)* it was intended to initiate a discussion on the importance of photography as an artistic practice, its documental role, memory, relation with time, the city and different registries. Different works of different artists were presented however conscious of the site where is inscribed and the moment, the XXI century. The works presented a city and its changes over time, its new shapes, colors, sounds and from photography, expanding its boundaries, we've searched for new images, new narratives of the city.

1.2 *Isto Não é Manchester*, José Oliveira, 2013

When entering the exhibition space at the gallery *Espaço Mira*, one is immediately confronted with a construction remembering a brick chimney, which occupies almost the entire entrance space making the visitor aware of its physical relation with the real space. *This is not Manchester* is José Oliveira's work, which title convokes another European industrial city, where the artist had studied. The brick round construction symbolizes the several factories and industrial past of the region, being incomplete, recalls it's abandonment yet important and real existence with which every day, *Campanhã* inhabitants and passersby deal with. The curatorial team proposed the artist the construction of the tower right in front of the entrance door, as if strangulating the space, therefore making one aware of its existence and creating a filter that impairs the vision inside into the exhibition, despite the glass doors. Outside, on the street (in the city), the visitor is already convoked, begins the dialogue. The visitor becomes then aware of the tower and to enter, has to go around it, into the unknown, a new territory (both the exhibition and the warehouse, which had been abandoned for many years).



Fig. 2: The entrance of the gallery space (by Paulo Pimenta, www.publico.pt)

Campanhã is José Oliveira´s theatre of operations, moving through space as his privileged action. With video and photography José captures the details turning reality visible, almost as mapping the territory; however a social map as the territory matters within a social context. More than a *flaneur,* he invites us on to his journeys. The route is important, thought, and translated into maps that are transformed into tours.

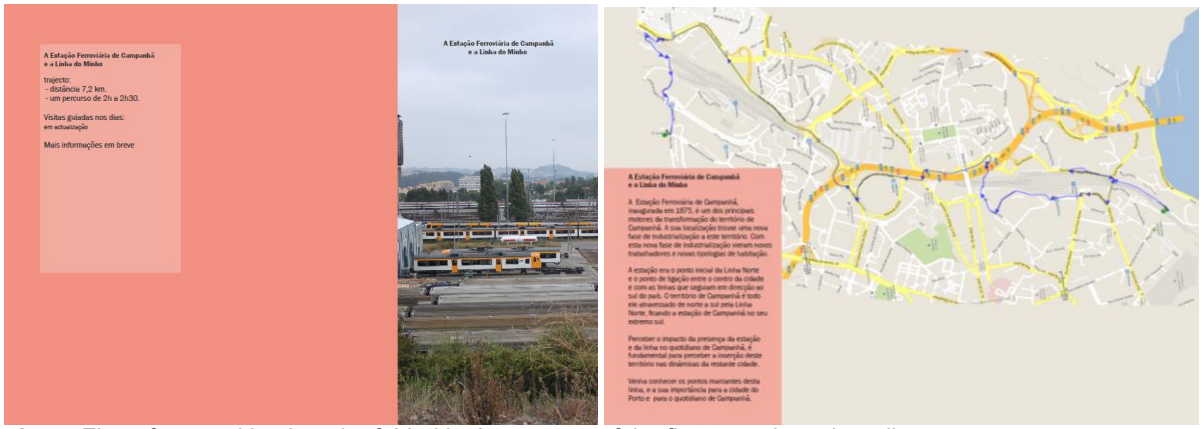

Fig. 3: Flyer, front and back, to be folded in three parts, of the first tour along the railway

Isto não é Manchester reminds us of the american artists Dan Graham's work *Homes for America* (1966-67) when his interest on the built environment, mainly the suburbanization occurred in the 60's, led him to document the mass production tract houses that gave rise to suburban developments, until then considered an unworthy artistic subject, and for that reason also, he presented it as documentation in a form of a magazine article (actually published), breaking with the notion of the artistic, museum type of object.
José Oliveira, a young artist living and working in Porto, presents us flyers and postcards in order to make the work/space real, convoking the visitor to take part, to handle the work, to take home, to read. All the elements are displayed next to the brick column on a low table, forcing the visitor to lean over in order to see, to handle; it requires the visitor's attention. Flyers but specially postcards are an entity that makes spaces real, even when we've never seen them or visited, we recognize them, we buy

them, we collect them, we send them, and those images stay in our memory as if they and reality are one and the same.

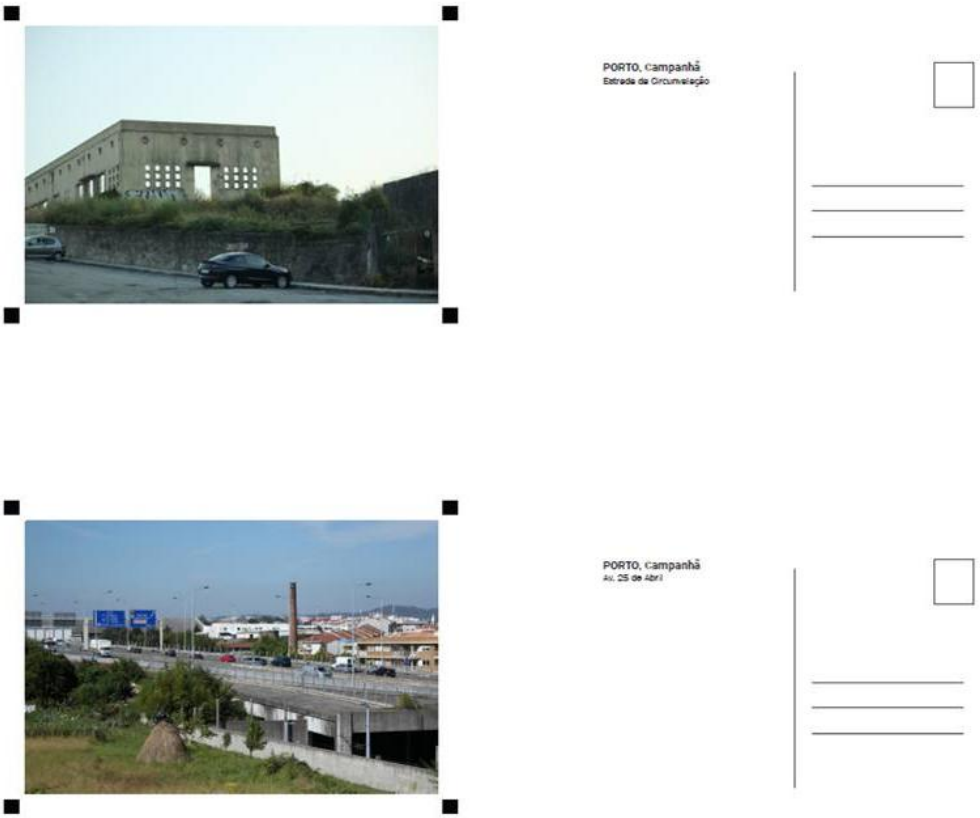

Fig. 4: Two of the postcards. An abandoned industrial building and the highway that also cuts the territory

Also on the table there is a projector showing a video on a small size picture (closer to a domestic size and not a cinema screen) that shows images of the *Campanhã* area, around the railway tracks. Though our mind would think of speed and loud sounds, connection with the outside and doorway in, it presents abandoned buildings, streets with no cars and silence, as if life had been sucked out and sent away on the first fast train. The pictures printed and displayed are of the same area, and the flyers are guided tours proposed by the artist and that will take place within the extensive program the curatorial team prepared.

Isto não é Manchester is a work in process that shows us the archeology of a site, diverse and multiple images of *Campanhã,* different yet physically so close to the city center. An important part of this work are the tours the artist planned and proposes in the form of flyers. Three tours: the first taken during the exhibition, on the 30th of November of 2013, along the railway tracks, where is possible to see how this urban transformation associated with connections has also separated areas and created barriers that change the space and social configuration. The second visit took place on the 22 th of March 2014, it was also a walking visit through a social and political heritage in the form of graffities, those that represent a form of popular political intervention very present in this territory and that givs us a different image and tell us a different, other story and part of the region. The third and last tour will happen in April of 2014 and is a longer tour, taken by bus, around the entire region including some of the most important factory buildings in the history of the region, the social housing blocks etc, as they are essential in order to understand the transformations taken place in this area so important for the city's history.

Preserving a city´s history and its heritage is not only about preserving or conserving buildings of declared interest but to feed the signs of a social history, which defines its inhabitant's memory and identity.

"Artistic practices have frequently had representational functions of institutional realities, and sometimes present themselves with critical distance, rarely evoking what in fact is not there, offering alternative possibilities; not the ones of utopia, of the future, but examine the conflicts from the point of view of the everyday actions, in the simpler way they can be when they don't wish to renounce to the thickness of human complexity." [2]

Art work such as the latter are the result of an investigation and thoughts on a specific region and context, in this case *Campanhã*, that are capable of transforming themselves into entities that develop from their limited physical existence by allowing a group of minds to discover and discuss the space,

the territory, its changes, in different ways. Artworks have long escaped the atelier, but are also escaping the exhibition space, going outside and gaining a new life within each visitor.

1.2 *CAPRI*, Paulo Mendes, 2009

Paulo Mendes's work had a special dialogued with José's work, in fact, when entering the exhibition space, around José's brick column, one's eye would immediately be directed to the big image in front, that covered the entire wall. A familiar image, yet somewhat strange, it appeared to be a still image, a photography, but it was actually a video presented in loop, taken on a site right next to the train station, in *Campanhã* of an only image going from day to night, almost in real time.
In fact, *Campanhã* until the 50's and 60's hadn't changed much, when industry was no longer its main economic motor, having several factories closed down, others moved far from the city, to cheaper locations, leaving its infrastructures abandoned and either taking their workers with them, but mainly, leaving them jobless. In an attempt to repopulate and give life to the region, and also as a sanitary measure, the City Hall had been building several social housing blocks, taking people out of the *ilhas* – many with no running water or sewage system, where several family members lived and slept in one or two compartments. Slowly, we've seen the scenery change from an industrial region towards a housing block region with services, however, still connected to its landscape and rural past.
Paulo Mendes's work has the capability of summing up all of these changes, the transformation from a rural, then industrial with low quality workers houses, into a region of services, in an only image. This reality, from the agricultural past, the workers houses to the promises of a better future illustrated on the big new 20th century glass and metal façade construction, representing new jobs, that even when the city sleeps, and night falls as if disappearing, keeps on moving, is still visible, as if its engines never stop towards the future.
However, as the image returns to its beginning, and we again see that nothing has in fact changed and the land is there, the constructions are still poor, over and over again, we realize that in fact the dream and promises may not be real, and what once were the new jobs are in fact the new form of precariousness - low rights, benefits and income, workers without contracts and being easily and replaced. As we moved from having poor quality of life as farmers, to factory workers with low income and poor housing conditions, into a 21st century of fast connections, speed information but still, low quality jobs despite the new clothing of steel and light.
Paulo Mendes also convokes architecture and the territory, a registry of the dichotomy of what the region once was and what wants to be, placing the question of if in fact, there is such a big difference, socially.


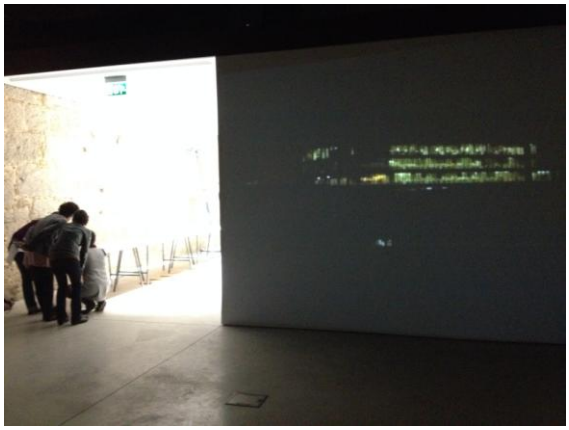

Fig. 4 and 5: view of *CAPRI* from day to night

Today, all is intended to be quick and give fast results, it is important for a mayor and other political representatives for everything to happen within their mandates, which in itself is contradictory with a city's evolution. The hurry to build fast and see results or a finished image generates tension that prevents any intervention to complement the city's many scales and urban tissue. As both artworks illustrate, there are no finish and immediate readings or images of a city, it takes time to go through José´s work and taking his tours in order to perceive the social reality of *Campanhã*, how the raiway tracks have deeply transformed the region and therefore the city, as it takes time to go through the transformations presented on Paulo Mendes's video that looks like a still image but in fact captures different centuries in a single plan. In the same way as a quick look and approach won't give us all the information so it happens with the city where time thickens its existence. History gives us the reading and understanding of the past, while artworks paint us the picture today, and preservation is not just, or should not be, about looking back and trying to freeze an important action, condition or building, as

cities can't live without a future. José Oliveira presented us ruins, to be preserved and rebuilt, integrated in the city, built ruins but also social ruins. Paulo Mendes focused on an important building, because of its scale and presence in the territory and also for what it represents, but he showed us "its back side" (it is in fact filmed on the back part of the building), as the future won't erase the past and should contribute to solving the present. There cannot be " an important monument in a city without the existence of multiple anonymous constructions (…) in the evolution of a city, the loss of that sense of role of each construction is in front of everyone. The general ambition for protagonism makes it then impossible for any form of protagonism". [3] Hence, the awareness and knowledge of a cultural, social and built environment is crucial for the construction of memory and collective identity, which is essential in order to intervene in the city, either a square, a street, a building, an abandoned field etc, as we are always dealing with an organism in constant transformation where all factors intervene in order to produce a unity.
In this sense, artworks as well as exhibitions, or a curatorial project, can be perceived as tools and source of knowledge to communicate the city, architecture, material and immaterial elements important in order to preserve both cultural and built heritage.

Bibliographical References (Arial – 11 pt – Lower case letters - Bold – Left aligned)

[1] *Público.* Mariana Correia Pinto,p.20. 1/Dezembro/2013. Porto

[2] SIZA VEIRA, Alvaro. *Álvarao Siza Imaginar a Evidência.* (translated by COSTA Soares). Lisboa: Edições 70, Lda, 1998. p7

[3] SIZA VEIRA, Alvaro. *Álvarao Siza Imaginar a Evidência.* (translated by COSTA Soares). Lisboa: Edições 70, Lda, 1998. P97

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Developmental dynamics of the Hypogea of *Piazza Duomo* in Syracuse

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Abstract
The understanding of the urban fabric of Ortigia, peculiar example of stratified city, can not be considered exhaustive if not also concerns the epistemological study of the underground structure of the site of Syracuse, place of our unconscious, recognizing in it the same arcane and the same magic, as if to understand the nature of the mystery of the soul and of the psyche.
It is particularly challenging to get into these areas to trace the history of all or just one's own and, at the same time, to be able to rediscover and recover the tangible signs of an underground intricate fabric that over time has undergone transformations and reuses determined by the evolution of life of those times.
The story of the place, the documentary images, the memories, and the medium of memory that acts on man as a tool for identification of investigation are the summands of an intriguing scenario that, in an intention of noble aspirations, are able to define the thin lines of the reasons of the place and the algorithm of the systemic sets and of the textures underlying routes.
The reasoned knowledge, carried out through a thorough and detailed historical and representative exploration, wants to give order, direction and extent of the need, planned or spontaneous, that led to the evolution of the introspectively kept spaces.
The story unfolds through the eyes of the representation of the subject in the past and the redesign, arduous and complex, of the present, in order to give new life possibilities that are not only related to memory; specifically it aims to be the support to give a colour to the materiality of the cavities, with the aspiration of building a consistent interpretation of the voids, giving sap and vitality to underground spaces.

Keywords: Hypogeum, Memory, Knowledge, Protection, Recovery

1. The dynamic process of knowledge

1.1 The cognitive process for the conservation of cultural heritage *(R. Valenti)*
In a fluid society where everything is in a continuous transformation and contamination, thinking about a cognitive process aiming at conservation, protection and regeneration of well established historical sites involves the experimentation of a dynamic course directed to the development of epistemological strategies suitable for the needs of particular circumstances.
Generally, architecture deals with the material space meant as a superstructure of the natural landscape. The present study, on the contrary, points out at areas whose architectural quality comes from "removing matter", a creative approach typical of sculpture. In particular, if sculpture establishes a tactile and visual relation with matter and its formal continuity, the same thing cannot be said for the architecture this research is applied to.

This study is about " architectural works" where it is possible to appreciate perceptively the spatial emptiness and not the "envelope"; where it is possible to realize an explorative experience of all parts without visually overlooking them and where, though, it is not possible to have an immediate reading of the functions which, in the course of time, characterized their presence.
We are dealing with an emptiness meant not as a non-place but as an icon of the past, or even better, as a space narrating a complex story which has produced, with the changing of demands, a model of form which has evolved into the densely present structure.
These are the characteristics of the hypogea of Cathedral Square in Ortygia. Places which disclose themselves with a sequence of temporal and spatial events relating to the physical and historical journey of generative processes determining their final form. Those areas have a story guarded in a very introspective way and do not directly reveal the complexity of their own transforming themselves into a space.
There is no doubt that the epistemological processes, in the present study, are not limited only to what stands out but necessarily involve the implied areas as well. To state it differently, those areas which, though less clearly evident, determine a sense of completeness so to understand the combination of the surveyed "fabrica".
As such, it is crucially important to arrive at the readability of the established interconnections between the hypogeum and its story as an essential preparatory action for the cognitive process of the complex structure. Only through the appreciation of the cultural and historical processes which hypogea originated from as an arrangement of space, it is possible to understand the meaning of the cultural messages which materially define those places.
Places attached to memories partly linked to the needs of life and partly to a past marked by the tragedy of war. In particular, the hypogeum in Cathedral Square appears as the final outcome of the anthropic stratification of the site. Therefore, it is necessary to gain a new understanding of the place as the result of all the occurred evolving processes.
The specific objective is to improve and sustain conservation raising the present quality standards, increasing accessibility not only from a physical and material point of view but, notably, from an epistemological one in the name of the so longed-for social inclusiveness. This can give a significant contribution to the maintenance of identity in order not to consider the cultural heritage as belonging to "others", rather the deep expression of memory and of its conservation.
Since, as Heidegger states, human beings start pondering on the essence of things only when they miss them, the widespread awareness of the importance of historical heritage and its full knowledge starts its conservation process. In fact, "the appreciation of the cultural heritage is not limited to its material conservation rather it is fully realized only when the cultural heritage and its knowledge and the relations with the belonging context (both physical and not) can be enjoyed and used by the community." [1]

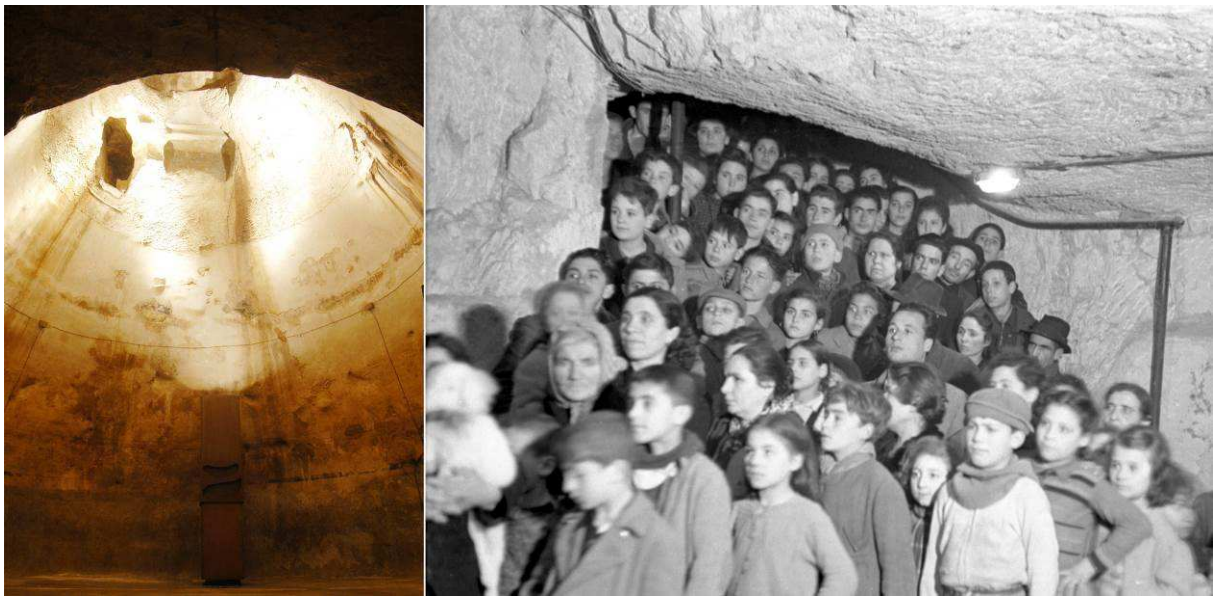

Fig. 1: Hypogeum of Cathedral Square in Ortygia. Praxeomorphic aspects: from the cistern to the air-raid shelter.

The aspect is particularly important when the nature of the common good is “praxeomorphic”, that is, connected to human activities in the course of time especially when they concern the needs of the community and its survival which are not acknowledged at present.
The oldest nucleus is represented in fact by the cistern of the Archbishop’s Palace realized in the early 1600s which was meant as a water supply system for the palace and which was, actually, used by all the people of the town as far as the XIX century. The digging out for the construction of the cistern was probably realized to find “in situ” the stones necessary for the extension of the old Archbishops’ Palace in Siracusa. The cistern was, at first, the quarry of the construction site. More recently, with the tragic events related to the Second World War, the cavity of the cistern was turned into an air-raid shelter whose works were organized by the UNPA Town Committee: the entries were reopened and the stairs under the Archbishop’s Garden, the gallery linking to the Marina and the gallery towards the north and south directions were also built.
A reasoned knowledge carried out through a deep and articulated historical and representative exploration, wants to give order, sense and measure to all the needs which determined the evolution of all these spaces introspectively guarded.
The research, as such, has the objective of developing and organizing complex information on the basis of a strategy which integrates 3D data acquisition with its analysis, cataloguing and project.
The reasoned survey is meant as a primary instrument of knowledge able to propel any revitalizing intervention. The contribution of the new technologies allows an overall reading, highly expressive and easily perceived even by the non specialists.
The formal characteristics of the hypogeum of Cathedral Square have suggested a tridimensional survey approach using laser scanning technology which granted a large quantity of metric data related to the time needed for the correlated relief operations, taking also into account the topology of the place.

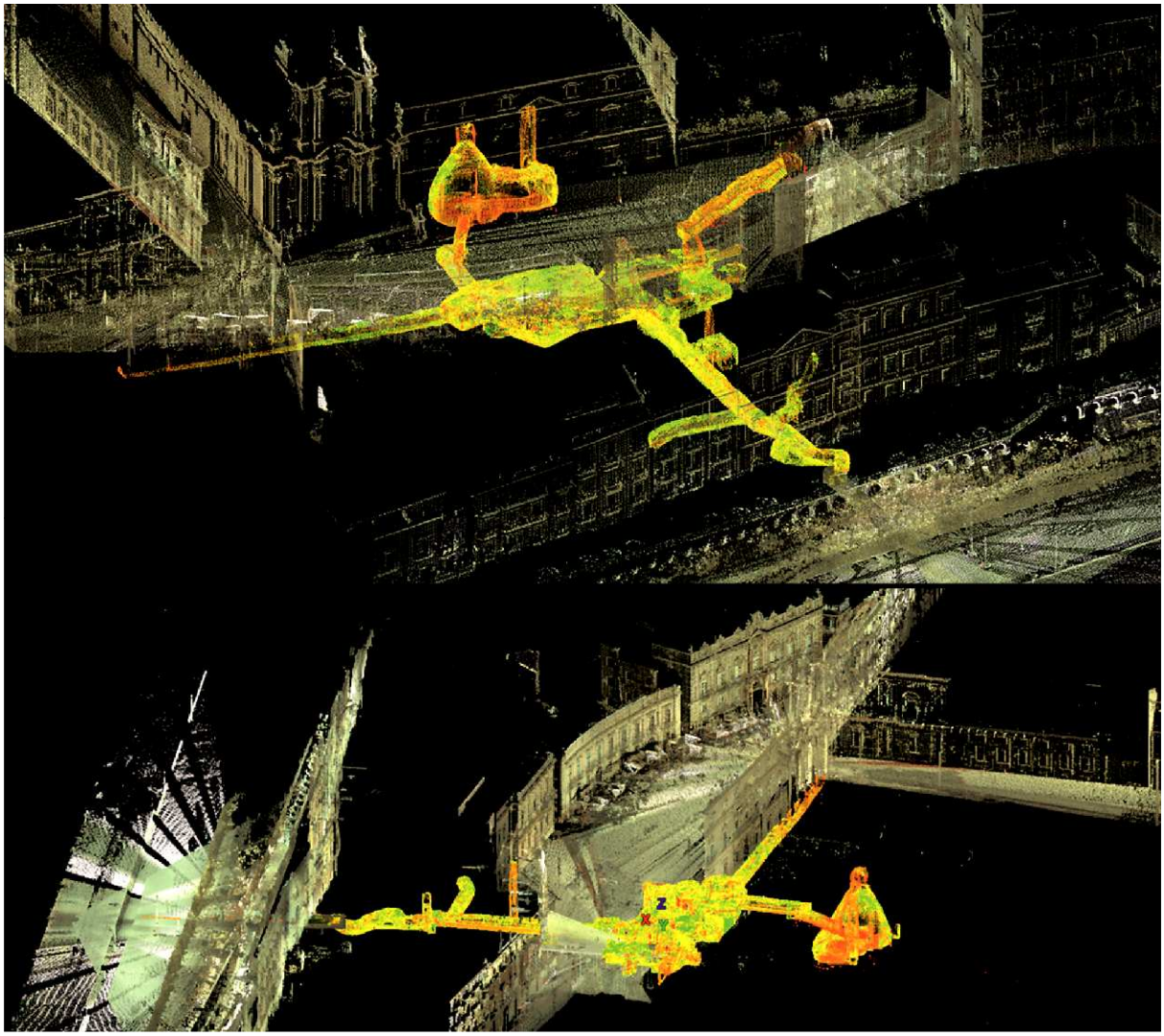

Fig. 2: Three-dimensional views of the hypogea contextualized within the urban landscape.

The epistemological approach is configured in the monitoring of the area, differently arranged in the various periods of time, through the realization of models based on an updating multiscalar system able to contain a wide range of information regarding material physical and geometrical aspects.
The 3D graphic restitution of the hypogea contextualized within the urban landscape realizes the perception of the indissoluble bond between what comes to light and is immediately visible, and what is still underneath the soil.
Surely one of the problems connected with this research doesn't concern all the difficulties we came across during the planning of the survey campaigns. It rather concerns the method for the transmission of information both from the graphic and modelling point of view and from the data organization point of view. The followed methodology is based on image sequencing whose diagrammatic mosaic model allows the detection of articulated sequences of meaningful sections interpreted as information regarding the geometry and the external corrugation of the place.
The emotional, sensorial and tragic aspects connected with the use of these places during the war period illustrated through the large photo documentation available contribute to their complete understanding: geometry through the survey helps finding orientation in the dug out space; the photos transmit the pathos of the evoked past.
The past which leaves a permanent mark on anyone who goes down into the morphologically articulated cavity of the hypogea of Cathedral Square which constitutes an identity fragment of an unforgettable history chapter.

1.2. The geometry of Hypogea *(M. Liuzzo)*

The difficulties involved in the fixed procedure of survey of an important part of a land are generically tied with the need to achieve the knowledge - complete and also accurate and detailed - of its spatial, formal and materic components, without losing the essential tie with the *topos*, meant as a larger physic and relational unit, inside which the land itself exists and structure itself both geometrically and functionally.
This characteristic becomes particularly relevant when the inner and branched nature of the place to survey negates the possibility to perceive, in an unique way, the relations between parts and, moreover, the stronger relations with the surrounding structure. So the aim of the survey becomes to make mutually evident, virtually touchable and understandable stratified spaces, negated relation and invisible or hidden urban logics, which once were full of meaning.
To this end, the campaign of surveys of hypogea of *Piazza Duomo* in Ortigia was initiated, organized into the frame of a research about the complex places of the stratified urban fabric of the Arethusean island, under scientific responsibility of Giacinto Taibi and Rita Valenti. The activity, realized with a couple of 3d time-of-flight laser scanners, saw the synchronic cooperation of two teams of surveyors – afferent to the Crabnebula Laboratory of Representation of the University of Catania, in Syracuse, and to the Laboratory of Survey and Representation of the Territory and of the Environment of the University of Enna - composed by the architects Sebastiano Giuliano and Giusi Maniscalco, the

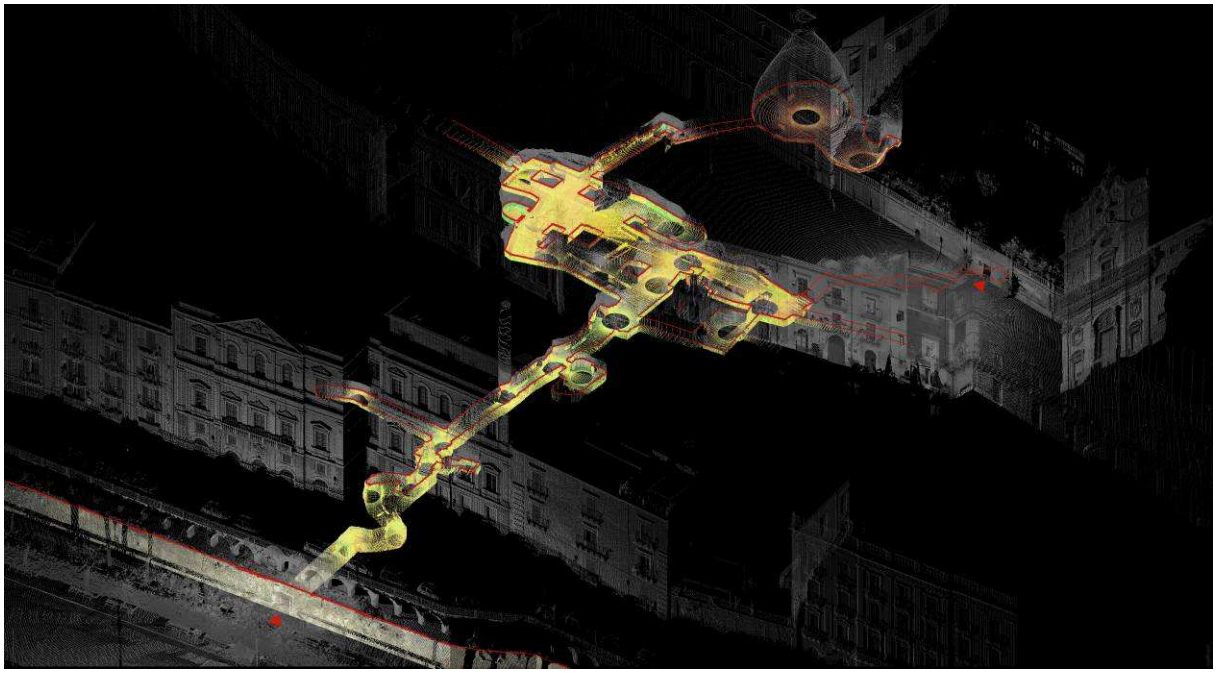

Fig. 3: The place as an expression of complexity: the planimetrical articulation of the hypogea.

engineer Salvatore Savarino and the learned architects Lucio Sirna e Roberto Cappuzzello, coordinated by Mariangela Liuzzo.
This combined activity made necessary to programme in a detailed way a precise operative protocol about methods, time, precision range and choice of points of control.
In particular, the union of the data collected by the two teams into an univocal reference system has been done with a procedure of scan and automatic identification of targets of high reflectivity, in the quality of point of passage, located among the tunnels and into the larger spaces from a minimum number of 3 for each linear section of about 15 meters, so they can be seen from at least 3 different scan points. Furthermore, the extreme targets were bounded to two couples of external control points, correspondent to the exits of *Piazza Duomo* and of the *Marina*. Thanks to these not only the correct integration in the survey of the interacting spaces – underground and open space – was guaranteed, but also the absolute reference to the geographical coordinates, with the use of a GPS. This anchoring to the geographical element, essential for the environmental surveys - but often neglected by the urban ones – assures the possibility of constant integration of other parts of the urban fabric of Ortigia, also in different time, basing on absolute coordinates, even if they are hard to be locally connected, thanks to a global model georeferenced.
This approach of study made also possible to define a series of analysis on the geometry of hypogea and on the relation with the topping structures, both private and public, especially by permitting to make hypothesis about the logics of the mutual relation between the previous urban structure and the geographic dimensions of places, nowadays so hard to read.
The achievement of a three–dimensional model, analyzed by a *frettage* of levels of sequential sections, highlighted a typological variety able to raise reasoning on the historical revisit and the morphologic genesis of the underground spaces.

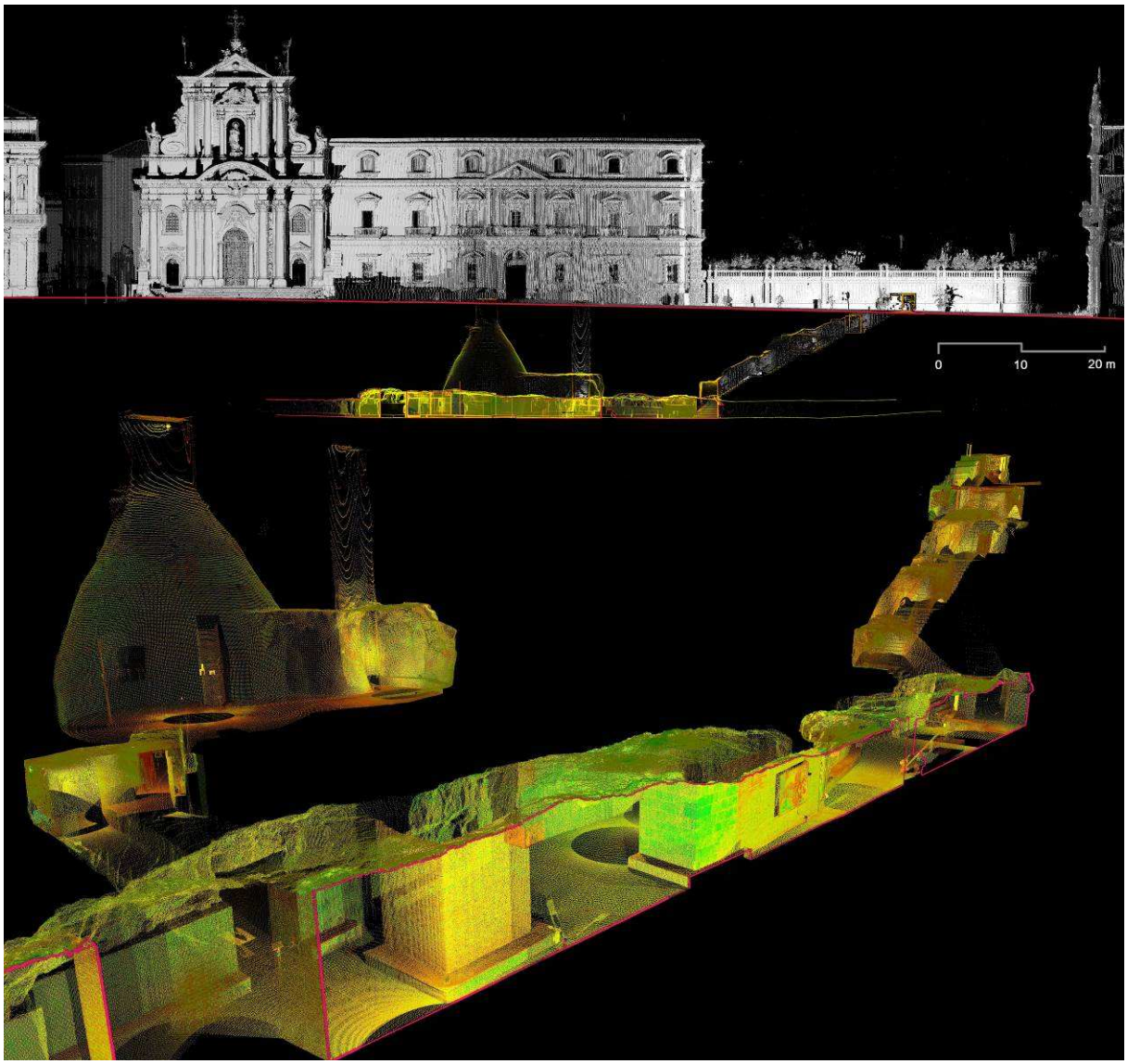

Fig. 4: Spatial dynamics of underground places.

It was possible, in particular, to isolate sections correspondent to a typical geologic-operative classification, based on the definition of four categories of underground caves, in relation to a three-dimensional geometry referred to a Cartesian ternary system. This classification distinguishes the following classes: vertical developing caves (wells, skylights, aerators, etc.): their dimension on the z axis prevails on the horizontal dimensions, x and y; linear developing caves (tunnels, walkways, hallways, galleries, passages, etc.): their dimension on the x axis prevails on the dimensions of the other axes, y and z; planar developing caves (caves system of stratum, big archway canalizations, etc.): the horizontal dimensions, along x and y axes, prevail on the z axis; cubical or room – developing caves (crypts, catacombs, caves, funnel-shaped cave, cisterns, beehive tombs, rooms of the sirocco, undergrounds of reunion, reservoirs, room graves, troglodytic residences, hypogeum churches, caves store, etc.), where the x, y, and z dimensions are of the same order of magnitude.
The dynamic analysis of the sequence of such sections applied to the hyopgea of *Piazza Duomo* of Ortigia contributes to the understanding of the stratifications of the hollow in the centuries, until we come to a distributive reading of the spaces and the functions during the most recent Second World War.
In this way, it is possible to walk through the hypogeum used as air-raid shelter, in accordance with the provisions of the U.N.P.A. (National Anti-aircraft Protection Union), along the winding of the long tunnels spaced out by larger gathering places - recognizable for the presence of several seats in cement or dug in the rock to welcome the crowd of the refugees -, by small vertical accesses to the outside, in correspondence of the public buildings, and by smaller spaces destined to welcome precious goods and functions or elite groups.
It deals with dynamic sections that, with the prevailing dimensions, recall the use of places now abandoned, but which were full of necessity, needs, pains and hopes up to not such a long time ago, using a specific study approach. This approach intends to achieve the cultural measure through the physical one and it considers possible to draw the lines of history and memory using the geometrical ones.

2. The design of sustainability

2.1. The strength of the colour as intrinsic sign of the place *(T. Patanè)*

The history linked to these underground places – lately interested by the dramatic episodes of the last wartime events - brings back the attention on this underground part of the city, where teams of rock workers called *pirriatori* enlarged the old quarry, digging new tunnels and opening another access to the galleries of the ancient wall of the Marina, in order to prepare an air-raid shelter. The following period has determined the abandonment of shelters and the consequently oblivion of this area; a great branched container has been hidden down there for a long time, characterized by unexpected volumes dug in the rock, long initiatory paths and zenith lights slicing through the dark.
It is almost a disruption of values and commonalities which were used to chain aims and aspiration over entire generations. A sort of liquefaction generated into the selfish and egocentric individual who act in a liquidness context. The human being, strongly disoriented in this flowing of modernity, has lost the benchmarks of the places of his past; places that have represented moments of high emotional intensity, hope and also angst and affliction.
The empty spaces of hypogea claim their own consistency and their meaning in this real dimension. The array of these empty spaces aspires to a renegotiation of their contemporary identity. The saving of hypogea settings represents a huge set of problems and interests particularly complex evolution systems.



Fig. 5: The fractal dimension of the ‘words’ of the underground places. (Photographs by L. Sirna)

The wish of making usable a good - which has represented the solution of many kind of needs through the time- becomes responsible for establishing congruity between the past role and the present reuse. Practically, we should activate a complex system of interrelationships between the interpretations of the place which has to be revitalized and the systemic whole of "*modus vivendi*".
In this case we can talk about the signs, both clear or hidden, of words and alphabet; in other words, we can talk about all those concept of identity and of right to the cultural heritage, which intentionally aim at the reconstruction of intrinsic character meaning underlying the aim of places. We should re-read those spaces using the words of a sentimental alphabet.
Simple words, as rocks, to which we have to give a specific "meaning". Free words, as the interconnections, that we can use to understand and discover. Words that help us in describing facts or feelings, in linking or in sharing, in communicating joy, pain, sadness and happiness. Words that can warm hearts, inflame aims, make us dream. Words that can hurt, reveal, move and denounce.
These places are characterized by a complex identity and they are founded on the irreducible contrast between nature and artificiality, primordial places relentlessly leading us back to the essence of our existence. They are strongly materical places and with a strong emotive and sensorial impact; places where is hard to live due to the particular micro-environmental conditions, but for this reason they force us to invent a different relationship-wise system from the perceptual-sensory point of view.
We are facing an underground net crossed over by one of the oldest symbol of human race: the water. The water gives the sense of the flow of life, but in a context of strengths and values intimately related and herald of overflowing energies.
Although its direct transparency, the water has its intrinsic colour that gives colour to our values and to our past meaningful heritage.
The water is the unifying element of the millenary history of mankind and it goes beyond the difference of meaning of different cultures; in this specific place, the water is the protagonist of a physical and spiritual "reconciliation" and it succeeds in annulling the dualism Greek-philosophical and Jewish/Christian between body and soul and between life and death. A mysterious container able to synthesize Christianity and Judaism thanks to an ideal path between the Piazza Duomo and Jewish *mikvè* of Giudecca.
Nowadays this inhospitable place gives us the possibility of a walk in the bowels of the city; moreover, it gives us the chance to take its history back, physically and spatially restoring and "reconciling" these two parts of the city, in a definitive interactive dialogue.
Here the colours of main elements as Earth, Air, Water and Fire reunify themselves in an ostensible hostility. Underground places where the themes of colour, substance, light and shadow, sound and silence, acquire a deep meaning because they represent their own essence.
Precisely this "photomorphic" contribution of natural and artificial light, with its daily and seasonal changes, offers a plastic and chromatic dynamism to these places, characterized by an illusory petrified immobility.
The fractal dimension of the roughness of the rock allows us to read of the signs left by men and nature throughout the centuries. The existence of meaningful caves and parts added to the basic volume highlights the contrast of tonality, the plays of light and shadow, both in terms of chiaroscuro and chromatic effects and sensed and insinuated sounds.
These places impose themselves on the man because they force him to consider the different environmental and spatial qualities more ontologically. They are an unique and unrepeatable creative-planning chance, where the new architectural poetics is no more defined by the laws of science, but it depends exclusively on sensory entirety given by the interaction between colour, substance, light and shadow, sounds, feelings and images. The perceptive "coordinates" of the visitor are completely overturned in a different knowledge of the place using the five sense of the underground traveller; a new way in which the sense of sight loses its supremacy in favour of the senses of hearing, smell and touch.



Fig. 6: The tones and the glazes of hope.

2.2. A materical and chromatic quality for place reuse. *(G. Taibi)*

Hypogea are locations quite far from our memories and they are nowadays seen as dusty places and owners of a not-always- accessible knowledge. They suggest… by stimulating our soul and, during the time, they tend to change under the watchful eye of a public becoming more aware and participating.

In this systemic and cultural framework we are in the presence of a proliferation of museum-model structures, which become highlight moments for determination of new forms and new institutions.

The semiotic approach, above all the others, is - maybe for its own ontological nature - the one usable to catch all the multiple innovative variables inherent to the transformation of the hypogeum, building up sense paths connected to culture, memory and identity.

It may be interesting to structure an open dialogue that can turn that place into an essential attraction. We are talking about a complex and articulated dialogue which, in many cases, affects the social partners and which is not exactly solved. The importance of the contemporary viewer and of his relationship with the space is an innovative model of "concentration"; this can improve the place perception and make the aesthetic appreciation an essential point of the individual and social growth of the community.

The public has to be welcomed together with its own identity and it needs also to be positively influenced in order to manage independently the visitor route. The multi-sensory involvement is one of those innovative variables in which the semiotic look on a location of memory stratifications and intimate tensions becomes necessary to disambiguate sense and functions.

The place goes out of the traditional idea of a museum to enter in a new communication channel with the public and the city. A dialogic reconnaissance tracing innovative relations that can lead to new creations of meaning. Furthermore, if we leave the visitor totally free, it will be disoriented: the strategy of the new museums is a sum of different readings.

In this way, a museum is a stratification of meanings and part of a larger space, but it is also a container of dialogue elements. It has been enriched of new functions and it is now able to build up always new effects of meaning, which are the basis of the dialogic relationship between the materical form and the whole scenery that has to catch the attention of the more and more participating visitor.

In order to set up a reasonable future, we need to think about realizing complex spaces conceived on a precise and specialized "ecology" that can describe the place as a net of structurally interconnected and interdependent phenomena.

In the current state, a great importance is given to the act of seeing. The sight is our most developed sense and it is the one used by community to create social conditioning.

All we can perceive is basically the results of a vision included into the three Cartesian dimensions that represent a very narrow viewpoint of reality.

Within a broader approach, we should give space to the other senses, factually under-employed in our interaction with the universe.

Our world experience should be based on a complex interaction of senses but, in general, the artistic shows – based on a superficial fruition - are generally invented and made for the sense of sight only; so they are pure images and they do not create a sensorial interesting setting.

Somehow we are facing a sort of visual art, that is a proposal-making form for the fruition of retinal images immediately comprehension.

However it would be better to refers to a morphologic reality considering an internal multisensory experience. An architecture that should be able to give emotions through the chromatic effects and to draw a space that can be measured with eyes, movements, touch, scent; in few words, it should put to use a contemporary presence of sensations useful to establish a strong perceiving relationship between our inner self and the setting.

The first step towards a sustainable spatial dimension which changes and harmonically models itself after our ways of feeling is to think, to conceive and to shape a new world using a global perception, going beyond the pure visual abstraction.

The visual input communicates complex data, inner elaboration and evocations, personally determined by important external incitements. The image stimulates and recalls in everyone personal reactions and memories; it can contain and recall symbols, it makes us relive emotions and produces suggestions. It is made of shapes, colours, light and darkness, immobility and mobility, chiaroscuro effects.

Our personal and peculiar ways of perceiving and usage of sensory channels gradually shape themselves. Our individual ways of mental reconstruction of a place – the object of our interest – come from them.

This mental image created by our brain is not the objective reality, as we believe, but it is our personal rework of sensory perceived elements.

Therefore, a negative feeling, coming from the fact that sometimes people are not able to feel that architectural product through all five senses, becomes representative of the unsuitability of the receiving person and it surely has to be investigated in the personal inability to perceive that specific message spread by the work.



Fig. 7: Hypogeum revitalized by zenithal light. (Virtual processing by R. Cappuzzello)

To this extend, the empty space has to be perceived as an icon of the past and as the effect of a cultural degradation which has deprived places of authenticity. They are empties originated by the history and they have a strong performative power that can generate categories for historical interpretation and, moreover, they can represent the basis of innovative proposal for these places, in order to re-negotiate their historical identity.
Proposals for the reuse of an hypogeum have to transmit this concept as Daniel Libeskind did in the Jewish Museum of Berlin, which perfectly represents the problems associated with the empties facing the complex relation with memory and history.
In a memorial architecture, a symbolic view of the empty space becomes expression of a tragic past we tend to remove because of problems of our subconscious. The bearing structure of revitalized hypogea has to rely on that empty spaces; with their symbolic energy, they are mediators and witnesses of the history.
The fruition of the space by a visitor needs to be solved in an evolving way: the entire path moves sinuously creating discontinuity between spaces.
The visitor passes through straight spaces broken by sudden bottleneck, segmentation, convoluted or hanging portions. In this way, the empties are bearing structures and point of equilibrium of the place, besides being clear traces of history.
The revisit of an hypogeum has to be identified in the intention of giving some mystery and dark appeal to those spaces using veils which represent the past.
We need to re-interpret the emptiness of the hypogeum -which is not a cultural one- through a system of veils unveiling the unseen. We have to cover the whole structure using nylon veils which can recall a sinister past thanks to the oscillation coming from air movements. From this sinister past, we can create a new and revitalized reality. To a certain extend it is a sort of emulation of the works of Christo and Jeanne Claude, who were able to raise new emotions.
In the meanwhile, an internal impetus, highly feisty, is born: the one of bursting into with dynamical lights that play their role with energetic slices and internal situations of duress inferred on the materic mass. The aim is to insert, during the evolution of hypogea, sources of extraordinary light, feisty and drawn as the frustum of glass cones. Thanks to their clearness, connecting hypogea with external parts, the cones radiate a mystic light into a definitely fractal place.



Fig. 8: Intersection between light and hope (Virtual processing by R. Cappuzzello)

Even the solution of a monumental glass pyramid celebrating the light, quite similar to the one invented by Leoh Ming Pei for the Museum of Louvre, can become an input for a revisit of a place that wants to raise again, despite its past as theatre of disasters.
A new light through which we can raise big hope for the plan of a memorial museum.

Bibliographical References

[1] CENTOFANTI, Mario (Scientific Coordinator), BRUSAPORCI, Stefano (editor). *Modelli complessi per il patrimonio architettonico-urbano.* Roma: Gangemi editore, 2013. 112 p. ISBN 978-88-492-2692-8.

[2] ROMANELLO, Isabella. *Il colore: espressione e funzione*. Milano: Hoepli, 2002. 160 p. ISBN 88-203-2998-0

[3] VOZA, Giuseppe (editor). *Siracusa 1999. Lo scavo archeologico di Piazza Duomo*. Palermo: Arnaldo Lombardi, 1999, 49 p.

[4] VV.AA. *Trame e stratificazioni urbane. Casi studio a confronto*. Siracusa: Lettera Ventidue, 2012. 202 p. ISBN 978-88-6242-072-3

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The epistemological measure of the quality of the natural landscape

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Abstract
All cultural agreements oriented towards environmental policies of our planet Earth establish signs of hope facing an inexorable decline in the natural habitat. The understanding of the man-made environment - having a different stimulating duality, of perceptual and sociological value, between insiders and outsiders - determines a deep psychological - emotional involvement and a particular way of perceiving that place, up to grasp its cultural roots, its soul, and even the smell emanating from *topos*.
The investigation on the formal perception of a geographical landscape relies on the relationship between communication tools and new possibilities for structuring visual form, related to the dynamics of temporal and visual development of that region. Moreover, understanding a place also means perceiving suggestions for its qualified modification.
Our disciplinary speeches, directed towards rigor and compliance with environmental quality, are intended to represent a moment of synthesis, framed in a synergistic relationship with the cultural content of the *European Charter of Landscape* in which it is crucial the issue of sustainable morphology, fixing a balance point between social needs, economic activity and environment.

Keywords: Sustainability, Landscape, Measure, Nature, Quality.

1. The measure of sustainability. *(G. Taibi)*

The cultural debate focused on protection and planning of the landscape tends, overtime, to assume an increasingly complex configuration and it cannot be seen as the historical moment of problem, whether it would be a conceptual, or a definitorial, or an idealistic one.
Actually, for most people, so busy with their daily happenings, the landscape is just what they can understand and perceive through senses by their own, and then explain with a plane language.
To this extend, the possibility of drawing a clear distinction between the insider – that is who intensely lives in that place, taking part to the political decisions about place modifications– and the outsider – that is who does not intensely live there but visit the place as tourist or visitor, enjoying the privilege of getting out of that scenery without responsibilities about it.
Precisely these responsibilities will lie on a painter, when he will be going to draw a landscape.
By painting, the artist has the duty to spread all the vocation owned by the place and that are not always evidently showed.
The landscape directly creates a tie, a commitment, an unconscious limitation, a psychological influence and logic of judgment.
Obviously, the subjectivity of the interpretation underlies all these processes.
The sets of signs and chromatic masses which have to recall a series of inner dynamics which are part of a systemic peculiar frame of the natural landscape.



Fig. 1: Physical depressions of the natural landscape.

The painter, strictly devoted to his role, has the task of drawing the character, the aim and the vocational peculiarities of the natural landscape.
In this sense, the artist has to know the place and his work should be addressed to the choice of subjects able to highlight the image of the natural landscape. This image is a sum of potential, quality and dynamic of the elements present in the landscape.
It is evident that the way we understand the natural environment surrounding us is essentially based on a complex process of interrelation of senses. It is also a great effort to activate a complex systemic set through which spread emotions using chromatic effects and draw natural environments measurable by eyes, movements, touch, smells; in other words, we should interrelate sensations usable for establishing an intense perceptive relation between our inner soul and the environment we are included in.



Fig. 2: The place between vegetation and massive systems.

The first step towards a sustainable spatial dimension which changes and harmonically models itself after our ways of feeling is to think, to conceive and to shape a new world using a global perception, going beyond the pure visual abstraction.
The specialists cannot escape from pondering and facing the three linked and consequent moment of representation; they also cannot escape from evaluations aimed to get the decisive moment of the intervention for the protection and the sustainable development.
Nowadays, when we talk about the sustainability of natural landscape, we feel the need to go far beyond that limit set as qualifying intervention on a field, because it is restricted to parts of intervention.
The reality calls a deep reflection, in order to canalize the systemic frame of the sustainability of landscape into the ecology of landscapes, that is a bigger local ecologic system. In this system, we cannot refer to a single units read as mosaic, but we should refer to a matric whole that can be set up in a globally interacting frame. This is the key point of a specific goal, in which the strategic rehabilitation becomes the innovative concept setting the whole system in a global revival, with interventions focused on improving huge section in their entirety. It is the idea of an holistic system of a place where the whole does not coincide with the sum of the single units.
The professional thickness of who intervenes on the landscape has to protect these concepts - expecially when the landscape cannot be reduced just to a geographic support or a visual perception – and to take in account the overflowing authority of the duplicity of the landscape, seen as a systemic and integrated set of vegetal, animal and human beings and their environment systems, spatially defined.
To understand a place means also to foresee how to modify it expertly.
We want to equilibrate social needs, economics and the synthesized environment, by those expert interventions, considering a synergic relation with the cultural contents of the European Landscape Convention. In this Convention, the theme of sustainable morphology is crucial. Therefore, our intervention on the field is basic and it has to tend to codify those cognitive processes which, when they will be codified in a set of shared rules, can be regulated by a new document recognized as a Quality Charter, in compliance with the European Landscape Convention mentioned above.
We aim to give a new life to an inexhaustible hermeneutic activity of those meaningful and productive logics we have to examine.
In this way, the natural landscape, filtered through this light of scientific accuracy, becomes an endless process of interpretation. There both objective and intrinsic characteristics of the place and the cultural quality of the operators, able to interpret it congruently, meet.
Thus the developmental progress of the computer system, set in a cultural sphere strictly connected to the theme of the phenomenal reality of the perception, is willing to take a leading role as main instrument for the planning and fruition of the *topos*.



Fig. 3: Natural trails.



Fig. 4: Styleme of the environmental system.

This happens into a context of reference where the integration between man and the environment underlies a sensory functionalism, which is determined by a strict interative relation between artifice and nature.
It is the field of a specific ecology based on auto-generation, where the man will be perfectly aware of the evolutionary processes of the environment.
We should begin to think about our status and to rethink our genetic code, in order to awake our crucial multisensory sensibility to the environment we are going to bring out with plenty of contents.
As well as the traces and signs of the forces which have passed through a place are both a mental and material construction, the intervention of recovering the sense of a place should act both on the imaginary and on the physical experience.
It is a series of semantic emptiness that needs to give to who walks down the place possibility of a subjective and free interpretation.
We are referring to minimal interventions that found their effectiveness on the absence and on the subtraction of material from the place.
The work goes to slips of meaning; operations that are more semantic than structural and that are able to re-establish meaning and dimension of use of a place; moreover, they can clean the place from all the stuff left there because of human negligence and start an ecologic reconditioning and recovering.
The case studies give the chance to apply some ideas. They are general indication that are later apply on the specific case.
The basic idea for the layout inserted into the landscape is to privilege walkways in the midst of nature, full of naturalistic and environmental interests; it is also about moving to operations of cleaning and conservation, instead of embellishment.
Because of this, we need to understand the meaning of the landscape and privilege paths that moves in the midst of nature, where the naturalistic and environmental interests are considerable.
It is needed to leave the places into their original and natural condition. We just have to remove, by minimal interventions, what disfigure the place, that is the set of present stuff we consider incoherent in that place.

Case of study: Pantalica and the areas of the Anapo and the Ciane rivers. *(S. Giuliano)*

In the territory of Palazzolo Acreide, the Anapo river flows from the sources of the Guffari river on the mount Lauro, the highest peak of the Iblei mountains. The name “Anapo” has Greek origins and it etymologically recalls the immediate meaning of “invisible”. Its course is very articulated and, after about 40km, through the gorges of Pantalica and the charming valley named after it, the river flows down the irrigated plain of Syracuse through the Big Marshes – the old Syraka –, now drained, and it flows into the water of the Big Harbour, alongside of the Ciane river.



Fig. 5: Caves along the Anapo river.

The Anapo and Ciane rivers are two exquisite realities, which find their most inner peculiarity in being placed into a context that has to be safeguarded and protected in the respect of a wished Quality Charter and of the movements of the human soul.
They are part of a complex place which interpretation is a highly complex mental process. The Ciane river, in particular, that is a small and short river powered by the same source of the Anapo river, is world-wide famous due to the presence of the characteristic papyrus, which draws and colours an unique scenery, spontaneously growing alongside the Ciane banks.



Fig. 6: The slow flow of the Ciane river**.**

The natural landscape outlined by the presence of the rivers suggests, captivates and it has to be interpreted as a “sets of signs and chromatic masses which have to recall a series of inner dynamics which are part of a systemic peculiar frame of the natural landscape”.
In this case, the landscape should be interpreted as the sum of the signs of the topos, dynamically interacting between themselves and brought to life by the insider. The insider place himself as the main actor of the particularly delicate process of the naturalistic place. It is evident that the inhabitant of a place, especially for his innate characteristic of configuring himself as integral part of the natural landscape, needs to establish a dialectic relation between his inner self and the aim of the place where he lives, for the benefit of his own wellness.
To this extend, signs, chromatic masses, perfumes, sounds of the continuous flowing and the noise of the silence need to find a synchronic movement of harmonic correspondence, concatenating their function into the landscape. This landscape witnesses a glorious past which has left an unforgettable trace into the ancient times.
Many ancient poets and historians glorified the Anapo river, such asTucidide, Plutarco, Livio, Eliano, Silio and even Ovidio, who tells the myth of Anapo and Ciane, with a plot showing the love between natural elements as ultimate aim; the same myth has been told by Gabriele D’Annunzio into its Laudi.
The Anapo river has been mentioned in the Sicilian Literature too. The writer Giuseppe Antonio Borghese wrote: “among the banks where the Primordial Arcadia appeared and found its expression, the tales comes down on the men and they go to meet them effortlessly, almost trembling”.
But the Anapo river, together with the Calcinara rivers, is framed in a larger environmental system, that is the one resulting from the necropolis of Pantalica, a naturalistic and archaeological place that lays on an upland surrounded by canyons formed during centuries: the Valley of Anapo. It is accessible from Sortino and Ferla and it is the representative upland of a place of high naturalistic and historical value.
We are in the prehistoric place of Pantalica, where the presence of the human being has been observed since the XII century B.C., as witnessed by the great necropolis of artificial caves and the majestic archaeological ruins still visible, which prove the existence of quite populated urban centres.
It is a meaningful case of fractal nature equilibrium given by a spontaneous plan between the folds of the rocks of Pantalica and the irregularity of the plan of the natural landscape.
Into this real setting, the harmony making the insider an integral part of the landscape regards the total de-personalization of the man during the process of edification of the place. This process can be defined as “edification as subtraction” and so it allows the total “abandonment of nature” by man, both metaphorically and physically.



Fig. 7: Prehistoric place of Pantalica**.**



Fig. 8: The small urban center of Buccheri**.**

So, the revival of this reality depends on the cleaning up of all those occasional decorations and on the recovering of the morphologic massive consistence and of the true values of the place.
The small urban centres of the mount Lauro cannot be neglected by our field of research. In those centres, the process of “edification as land folding” is set against the “edification as subtraction” one. It is here clear that the urban landscape perfectly matches the orthography of the land, where colours and materials harmonically accompanies the natural material of the place.
Also the built-up area of Buccheri, on the slope of the mount Lauro, is a place where the main axis represents the cornerstone of vital and founding principles. This area, built on a land hollow, is full of archaeological records showing the presence of the human being since remote times.
According to a reading of harmonic integration with the natural landscape, the groups of houses, organically adapted to the winding curves of the mount Lauro, give the impression that the earth crust lifts up to form “natural steps” suitable for human life.
Moreover, the constituent materials of the anthropic landscape seem to be integral part of the natural one. The overview of roof and rock, which characterize the build area, answers to a natural mimetic dynamism, where the architectural emergences, identified in bell towers and in church facades, seem give equilibrium to the small hollow.
It is very important to be able to draw the character and distinctive sign of the places.



Fig. 9: Edification as subtraction. Edification as land folding.

In the end, the Anapo and the Ciane rivers must be protected, in full awareness of how much they have meant and spread during time, thanks to the incisive strength of their spontaneous values, able to arrange a place for the calm flowing of crystalline water and for the grace of the autochthon vegetation. So our minds has to be proactive and bounded not only in recovering paths of naturalistic route and minimal crossing, but mainly in recovering the values of the sounds of nature, silence and vegetation masses.
As well as the spontaneous growing of papyrus is the distinctive element of the Ciano river, the typical characteristic of the Anapo river is its holing underground in many point. In this way, it puts itself as an example of “natural mimesis” of eastern Sicily and, according to the principle of harmony, it becomes the basis of a strict and empowered dialectic relation between the “self” of the river and the aim of the place.

Bibliographical References

[1] VON MEISS, Pierre. *Dalla forma al luogo. Un’introduzione allo studio dell’architettura.* (Translated by DE BENEDETTI, Mario). 1ª ed. Milano: Hoepli, 1992. ISBN 88-203-1928-4.

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Confiscated property : best practice in management of Cultural Heritage

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Abstract
Huge amounts of money amassed by organized crime groups through tax evasion, corruption, fraud to public institutions, are increasingly found to be laundered in art collections or high-value real estate.
Very often assets of this kind are not immediately subject to investigation or preventive measures, revealing their presence only at a later time usually during specific confiscation operations. This is the last step in a process that rarely takes into account the possible intrinsic cultural value of the confiscated goods which, in many cases, prove to be false or counterfeited.
This paper aims to focus on an urgent need to establish the best practices in the handling of assets that could be considered part of a country's cultural heritage. These have to be adopted from the early stages of the judicial work and must pursue a virtuous and proper management of “beni culturali” (according to *Codice dei Beni Culturali*) through the signing of memoranda of understanding between all public institutions involved, with the purpose of preserving the specificity of such goods.

Keywords: measure of prevention, seizure, confiscation, public institutions, cultural heritage

1. Seizure an Confiscation in the Italian legal system.
Aggression against property of illicit provenance is one of the main - if not the most effective - tool among the means of fighting organized crime and it takes the form of two specific regulatory instruments: seizure (or freezing) and confiscation, both applicable in proceedings of prevention or in criminal proceedings.
Italian regulations allow for various forms of penal seizure, but the essential characteristic that distinguishes institutions designated by the terms "seizure" is to temporarily prohibit the transfer, conversion, disposal or movement of property or to temporarily assume custody or control of property on the basis of an order issued by a competent authority.
In the present context, it is useful to focus on the assumption of the seizure under article 321 of Code of Criminal Procedure (permanent confiscation may follow under article 240 of the Criminal Code) which happens when there is foreseeable danger that, if a good connected to the crime remains available, it might aggravate or extend the consequences of the offence itself, or facilitate the commission of other crimes.
A seizure order is normally issued by a court (usually *Giudice per le indagini preliminari*, Judge for Preliminary Investigations), on the basis of a reasoned decree, but in particular cases of urgency, during preliminary investigations, the seizure can be issued by the *Pubblico Ministero* (Public Prosecutor) or by Judicial Police officers. The seizure is aimed at stopping the process of a criminal offense or at preventing new crimes, or at ensuring the confiscation of a good.
Prevention measures are involved *ante delictum*; they are intended to prevent a crime by a person considered socially dangerous and they are characterized by being applied regardless of the commission of an offense. In this context, the seizure is configured as a *sui generis* prevention measure, of provisional and precautionary kind, that can be applied when there is reason to believe that the property, directly or indirectly available to the subject of the proceedings, is part of the

proceeds of illegal activities or can constitute its reuse. Preventive measures on assets are applied, at the request of the Public Prosecutor, by a specialized court (*Tribunale – Sezione misure di prevenzione*, Court - Section prevention measures) that is established in every county, which, in addition to an order for the seizure, shall act on any request to revoke the seizure and decide whether to adopt the seizure (first instance). The seizure follows an investigation (direct or indirect) on the degree of danger posed by the individual, irrespective of criminal responsibility or even of a prior acquittal judgement.
With regards to the specific field of preventive measures on assets, over time, a long series of measures have been introduced, either aimed at the forfeiture of unlawfully acquired property or at preventing their subsequent reuse within the legal economy. These measures have given rise to a multi-layered legislation centered around two principles provisions: *Legge* n. 1423/56 [1] and *Legge* n. 575/65 [2]. Numerous special laws were grafted on them, generally as a result of emotional decisions taken at times of bitterness in the fight against crime, thus resulting in significant changes in the scope and method of application, management and allocation of assets, as well as in the powers conferred to the different authorities involved. The latest step in the regulatory framework is constituted by *Decreto Legislativo* n. 159/2011 [3], the so-called *Codice Antimafia* (Anti-mafia Code), designed and issued for the purpose of rationalizing and integrating the entire current legal framework of anti-mafia legislation, prevention and certifications anti-mafia. Title II of the new code regulates the delicate topic of preventive measures on assets, defining the following measures: seizure, confiscation, bail, confiscation of bail, judicial administration of personal property and judicial administration of assets related to economic activities. These are applicable to a wide audience of individuals - recognised as socially dangerous according to two categories. A "generic" type (i) i.e.: subjects habitually engaged in crime or who habitually live, at least in part, off the proceeds of criminal activities or are engaged in the perpetration of specific offenses, or a "qualified" type (ii): subjects suspected of belonging to criminal groups as defined by article 416 bis of the Criminal Code, including collusion or perpetration of crimes within the jurisdiction of the *Direzione Distrettuale Antimafia* – DDA (Anti-mafia District Authority) or crimes connected to terrorism or violence at sporting events.
The Italian Legislator has emphasized the autonomy of the prevention proceedings with respect to the criminal proceedings, opting for the choice of a "dual-track". In this context, the Anti-mafia Code (article 30) regulates the possibility of coexistence between penal seizure and preventative seizure which, in practice, has resulted in many application problems. While under penal seizure the law only provides for custody of the seized goods, in prevention seizure there are provisions for planned forms of management and administration of the goods themselves. Thus, in the case of coexistence of the two measures, prevention seizure should prevail, resulting in the involvement of a judicial administrator, in order to ensure, in the case of confiscation, the best destination of the assets [4].

2. The European legislation context.

On March 14, 2014 the European Union Council of Ministers has adopted the new directive on the freezing and confiscation of the proceeds of crime in the European Union. Only Poland voted against, while United Kingdom and Denmark did not take part in the vote. The text was agreed with the European Parliament which adopted its position on February 25 [5]. The directive, which is the result of the debate held in the European Council, Parliament and Commission, has already been informally agreed upon by national governments and has been welcomed by many. However, some like the European Criminal Bar Association – ECBA, for instance, have criticised it, suggesting that the new legislation could have an impact on the fundamental rights of the individual and could go against the proportionality principle.
The new directive establishes a clearer legal framework which can strengthen the judicial cooperation among the European Member States. The directive applies a new larger definition of crime proceeds (article 2: “any economic advantage derived directly or indirectly from a criminal offence; it may consist of any form of property and includes any subsequent reinvestment or transformation of direct proceeds and any valuable benefits”) and property (article 3: “property’ means property of any description, whether corporeal or incorporeal, movable or immovable, and legal documents or instruments evidencing title or interest in such property”).
The new directive will apply extended confiscation to more crimes than before: active and passive corruption in the private and public sectors as well as active and passive corruption involving European Union and Member States' officials; participation in a criminal organization; child pornography, and cyber-crime. The list of offences enabling extended confiscation can be further widened by the European Commission to include other crimes.
Moreover, third party confiscation will be possible in the case of goods transferred for free or below the market price and when the third party knew or should have known that the purpose of the transfer or acquisition was to avoid confiscation. Confiscation measures are extended to cases of flight or illness of the suspected or accused person.
The directive also ensures the rights of victims of crime to seek compensation for their claims.

As for confiscation, the final text agreed by the European Parliament and Council does not endorse the initial proposal to establish a full regime for “non-conviction based confiscation”, (that is when, even in the absence of a criminal conviction, money or any assets could be confiscated where a court is satisfied or convinced that the money or assets derive from activities of a criminal nature) as it is the case in Italian law. As further action in the area of confiscation, a joint declaration by the Council and the European Parliament asked the European Commission to carry out a study on the benefits of confiscation in the absence of a criminal conviction, including cases of death and other situations not covered by the new Directive. Member States will have 30 months to transpose the Directive into their national laws.

3. *Agenzia Nazionale per l'amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata* - National Ag ency fo r a dministration and destination of assets seized and confiscated from organized crime.

As a result of a need to provide management, administration and destination of seized and confiscated properties in Italy, an *ad hoc* authority was established to guarantee a centralised and effective administration and allocation of assets seized and confiscated from organized crime, also through a stable relationship with the judicial and other authorities involved, in order to ensure a rapid deployment of these assets: *The Agenzia Nazionale per l’amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata* – ANBSC (National Agency for administration and the destination of assets seized and confiscated from organized crime) was established by decree *Decreto Legislativo* 4/2010, converted into *Legge* n. 50/2010 [6], now transposed in the Anti-mafia Code.

The principal scope of the ANBSC is to provide for the administration and destination of definitively confiscated properties, as well as to assist the judicial administrator under the direction of the Judicial Authority during the seizure phase until confiscation (Court of First Instance), after which the ANBSC assumes direct management of the properties.

Through close cooperation with the Judicial Authority, the ANBSC provides valuable support to the planning of assets allocation, even during the judicial phase, acquiring all necessary information and at the same time advising on how to overcome the issues that often hinder or slow down the reallocation of mafia assets to social purposes use by the community.

Of course, the activity of administration and allocation of goods carried out by the ANBSC, who are animated by the desire not to frustrate the efforts of law enforcement agencies and the judicial authorities, is accompanied by the constant monitoring as a guarantee of the actual social reuse of mafia assets, so that the institutional role played is not reduced to a mere statistic, but is translated into a real perception of the presence of the State on the territory.

The establishing law, in particular, has given the ANBSC important tasks related to the two phases in the management process, namely the judicial and the administrative phase.

In the judicial phase (i), ranging from seizure order until final confiscation, the Agency is required to perform the following functions:

- Assistance to the courts: since the beginning of the proceedings, the ANBSC is called upon to support the judicial authorities to resolve critical issues identified by the judge and the administrator. In carrying out this responsibility, the Agency has been assigned a role, "not as a mere executor of the provisions of the court, but as a forum for consultation and advice" [7];
- Administration of the assets during the judicial proceedings: after the conclusion of the preliminary hearing (in case of criminal proceedings) or the confiscation of First Instance (in case of a prevention process), the ANBSC is required to play the role of administrator of the assets, taking upon itself the duties which, in the initial phase of the proceedings, are the responsibility of the judicial administrator appointed by the court.

In the administrative phase (ii), which begins with the definitive confiscation, the ANBSC performs the important task of disposal of any confiscated property, even taking into account the programming done in the previous judicial phase. In this respect, the law requires the Agency to allocate the asset within ninety days of the final confiscation, extended term of ninety days in the case of more complex operations.

It should be noted that, in both phases described above, the Agency is also entrusted with the task to monitor and acquire data on seizures and confiscations, by programming the destination of the goods in view of the final confiscation and monitoring in order to the use of the assets after the allocation.

4. Destination of confiscated assets.

If a good has been seized in a normal criminal proceedings, once it is definitively confiscated, the Registry of the Court provides for its sale or destruction, except for some special kinds of goods for which a specific destination is required. Among them are works of art, rare objects, antiquities, or

object of scientific interest, all of which are redirected by the Ministry of Justice to the Criminal Museum in Rome or to other institutes [8].
If the confiscated goods are assigned to the ANBSC, they can proceed with the destination of the assets. Real estate (i) is managed by the directors of ANBSC and, only in rare cases it is alienated [9]. Any confiscated money (ii) which is not required to manage other confiscated goods or to be devolved to victims of mafia crime, must be transferred to *Fondo unico di Giustizia* (Justice Fund); other movable goods (iii) must be sold, and the income transferred to the Justice Fund, or re-used by the ANBSC for institutional activities or destinated to other public administrations or regional authorities or volunteer associations for social purpose [10].
According to the Anti-mafia Code, the priority destination of confiscated assets must be its restitution to civil society through public destination or allocation for social purpose. The social and educational value of restitution of the proceeds of crime is amplified when such proceeds belong to the cultural heritage, which has social value in itself. Therefore, the allocation of movable cultural heritage must not follow the normal way and be sold and transferred as money would. It must be destinated for a social purpose.

5. The work of art as a safe have n, source of investment and s ymbol of social ascent.

Seizures of works of art and antiques carried out by the *Direzione Investigativa Antimafia* - DIA (Anti-mafia Investigation Department) in the houses of the boss, show a lesser known face of organized crime, both in Italy and around the world. The purchase of works of art often conceals money laundering of the proceeds of drug trafficking, extortion and usury. Works of art therefore become a means of alternative investment but also a *status symbol*, a distinctive sign of power and wealth, but also of social redemption. It is not simply the ownership of an object: criminal organizations have learned how to manipulate the art market to create illegal opportunities to sell stolen art, stolen archaeological finds and fake or counterfeited objects. This particular form of organized crime is characterized by high specialization and figures with expertise in different fields, grave robbers or thieves, brokers, carriers and drivers, customs officials, art dealers, experts, restorers, employees of auction houses, etc. These people often work together, within an organization structured like a pyramid or cross-linked, often on a transnational level, and they perform the illegal purchase of cultural property and their illegal export from the country of origin, the production of expertise in order to raise its price, the laundering activities aimed at giving objects a false legal provenance. Such aggression against cultural heritage is waged by transnational criminal organizations that can count on a powerful commercial structure, important logistical means, and sometimes on the complicity and support of the political and administrative institutions of the State [11]. Cultural and environmental trafficking stands alongside trafficking in drugs, weapons or human beings. Criminal organizations have in fact developed the ability to quickly adapt their areas of intervention to fluctuations in demand and insidiously infiltrate legitimate businesses and financial circuits across national borders. They operate on a global scale amassing huge illegal profits to reinvest in several countries, including money laundering. Among numerous examples of these activities it is worth remembering the international operation that led to the return to Italy of important archaeological finds that were exhibited in major U.S. museums ([11] case ITA 1).
Alongside trafficking of cultural property another form of investment is counterfeiting and marketing of fake contemporary art. This is subject to fewer constraints and restrictions with respect to works protected by the *Decreto Legislativo* 42/2004 so- called *Codice dei Beni Culturali* (Code of Cultural Heritage) [12], such as the “Plotter case” ([11] case ITA 3), in which an organized criminal group, dedicated to counterfeiting and selling fake works of art from Italy and Spain to Germany and Brazil, was charged with trafficking in cultural goods, counterfeiting and money laundering.
A massive seizure of art by the DIA dates back to July 2008. During the operation “Metallica" coordinated by the DDA of Milan 21 works of art were seized. The same operation turned up 55 works of ancient and contemporary art, mostly paintings, including some exported illegally from Spain. The 24 people arrested for mafia association (article 416 bis of the Criminal Code) were affiliated to the *'Ndrangheta* from Calabria and in particular to the clan headed by Giuseppe Onorato. Criminals reinvested in paintings and jewelry the proceeds of crime such as drug trafficking, usury and extortion. Onorato's clan made its money importing pure cocaine from South America, money which was then laundered by an associate, arrested with six other people, who would buy furniture, antiques, jewelry and works of art all over Europe. In particular, the purchase and resale of famous paintings in some well-known Italian auction houses allowed the clan to recover "clean" money to be invested back again in illegal activities of the Onorato group, for a turnover of several million Euros [13].
Trafficking in art and money laundering: art attracts organized crime because art means business. In this area, the interweaving between organized criminal groups, professional thieves, predatory adventurers, merchants, managers of galleries, auction houses and museums is becoming more frequent. Criminals place on the market art that might be stolen or illegally excavated and then

trafficked. When criminals do not carry out the theft themselves, they act as intermediary between private collectors and professional thieves. But art can also be used to turn money obtained via drug trafficking, into something of value that is easily portable and marketable.
According to experts, the control that drug traffickers have on the art world is so wide that, if they suddenly stopped buying paintings and sculptures for their money-laundering purposes, part of the art market would suffer a setback [14].

6. A case study: the Zappia seizure.

In November 2008 officers from the DIA raided a series of houses in Milan and Cattolica Eraclea (Agrigento, Sicily), belonging to Italian-American boss Beniamino Zappia.
The raid resulted from a seizure order by a Court in Rome and yielded 345 paintings including signed works by Guttuso, De Chirico, Dalì, Sironi, Morandi, Campigli, De Pisis, Boldini. In addition to the paintings, precious objects such as watches and jewelry (about 200), precious stones, vases, statues, bronzes and antiques were recovered. The Sicilian residence, in particular, had become a real "house museum".
Zappia had been in jail since October 2007, following his arrest during operation "Orso bruno". He was considered the Italian referent for North American Mafia families interested in winning lucrative contracts for the construction of the bridge over the Strait of Messina, linking Sicily to Italy's mainland: among them the Bonannoes from New York, and the Cuntrera, Caruana and Triassi families from Toronto. The same Zappia was linked to two Rome based companies ("Made in Italy" and "Made in Italy Inc") used to launder proceeds of drug trafficking, and whose president Mariano Turrisi had been arrested in France in October 2007.
The 2008 seizure was the result of the application of preventive measures on assets, which had kicked in when Zappia declared to the Revenue Agency that he lived on a minimum pension of about € 350 per month [15].
Despite the fact that Zappia was eventually fully acquitted in November 2012 by the the Court of Rome, the prevention measures proceedings ended with the final confiscation of his property.
Following confiscation, the judicial administrator appointed by the ANBSC to manage this huge fortune was then faced with the difficulty of dealing with goods of a special nature.
The movable assets confiscated, became State-owned, dating back over fifty years and which are the work of an author no longer living, are considered Cultural Heritage (as defined in Articles 10, paragraph 1 and Article 12 paragraph 1 of the Code of Cultural Heritage). As a result, they are subject to all the protection provision disposed by the law.
Despite the fact that, at the time of the seizure, the officers became aware of the presence of goods that could have some cultural and economic value, as in the case of high market value paintings signed by well-known artists, as well as other precious objects, they could not clearly identify the most important works of art. Thus they availed themselves of the support of an employee of a well-known Milanese warehouse and vault to separate artwork and jewelry from other goods and to then transport and store them in a suitable location. The goods were listed and photographed and then moved into the vault, where they are still stored for a fee. Looking at registration and photographs now, the limits of an operation conducted by non-experts is apparent. Photos are blurred and dark and the list too generic to be useful to identify single objects. Storage in a vault for over five years carries a significant cost to the State making it now necessary to assess the merits of the stored works, including whether they are authentic and to find a destination that allows adequate conservation, enhancement and public enjoyment of the goods.

7. Problems to be solved and proposals for best practice.

As seen in the above case-study, the richness gathered by organized crime groups, tax evasion, corruption, frauds to the public institutions, ends up increasingly as money-laundering in collections of artistic works of art or quality immovable properties.
Very often assets of this kind are not immediately subject to investigation or preventive measures, revealing their presence only at a later time, usually during specific confiscation operations. This is the last step in a process that rarely takes into account the possible intrinsic cultural value of the confiscated goods, which in many cases prove to be false or counterfeited.
The problem arises primarily from the fact that, except in cases of crimes against cultural heritage, (as in the emerging transnational crimes such as illicit trafficking in works of art), seizures of art mostly happens incidentally in the context of reinvestment of crime proceeds, as part of larger investigations of crimes of greater social impact.
It is worth considering that in cases such as Zappia's, for instance, where seized objects were not immediately recognized as potential carriers of cultural interest (after all, not all of them were) it often boils down to the individual initiative of police officers or the judicial administration the initiative to involve art experts in the early phases of the management of the goods. Not everything is cultural property yet art objects are not only paintings. There are a number of categories ranging from

archaeological items, to jewellery, to furniture to cars, making it difficult to differentiate management of the different objects.
According to current legislation, which transposes the wording proposed by Commission Franceschini in 1964 [16], cultural property is defined as a "material testimony of civilisation" ("testimonianza materiale avente valore di civiltà" – Code of Cultural Heritage, article 2), and as such it deserves to be recognized as belonging to the nation's Cultural Heritage. For its function, for that which it is able to represent more than what it is, it performs, through the public use, a cultural function of transmission of a memory of the past.
For this reason it is becoming increasingly clear that current legislation and its implementing regulations lack the foresight that seized objects could be potentially Cultural Heritage. For example, the Implementing Provisions of the Code of Criminal Procedure, at the moment of seizure distinguishes between the following: perishable goods, common objects and valuables (among which are numbered drugs and psychotropic substances in general, coins need to be maintained for procedural requirements, precious objects in general, and objects of scientific, artistic or archaeological value) with no regards to specific conservation measures. The ANBSC distinguishes the goods seized in four categories: corporate assets, real estate, registrated movable property (i.e. cars, boats, planes etc.) and sums of money. In this perspective, we consider a missed opportunity the fact that the framers of the Anti-mafia Code did not take into account the possibility of equipping our normative system with *ad hoc* measures for identification and management of (presumed) cultural assets, with an aim to ensure various forms of judicial control in accordance to the different characteristics of the good.
The definition of good with potential cultural interest must be transposed by the criminal legislation in order to be able to intervene in the early stages of the seizure proceedings to provide specific procedures for goods that exhibit the characteristics of cultural heritage. A systematization of procedures is also necessary in the early stages: the *Ministero dei beni e delle attività culturali e del turismo* – MIBACT (Ministry of Cultural Heritage and Tourism) must be involved (through memoranda of understanding according to the article 113 of the Anti-mafia Code) from the very first step of the proceedings to make a first selection of what deserves attention (i.e. objects of potential cultural interest, on which to initiate studies and surveys about authenticity), and what can safely be discarded or treated as a normal object.
Another role that should be played by MIBACT is that of judicial custodian for those goods that are of potential interest by making available some of its storage vaults (one or two per region according to the needs, for example).
The involvement of MIBACT is also crucial because, if after seizure, the property is then confiscated by the State it will pass from a status of work of art to that of cultural property, subject to all the provisions for protection under of Code of Culture Heritage. Article 10, paragraph 1 and article 12, paragraph 1 determine that any public property made by an author no longer living dating back to more than fifty years, if mobile, or over seventy years if real estate (the case of listed buildings and real estate of potential historical and artistic value is interesting, but not addressed in this paper) are subject to law until the end of the verification proceedings required by the Code of Culture Heritage.
Another problem to solve is that of the destination. In the allocation of confiscated property should be a priority target the destination for purposes of public interest (i.e. maintenance to Tax Authority or transfer to local authorities) and their best end use in order to reintroduce them into virtuous circles involving the community: a property rendered to society weakens criminal organizations, states the rule of law and constitutes a resource for the territory. If, with regard to the process of administration, destination and re-use of the seized and confiscated assets (property and business), are not yet resolved, the operators of the sector will often encounter certain problems., At least in the field of cultural heritage we can adopt better practice because, for their intrinsic nature, cultural heritage fit perfectly in the social and public interest required to assign the confiscated property.
Cultural Heritage generates civilization, education, social cohesion. All concepts that are based on Article 9 of the Italian Constitution: "The Republic promotes the development of culture and scientific and technical research, The Republic Protects the landscape and the historical and artistic heritage of the Nation." ("La Repubblica promuove lo sviluppo della cultura e la ricerca scientifica e tecnica. Tutela il paesaggio e il patrimonio storico e artistico della Nazione"). It emphasizes the primacy of the protection of the National Cultural Heritage even before other public interests and it is founding reason of policy of public protection and valorization. Cultural Heritage is related on one side to the essential identity, territorial and national value, and on the other side to the purpose of promoting the development of culture.

8. Conclusion.

In this paper we first analyze the current state of the Italian and European legal framework related to the institutions of seizure and confiscation in the Criminal Code, in the Anti-mafia Code and in the Directive of the EU Council on the freezing and confiscation of proceeds of crime, and we make an

overview on the tasks of ANBSC in the management of confiscated assets. Then we introduce a few cases of crimes directly or indirectly involving cultural heritage that ended up in confiscation of cultural property. In particular, we analyze a case in which a huge number of artworks were seized and then confiscated. This case shows the limits of the procedures currently followed in the seizure of cultural heritage and allows us to make proposals towards best practice in procedures of seizure and confiscation. In conclusion we propose:

1) Reform of the normative system regarding seizures and confiscation, including the addition of a new category of "object of potential cultural interest" to the list of categories of seized goods and a provision for the specific management of object or assets of potential cultural interest.
2) The signing of an agreement between ANBSC and MIBACT to establish all steps required for an adequate procedure.
3) Early intervention of MIBACT in the case of seizures related to cultural heritage.
4) Selection of warehouses or storage locations that can guarantee proper monitoring of storage condition of Cultural Heritage (i.e. temperature, lux, humidity) .
5) After permanent confiscation, ANBSC should submit a request of *verifica dell'interesse culturale* (Verification of cultural interest) according to Article 12 of the Code of Cultural Heritage. The verification distinguishes between Cultural Heritage and goods without cultural interest.
6) The final destination of confiscated cultural property must take into account its double value as proceeds of crime returned to community for social purpose and Cultural Heritage to be protected, enhanced, and destined to public fruition.

Bibliographical References

[1] Legge 27 dicembre 1956, n. 1423, *Misure di prevenzione nei confronti delle persone pericolose per la sicurezza e per la pubblica moralità*.

[2] Legge 31 maggio 1965, n. 575,*Disposizioni contro la mafia*.

[3] Decreto Legislativo 6 settembre 2011, n. 159, *Codice delle leggi antimafia e delle misure di prevenzione, nonché nuove disposizioni in materia di documentazione antimafia, a norma degli articoli 1 e 2 della legge 13 agosto 2010, n. 136*.

[4] FIANDACA, Giovanni, VISCONTI, Costantino. Il ''Codice delle leggi antimafia'': risultati, omissioni e prospettive. In AA.VV. *Legislazione Penale*. Anno XXXII n. 2 - 2012 (106), p. 181-184.

[5] *Position of the European Parliament adopted at first reading on 25 February 2014 with a view to the adoption of Directive 2014/.../EU of the European Parliament and of the Council on the freezing and confiscation of instrumentalities and proceeds of crime in the European Union*. Web: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2014-0120+0+DOC+XML+V0//EN&language=EN#BKMD-16

[6] Decreto Legislativo 4 febbraio 2010, n. 4, convertito in legge con modificazioni, dall'articolo 1, comma 1, Legge 31 marzo 2010, n. 50, *Istituzione dell'Agenzia nazionale per l'amministrazione e la destinazione dei beni sequestrati e confiscati alla criminalità organizzata*.

[7] MALAGNINO, Mario Erminio. *Il Codice Antimafia. Commento al d.lgs. 6 settembre 2011, n. 159*. Torino: Giappicchelli, 2011, p. 305.

[8] Decreto Legislativo 28 luglio 1989, n. 271, *Norme di attuazione, di coordinamento e transitorie del codice di procedura penale*. Articolo 87.

[9] Relazione annuale dell'Agenzia Nazionale per l'amministrazione e la destinazione dei beni sequestrate e confiscate alla criminalità organizzata ANBSC, 2012. Web: http://www.benisequestraticonfiscati.it/Joomla/index.php?option=com_content&view=category&id=37&Itemid=13

[10] COPPOLA, Alessandra, RAMONI, Ilaria. *Per il nostro bene*. Milano: Chiarelettere, 2013.

[11] United Nations Office on Drugs and Crime Vienna. *Digest of Organized Crime Cases. A compilation of cases with commentaries and lessons learned.* New York, United Nations, 2012. Web: https://www.unodc.org/documents/organized-crime/EnglishDigest_Final301012_30102012.pdf

[12] Decreto Legislativo 22 gennaio 2004, n. 42, *Codice dei Beni Culturali e del Paesaggio adottato ai sensi dell'articolo 10 della legge 6 luglio 2002, n. 137*.

[13] Web: http://www.crimelist.it/index2.php?option=com_content&do_pdf=1&id=710

[14] DI NICOLA, Andrea, SAVONA, Ernesto U. *Tendenze internazionali di traffico di opere d'arte e politiche di contrasto*. In *Transcrime Working Paper*. Giugno 1998, n. 25.

[15] The facts are well-known and they could be easily found on the web. See, for example: web: http://www.corriere.it/cronache/09_giugno_25/dia_sequestro_tele_mafia_c29678b8-6161-11de-80bb-00144f02aabc.shtml; web: http://roma.repubblica.it/dettaglio/sequestrate-opere-darte-al-boss-beniamino-zappia/1660331.

[16] *Per la salvezza dei beni culturali in Italia. Atti e documenti della Commissione di indagine per la tutela e la valorizzazione del patrimonio storico, archeologico, artistico e del paesaggio*. Roma: Colombo, 1967. Web: http://www.icar.beniculturali.it/biblio/pdf/Studi/franceschini.pdf

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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'THE BOSPHORUS, ISTANBUL: MAGNIFICIENT PAST, DUBIOUS FUTURE '

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Abstract
Most probably due to its strategic location, Istanbul has served home to a number of glamorous civilizations whose traces are endlessly testified by the majestic architecture they left behind. Following its fall to the Ottoman Empire in 1453, the City has enlarged beyond its walls and spread over the two shores of Bosphorus, the elegant straits which bisect the settlement in two and mark the separation of Asia and Europe. In addition to impressive serails and palaces, beautiful wooden residences have been erected since then and after the proclamation of the Republic of Turkey in 1929 on the Anatolian and Thracian shores of Bosphorus. In the form of small agglomerations interrupted by the green, these beautiful Turkish- Ottoman dwellings, occasionally influenced by western styles, have exemplified a truly humane scale and a profound integration with nature.
Economic conditions, cultural transitions and finally the appearance of new building materials and habits have gradually led to the extinction of the wooden building tradition in Istanbul to replace it with more profit- generating condominium- type concrete structures designed on imported models and permitted under local regulations on these high- value lots. It has only been few decades ago that authorities and academicians have realized the negative consequences of the concrete-plaster invasion and have initiated successive building restrictions to prohibit the destruction of the rare pieces of the architecture and the natural environment. Yet, the repeatedly revised and tightened legislation has not stopped the cultural massacre.
The present paper and the associated pictorial demonstration review and analyse the current state of the residential antiquities and the contemporary building trends in this unique context.

Keywords: Istanbul, The Bosphorus, Alp, Architectural Heritage, Conservation.

1. Istanbul's History
Istanbul is reported to be founded on the peninsula at the mouth of Golden Horn by a group of Greeks originating from a place called Megara. Initially named Byzantium, the City's strategic emplacement linking Asia and Europe and it's natural harbor have fostered its development as a major center of trade and commerce. Following its inauguration as the capital of the Roman Emperor Constantine in 324 AD, its name was changed to Constantinopolis and it was largely remodeled with the Roman monumentalism in mind. In 395 AD, when the Roman Empire divided into two, it has continued to serve as the capital of the Eastern Roman Empire, and with its churches, monasteries and places it has became soon the focus of the Christian civilization.

In 1453, subsequent to a series of unsuccesful Muslim attacks, the Ottoman Emperor Fateh Sultan Mehmet conquered the city through a miraculous military maneuver and Istanbul commenced a new era as the capital of the majestic Ottoman Empire for 500 years. As the metropolis of the Islamic realm it was then called ‘’Dersaadet’’ translated as ‘’Threshold of Felicity.’’ The City’s population ascended to 400.000 during the climax of the Ottoman Empire in the 16th Century. The degradation of Ottomans, however, subjected Istanbul to once more experience the dominance of the West. In 1903, the cosmopolitan population reached 1.200.000 (see table). Following the World Wars Istanbul became the major center of the Republic of Turkey. Today about 15.000.000 people live amongst the Great Ottoman master Sinan’s mosques of unsurpassed grandeur and elegance crowning the City’s seven hills with their gigantic domes and slender minarets.

2. The Bosphorus, its Architecture

The shores of Asia and Europe intertwine and come to meet at the Bosphorus which divides today’s Istanbul into two major parts. Spanned by two elegant suspension bridges the Bosphorus joins the waters of Marmara Sea at the South and Black Sea at the North in a legendarily beautiful setting. Gentle or abrupt slopes crowned by colorful woods attribute the Bosphorus an unique character further jollified by its delicate architecture. In addition to splendid palaces, fortifications, mosques and pavillions sited on both sides by the earlier occupants, the wooden houses describe picturesque villages. Those initially confined to valley-heads, today expand continuously along both shores. Now integral parts of the city, the Bosphorus’ settlements were mostly suburban resorts hosting the local population of fisherman and garden-keepers, elite families and foreign missions’ residences.
The Bosphorus where natural and built environments are delicately interwoven to each other has always meant pleasure and repose, luxury and elegance, distinction and prestige. The wooden houses on the shore-front, or ‘’Yalis’’ stretch out in rows and project onto the waters while on the banks perched among trees, they blend with the woods enchanted with multicolor flowers.
The Bosphorus’ timber houses, mostly of two-to-three storeys, exhibit cantilevered loggias or ‘’cumbas’’, deep-projecting roof-eaves, 1/2 ratio windows screened by delicate lattice-work and ironwork, splendid arcades and rich balustrades. Covered by red roof tiles or ‘’ardoise’’ sheets, they either refer to dynamic balance or symmetrical formality in their plan and elevations.

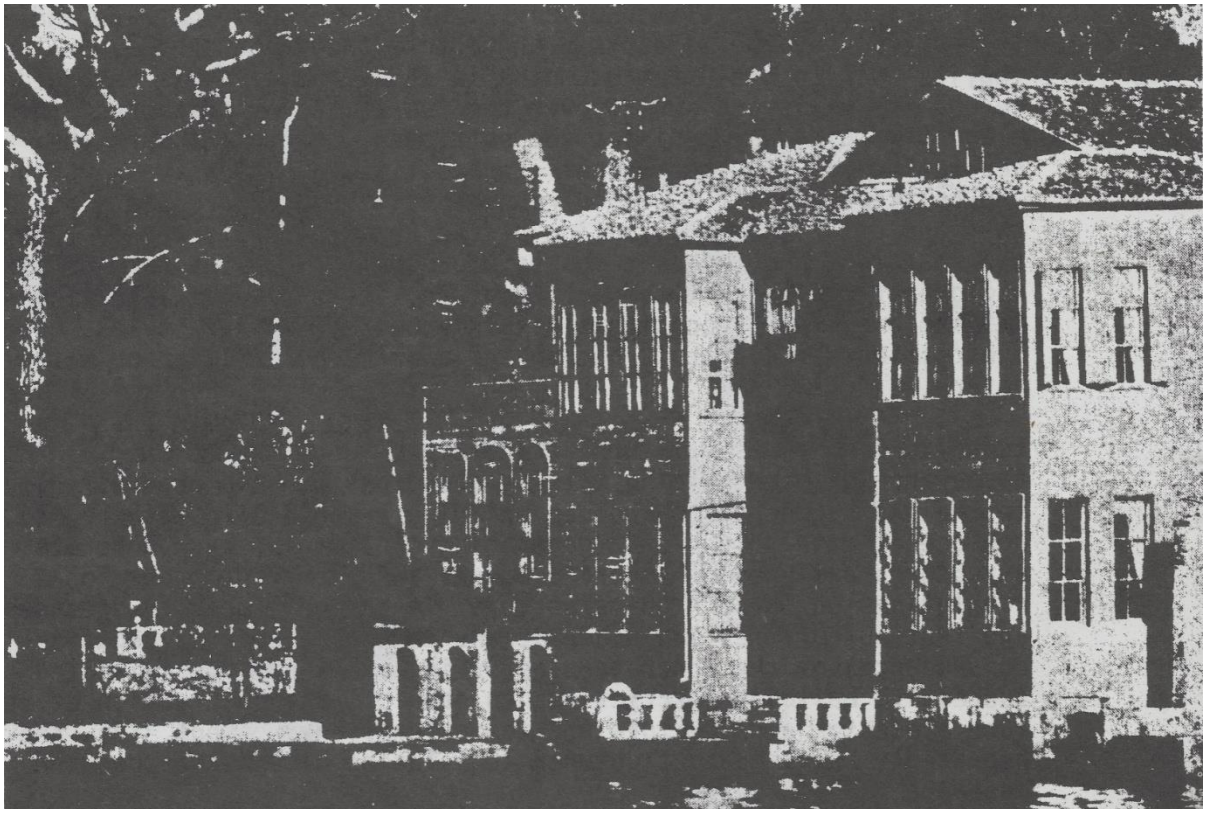

Fig. 1: Vertically elongated windows and red brick roof projecting on the water are typical characteristics of the Bosphorus’ sea-front residences or ‘Yalis’.

Occasionally influenced by Western styles, Bosphorus' houses exemplify excellence in timber structure and craftsmanship.

2.1 Threats to the Architectural Integrity

Not only because craftsmanship has not been transferred to younger generations, but economic conditions, cultural transitions and dominance of new construction technologies and materials have brought the end of timber architecture in Istanbul. The construction industry and its speculators as well as insensitive individuals have sadly initiated a gradual architectural degeneration process on both shores of Bosphorus.

Even before the fashion for concrete apartment structures started, Bosphorus had its own problems. There have been state-owned factories positioned here and there, tobacco warehouses and others, giant fuel storage tanks, coal distribution posts right on the shorelines; there have even been a shipyard, many private sand / gravel dealers with their frigthening machinery along the costs. However, those were still acceptable since they have been few in quantity and had become landmarks to the habituated eye in sharp contrast with their surroundings.

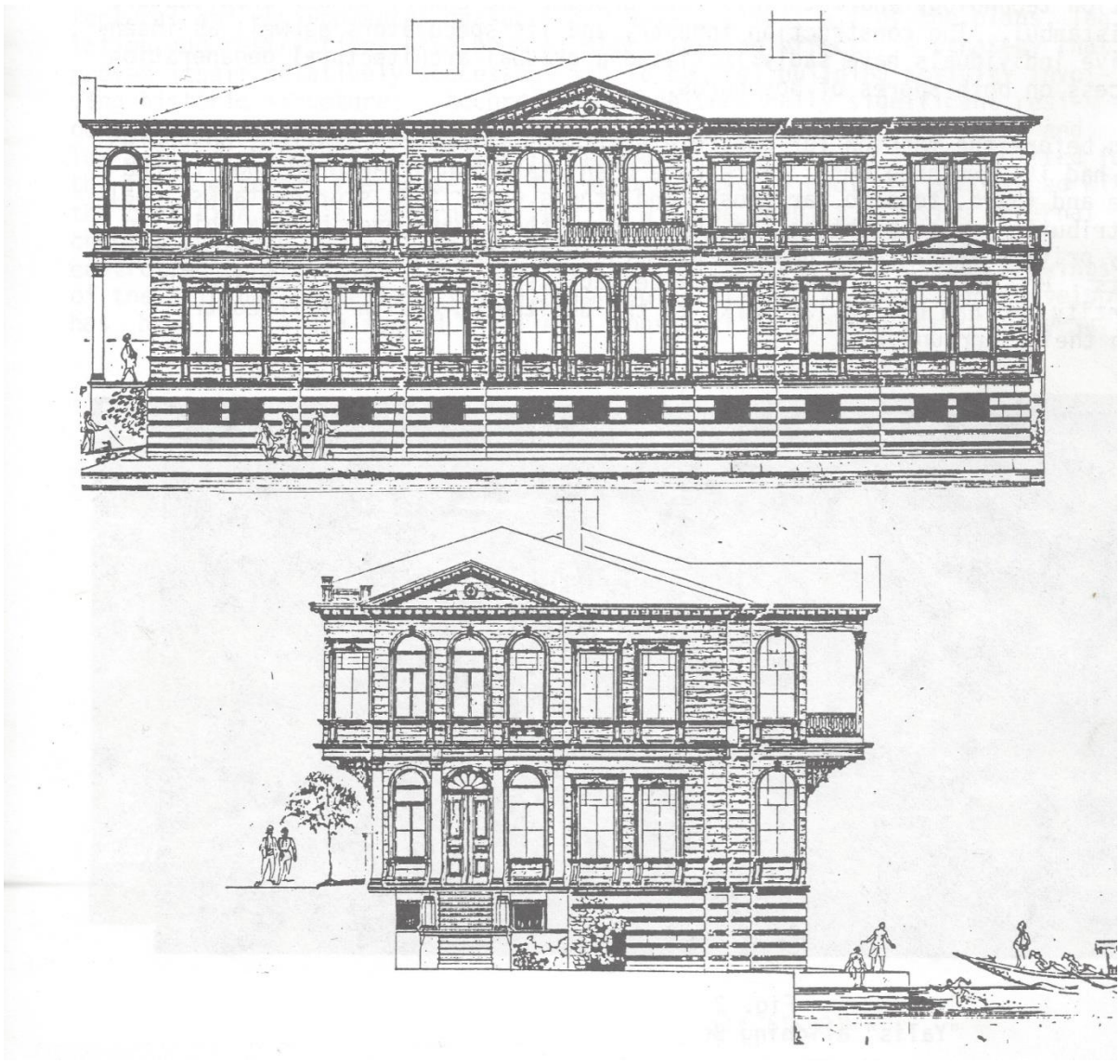

Fig. 2: Measured drawings of "Rasim Pasha Yali".

Dangers of more serious nature have appeared later. Economic conditions and cultural transitions, over-population and concentration in big cities, ineffectiveness of the authorities, passive attitude of the community and academicians and many other contributory factors opened the gates to developers to erect profit generating condominium-type concrete structures insensitively designed on imported models and permitted under local regulations. The situation has worsened when illegal building activity either in the form rural population on the other hand invaded the banks of Bosphorus. Finally, large scale cooperative-housing schemes climaxed the threat to the integrity of the Bosphorus natural and built heritage. The tasteless apartment blocks and the slum housing or 'gecekondus' built overnight by the immigrated poor did not leave the picturesque wooden houses untouched. Not only that they lost their inspiring environment, but a quite large number of them were sacrificed in the search of financial profit and ''modernization'' as a side benefit.

2.2 Remedies

Since some decades, a certain awareness of the disastrous stream of events have forced the concerned bodies to try to slow down, if not stop, the architectural and environmental massacre. However, almost all of the plans, legislation and restrictions have been of short-lasting effects. A strategy that proved itself relatively successful was to control building activity involving historic structures. Accordingly, architecturally significant residences were divided into three groups of respectively high, moderate, and low aesthetic and historical merit. Approved repairs only were permitted for the first category. The houses in the second category could be demolished with the condition that an externally replica will be rebuilt allowing internal changes only. And the last category was set free for new, yet size-wise controlled construction provided that an approved set of measured drawings of the original house is filed with the authorities. That was followed by a specific decree intended specifically for the Bosphorus site banning all sort of new building activity.
All such attempts have naturally initiated reactions and legal problems intricate to solve.

3. Conclusion

Its skyscape of thrilling beauty, its landscape of enveloping charm and its picturesque architecture still classify the Bosphorus as one of the most appealing, characteristic and mystical spots of the World. Isolated efforts, enforced rules, and cries of some faitfull intellectuals have appeared to be not sufficiently effective and long-lived to save its heritage. The experience from the past indicates that a much more encompassing strategy dealing with issues of zoning, building limitation and restriction, land subdivision control, restoration and adaptive-reuse, landscaping and tree replantation, aesthetic controls for new dwellings, valuation of open lands, prevention of loss due to fire and aging, maintenance, land tax regulation and educational programs may possibly contribute to establish a stable balance of the economic, political, cultural forces that have always been battling over the Bosphorus.

Muslims	762.902
Greeks	193.152
Armenians	104.856
Jewish	59.253
Latins	3.330
Bulgarians	4.782
Protestans	170

Fig. 1: The composition of İstanbul's population in early 20th Century
(Archives of the Municipality of Istanbul9

Selected Literature

Agat, Nilufer
"Bogaziçinin Turistik Etudu"
(Toutistic Study of Bosphorus) Doctoral Dissertation Istanbul Technical University, Faculty of Architecture, 1963 (in Turkish)

Alp, Ahmet Vefik
"Bogazici'nde İki Eski Yali"
(Two Old Yalis in the Bosphorus)
İn Arkitekt, 371/1978, pp. 95-98 (in Turkish)

Alp, Ahmet Vefik
"An Approach for the Preservation of the Residential Architecture of Historical Value in Developing Countries" in Housing Science and Its Application, Vol. 8, No 4, pp.419-424, 1984

Barkan, O.L.
"Essais sur les Données Statistiques dans l'Empire Ottomone aux XVet XVI Siecles" in Journal of Economic and Social History of the Orient, August 1957

Cecener, Besim.
"Kultur Degeri Olan Yapilarda Koruma ve Mimar"
(The Architect and the Preservation of Building of Cultural Value in Mimarlik, 72/6, June 1972. Pp. 40-44 (in Turkish))

Ceyhan, Necdet.
"Rasim Pasa Yalisi Rolovesi"
(Measured Drawings of Rasim Pacha Yali) in Mimarlık, 72/6, June 1972. pp. 60-65 (in Turkish)

Çubuk, Mehmet
"Bogazici'nin Korunmasi ve Degerlendirilmesinde Urbanistik Kavram Gelistirilmesi"
(Developing Urbanistic Concepts for the Preservation of Revaluation of the Bosphorus) in Mimarlik 72/6, Jue 1972, p. 46 (in Turkish)

Fagan, Peter
" Saving a City's Heritage"
İn Mediterranean Construction, November 1984, pp. 35-37.

Gulersoy, Celik
"Korunmesi Gereken Bogazici"
(The Bosphorus Needs Preservation)
A publication Turkish Tourism and Automobile Club, Istanbul, 1972 (in Turkish)

Gülersoy, Celik
"Bogazici, Sorunlar, Cozumler"
(The Bosphorus, Problems, Solutions) A Istanbul Kitapligi Ltd. Publication, 1983 (in Turkish)

Kilincaslan, Ismet
"Istanbul, the Largest Capital City of the Middle-East in 19 Century"
İn Al-Faisal Architecture & Planning Journal, vol. 1, No. 1. April 183, pp.48-50.

Özçay, Muren
"Istanbul"
Aga Khan Awards for Architecture Publication, 1983 Awards Ceremony, Turkey.

Ozden, Sahip
"Zavalli Bogazici"
(Poor Bosphorus) in Mimarlik 72/6, June 1972, p. 47, (in Turkish)

Tekeli, Ilhan; Erder, L.
"Iç Gocler"
(Internal Migrations) Hacettepe University Publication, Ankara, 1978 (in Turkish)

Yucel, Atilla
"Contemporary Turkish Architecture" in Mimar 10, Oct./Dec. 1983,pp. 58-68

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Mosques of Madinah: Designing towards Authenticity

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Abstract: The architecture of mosque design since the establishment of Islam in Madinah has witnessed various forms of development and political precedent. Form and function, construction methods, material use and decoration have led and sometimes followed technological innovation. The majority of mosques built in Madinah in the 20th century have a single communal character; a copy of historic architectural forms without a connection to that historical culture or politic.

Various contemporary positions within the nature of these changes are held; some consider that contemporary design does not need to have historical references to buildings which are not part of that political or geographical arena, while other thought recognises historic layers even if out of context with building methods, materials or social norms.

This paper discusses in brief the principles of historic mosque architecture within the first city of Islam in terms of architectural and artistic expression which illustrates the intellectual and physical factors contributing to this architectural heritage. A philosophical criticism is helpful in order to establish some reflections concerning the relationship between authenticity and concept of design in the 21st century.

Key words: Principles, Imitation, Tradition, Innovation, Authenticity.

1. Introduction

From a Muslim perspective, Madinah represents an eternal archetypal city and place of wisdom received through revelation by the Prophet Muhammed 1435 years ago. Governed according to the innovative treaty of the 'Sahifat al Madinah' (Amatulla) the city became a declaration of social justice and reflected the new society's purpose and the establishment of Madinah's first Mosques within Islam.

Madinah was a fertile crossing point within a harsh desert climate; a geographic bowl, where rain-water drains into from the surrounding mountains. It became a centre for trade caravans. Watch-towers were built as protected look-out posts against marauders and bandits. Madinah was not a walled city; its defense was in part due to the difficulty of its approach and harsh climate.

The initial buildings of note were built using local materials of Basalt and lava stone with red earthenware clay. The lava stone spread throughout the region from volcanic eruptions and lava flows. The stone is strong and yet friable and was used for foundations and walls which rose above grade. Clay walls would continue in the French Pise tradition of building, as well as the production and use of unfired clay brick. Roofs were flat with palm trunk spas and joists. Domes and vaults were not known or used until the Mamluke and Ottoman eras.



Fig. 1 Simulation of the Mesjid Nebawi; the early mosque built during the establishment of Islam

The main element of a mesjid is primarily a clean open space to pray together. A further element is the direction to pray, incumbent to face Mecca and its centre, the Kaaba, an open house with a celestial stone embedded within one corner. A raised platform or tower enables a person to call people to the daily prayers but is not mandatory. Lastly there must be a facility for washing, enabling cleanliness for the prayer to be performed in an accurate manner.

From these elements of purpose sprang an architecture which contained these criteria, using the modest and available local materials. This early architecture in its simplicity was a collective response to need and identity; not just a spiritual identity but one informed through governance and directive.

The various Muslim governments and their societies brought layers of expansion to each mesjid. These were sometimes due to fire or lightning, which required repair or the need for an expanded space as the Muslim population grew. Mesjid al Nebawi grew from simple clay walls and palm

trunks to stone pillars during the authority of the Caliph Umar. Rock wall foundations and further stone pillars under the Umayyad Dynasty were added; each dynasty and epoch adding and imprinting their own skills and architectural elements.

These expansions and developments reflected the governance and societal aspirations as well as skills and developments in building; new techniques and materials were incorporated within each new build. These reflect each epoch and therefore become a true critique and reflection of that society. Each governing epoch portrayed its own outlook, expressed through the skills and knowledge of its artisans. The simplicity of clay and its direct community involvement led to the use of stone and a specialized workforce.

Contemporary mosque architecture also becomes an accurate reflection of society and is worthy of investigation and comprehension. Our aim here is not to show the historical step by step development of the main mesjids of Madinah, but nevertheless to show and reflect the society as portrayed within the architectural models.

We conclude with a deeper appreciation of tradition, while acknowledging that pastiche and imitation is not enough to accept a 'historic' architecture. Respecting an environmental context, a memory of place and the cultures of local people are important but allied to authentic use of space and physicality with appropriate functionality.

This linear outward enquiry has three streams;

1. An historical reference and displacement using pastiche motifs and modern materials.
2. A post modern sensibility which recognises a cultural/historic legacy and its connection to place while bringing a layer of empathetic personal identity.
3. A contemporary approach without location or historic reference.

2. Tradition and its meaning

A point to be clarified helping us understand the world of people living before our 'modern' age is to understand the meaning of tradition which concerns aspects of material culture, local techniques of building and principles of common life, including faith and intangible heritage. Therefore, the process of industrialization and its effect of globalization have widely marginalized the spirit of creativity and authentic expression of specific cultural groups, affecting social and individual behavior, transforming a local identity into a globalised identity. (Abu Al Haija, 2014)

Tradition should be understood from a tangible and intangible realm embracing culture. Each age and people still held to innovative techniques bringing out a particular genius established through their geographical location and identity. A tradition is tempered by hand skills and a passing on of knowledge without the use of heavy machinery or an idustrialised process. (Foster, 1973) It is not the buildings per se which are traditional but the society which produced them.

3. Three streams of Identity

We have within contemporary architecture three streams of identity which we hope to elucidate here and which in fact reflects the social condition of our age. Madinah is not separate from this and can be used as an example of inquiry which helps elucidate our modern condition and situation. We have a dichotomy between Traditional society and Modern/Contemporary society which still needs to be examined deeper in order for us to arrive at an appreciation of what is in front of us.

These streams must be recognised as the inheritors of a lost or at least a broken 'traditional' architectural identity which reflected a 'traditional' Islamic society. Traditional Islamic societies have become technological. Echoes are in place; both in terms of building footplate and cultural heritage, although society itself moves away from that echo within each passing decade. Mythos is discarded, only logos remain. (Armstrong, 2004) This linear post traditional enquiry has three streams;

2.1 Stream one: Imitation

The first stream emerging from this loss of tradition acknowledges historical style within a design process. This style in fact becomes an icing on a concrete cake. It usually does not use the materials of the past, (whether stone, wood, clay or fired brick) but the convenient materials such as steel and concrete with various hollow brick infill. This style may also be adoptive and eclectic, traditionally never simply surface decoration but something deeper, connected to use, function, geometry and meaning. The 'Muqarnas' within the 'Mihrab' (or prayer niche) is a good example, this stalactite form was not simply a decorative transition of square to circle, but an amplification of sound, allowing the voice to be projected back to the far wall allowing all to hear and therefore participate.

This historical necessity becomes a pastiche from its original source, an outward recognition but hollow in its authenticity. Geometry (as visual number) is not considered in the buildings conception and an identity to local people or their governance is not expressed. The mosques of Qiblatain and Miqat, in their new emergence and enlargement receive a 'Mamluke' style, with interiors of Moroccan and Ottoman decoration. Mesjid Al Nebawi has an Andalusian 'Umayyad' style reminiscent of Seville and Damascus (Fig 2). When the decorative elements of yesterday are copied and re-elaborated using modern technology.


Fig 2


Fig 3

Fig. 3 Shade umbrellas are in place within the pavilions of Mesjid Nebawi. This innovative design allows for a flexibility of space during different types of weather, they are not overbearing in scale or foot-plate and are folded when not needed allowing a clear view-site.

2.1.1 Mesjid Qiblatain (Mosque of the two Qibla's) and Mesjid Miqat

Within the Qiblatain mesjid, the previous direction of prayer (to Jerusalem) has been removed, excepting a small marker as reference. The scale and footplate is enlarged with external Mamluke style decoration yet without the wonder of the carved sandstone dome present at the Muayyad mosque or the simplicity of the Ibn Tulun Mosque at Cairo. So we start to see a difference between past 'Traditional' society and its build criteria and today's 'contemporary' pragmatic use of diverse internal decoration, applied as a surface aesthetic without connection to the meaning of the whole architectural expression.

The Miqat and Qiblatain mesjids are mainly built of an extruded and fired 'light' clay brick. The arches contain a hidden reinforced concrete load bearing structure, although the Pendentives and Domes are built in a manner reminiscent of the Nubian constructions of Upper Egypt. It is a necessary compromise considering load and compressive strengths of the red brick when dealing with this scale and the increase in load-bearing weights, time constraints and monetary budgets.



Fig. 4

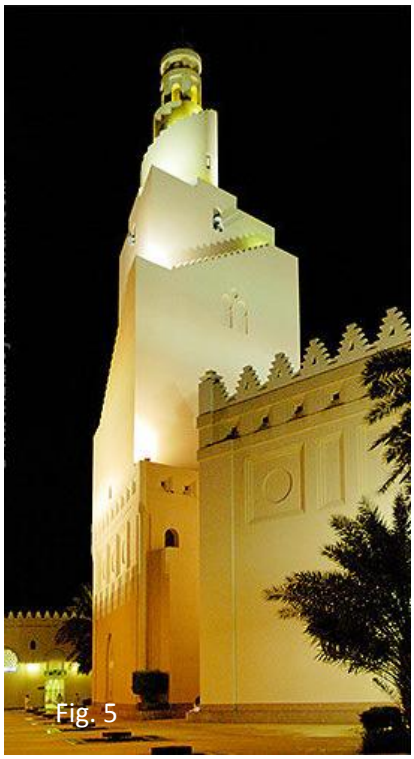

Fig. 5

These monumental buildings are outwardly impressive and have been achieved with difficulty and compromise. It still raises questions of accuracy in terms to our reference of history and governance. What is the connection in design terms to the Mamluke period and the established Saudi Kingdom?

However beautiful they may appear, scratching the surface of decoration produces an eclectic mix divorced from local skills, governing directive or integrated build structure. Instead it relies on an imported historic style devoid of governing directive.

2.1.2 Ibn Tulun Mesjid, Cairo 9th Century Egypt and Mesjid Miqat, Madinah 20th Century

The contemporary mesjid of Miqat shows how materials and technology have driven the final design. The mesjid of Miqat takes as a reference the Cairene mosque of Ibn Tulun. The mesjid of Ibn Tulun's unique design, with its minaret staircase is also an echo of the mosque of Samarra, Iraq (Fig. 6). It uses sandstone as its main material, while its scale still evokes a human measure. A modesty of scale becomes intimate and inviting, not intimidating. The build materials are transparent and have a quality of directness and honesty.



Fig. 6



Fig. 7

Cast concrete blocks (Fig. 8) are made for the Miqat capitols while a heavier scale and design sensibility is introduced. The design above the doorways become heavy and arbitrary with loop-holes as décor (Fig. 9) while the Minara becomes a totem; a symbolic place for calling the prayer. The brick remains visible, with a weather-proof paint coating and double pillars give an impression of strength and scale, although are hidden reinforced and cast-concrete pours.

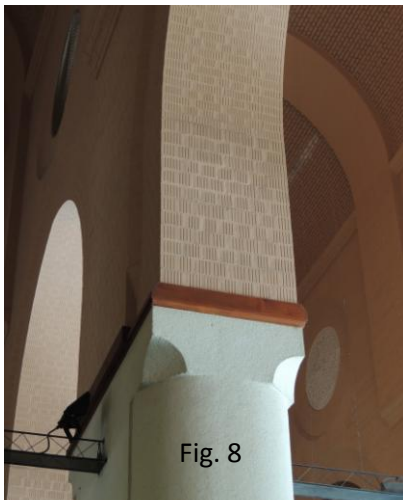

Fig. 8



Fig. 9

3.2 Stream two: Revised Modernism

The second stream is post-modern; one of re-connection to a historical/cultural past as well as a consideration to location and specific use. It may embrace technological innovation and current materials. It does bring innovation and is usually creative.

3.2.1The Grand Mosque of Rome

A strong example outside of Madinah would be the Mosque built in Rome and completed in 1995 by the architect Paolo Portoghesi. His architectural design is based upon hands raised in supplication and prayer, while structurally it serves a purpose by holding a large covered prayer area without heavy intervening pillars which can interrupt prayer lines (Fig. 9). It fulfills a similar concern as the Ottoman mosques of Sinan. Scale and space is achieved yet with an integral structure and design/concept sensibility. It uses modern techniques and materials imaginatively which complement and illustrate the concept of prayer and supplication (Fig. 10 and 11).



Fig. 9

Modern technological systems are used to enlarge the open space of prayer. The structural elements have also an expressive message in terms of forms and natural lighting. This example may however become overly complicated, even a distraction to the main purpose of collective worship. A design criteria concerned with its patronage may also have created a flamboyance or overly complicated structural solution.



Fig. 10



Fig. 11

It does not reflect a specific Muslim community or governance; indeed it represents a community mix with various outside patrons within a host Christian country and represents integration to a city fabric. It aims to reflect a social integration of Muslim immigrant populations into a wider host community. The interpretation of some religious actions into the use of forms abandons a traditional expression in favour of shapes reflecting a concept of design. (Hands raised in prayer.).

3.3 Stream three: Innovation

The third stream is of a contemporary style and divorced from place or cultural identity. It is its own statement and a landmark building of notice and attraction. It may contain various materials, though usually of reinforced concrete, glass-plate and cladded materials. This character may carry its own concept usually independent or personal to the architect.

Jamia Mesjid in Prishtina, Kosovo


Fig 12

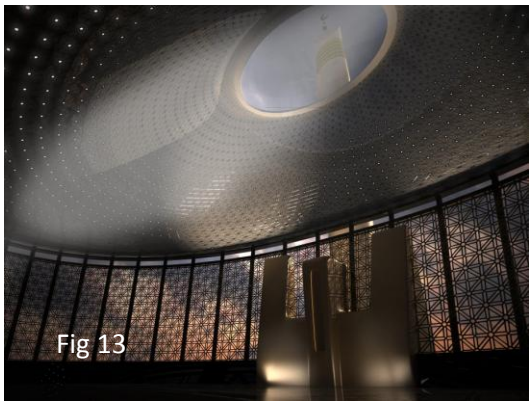
Fig 13

A design proposal for a Jamia Mesjid in Prishtina, Kosovo, showcases an individual approach which is truly a 'Tabula Rasa' after the social and political traumas of its recent past. It does however have its own honesty of approach, imposing its own awe over the congregation, spiritual or otherwise, despite an absence of historical reference (Fig. 12 & 13).

This example does bring simplicity to the internal space; an opening within the roof considers natural light as well as the movement of the sun, while also promoting a cosmological awareness and sense of spirit. It is calling for a shift in paradigm which is of worth and may indeed become a model of aspiration for a return to first principles.

This model is not integrated within an urban context. According to the historic function of a mosque it related directly with society and the urban fabric rather than a monumentality of building. It continues to be technological and outside the skills implementation of the local people it serves.

4. Conclusion

The historical element proclaimed a societal identity intrinsic to its structure, (through geometry) as well as its decorative form as an outer expression of its political identity, whether Umayyad, Mamluke or Ottoman. Contemporary architecture is essentially defined by technological terms with a style identity added on; buildings reject a distinctiveness reflected in people as a governing identity.

We can see that respecting tradition superficially may not be the same as standing within a Tradition; a point perspective looking out from a confirmed source. We also recognise that traditional Muslim societies are not in place and therefore allow an architectural confusion to occur. Respecting an environmental context, a history and memory of place and the culture of local people is important but also needs to be deeper. Is it an inside-out or an outside-in sensibility?

Architectural elements should reflect not just an honesty of materials and technology integrated to form and function, but should still be wary of imitating historical and previous political tradition, especially if it is out context to the people the building serves. Imitation of traditional forms doesn't mean a respect of tradition, but a shortage of creativity and correct architectural vocabulary. This lies with the governing polity as much as the architect.

Importantly for an architectural expression to occur which is true to source, a re-appraisal, even a new Nomos (C. Schmitt) is needed within architecture and Muslim society. It can be suggested that this is achieved architecturally by a return to first principles including the important integration of social inter-action and urban texture around mosques. Simplicity of space and importantly a sense of spirit, as well as an inspiration for local governance within the collective must be addressed. This may mean that the Dome or Minaret are seen as secondary elements, historically important but not conditional.

A re-evaluation of human scale and compatibility as well as the essential elements of a clear or flexible open space, without visible intimidations of worldly power would be a welcome return to first principles.

The architecture of mosques and cities ultimately reflect the society they contain, not just a philosophical position but its governing polity. This position is all encompassing including its wealth and trade transactions. From this primary position the secondary important considerations of durability, context within environment, human scale and cultural identity can then be formed.

Bibliography

Abu Al Haija, Ahmed *Authentifing Heritage in Madinah Contemporary Architetcure,* Majallat Al Amana, First Edition, 2014

Armstrong, Karen; The Battle for God, Harper Perennial, London, 2004

Behrens-Abouseif, Doris; *Islamic Architecture in Cairo: An Introduction*. Leiden, New York, 1989

Kaki, Abdelaziz; The Urban Texture of Madinah, Al Sarawat Ed. Jeddah, 2006

Foster, George McClellend; Traditional Societies and Technological change, Joanna Cotler Books, 1973

Amatulla,Ruby; Muslim Heritage http://islamforwest.org/2011/12/28/the-constitution-of-medina-the-first-written-constitution-of-the-world-2/

Schmitt, Carl; The Nomos of the Earth, Telos Press Publishing, 2006

Taha, Hatem; Taibah and its Fine Art, Taibah Ed. Madinah Munawarah, 2008

Figures

All photos as authors own except as indicated

Fig 1 http://muslimmatters.muslimmatters.netdna-cdn.com/wp-content/uploads/current-mosque-is-larger-than-the-entire-city.jpg

Fig 5 http://www.beautifulmosque.com/wp-content/uploads/2013/06/Miqat-Mosque-in-Dhul-Hulayfa-Saudi-Arabia-01.jpg

Fig 6 http://rolfgross.dreamhosters.com/Islam2013/Chapter2/Chapter%202_html_bfcc88d7.jpg

Fig 9 https://encryptedtbn2.gstatic.com/images?q=tbn:ANd9GcSa_nBb8bio0ergzNx5s1EuNX1OOJlCSj1bdHOCw-phldbuB45TJ1o7OyUW

Fig 10 https://encryptedtbn2.gstatic.com/images?q=tbn:ANd9GcSa_nBb8bio0ergzNx5s1EuNX1OOJlCSj1bdHOCw-phldbuB45TJ1o7OyUW

Fig 11 https://encrypted-tbn2.gstatic.com/images?q=tbn:ANd9GcSa_nBb8bio0ergzNx5s1EuNX1OOJl

Fig 12 http://www.archello.com/sites/default/files/imagecache/media_image/Facades_PTK.jpg

Fig13 http://www.archello.com/sites/default/files/imagecache/media_image/Final_Interior_view.jpg

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The accessibility of archaeological area of Pompeii. Knowledge methodology and sustainable proposals

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Abstract
The paper will explore experimentally the improving accessibility of archaeological site of Pompeii, in the broader sense of adaptation, not only to the instance of the removal of architectural and perceptual barriers, but also to the more general enhancement of the site. This latter must be interpreted as the improvement of services for safety and comfort, and as a knowledgeable and informed perception of the archaeological area of Pompeii, one of the most visited in the world.
The contribution will deal with a research methodology that started from a survey on the "state of the art" about the subject, a careful analysis of the present state of some selected areas, chosen as study-cases, arriving to identify the main morphological and material matters for broader use of the site of Pompeii, and the strategic nodes to implement to support the fruition and development.
The research has dealt with users with greater difficulty, made up of people with disabilities, intended not as a separate category, but as part of a whole. In this context, the aim was to propose experimental solutions, careful to the issues of reversibility and material compatibility.
Thus, the research started from the field analysis of some case studies and from the 'hermeneutic' exercise of conceiving some possible solutions in line with the most updated and shared criteria of restoration, such as the principle of minimum intervention, reversibility, material compatibility with the 'fragile' ancient materials of Pompeii, as well as the *figurative contemporaneity* of modern elements added to increase accessibility.

Keywords: Accessibility, Pompeii, archaeological heritage, conservation, enhancement.

1. Heritage preservation and improvement of accessibility
This topic is based on the outcomes of the research project "Accessible Pompeii. Guidelines for a broader use of the archaeological site" funded by the University of Naples "Federico II" that i have coordinated between july 2011 and january 2013 [1].
At the dawn of the third millennium, the strategies for the future of the archaeological site of Pompeii must take into account aspects related to the site protection and development, raising the quality of its use and preventing the adverse effects on its preservation. This is also in line with the most recent legislative framework, which – following the amendments brought to the *Codice dei Beni culturali e del Paesaggio* in 2008 – lists among the enhancement measures those actions aimed to "ensure the best conditions for the use and enjoyment of public heritage, even by person with disabilities".
With a well-established literature on the subject, resulting from over twenty years of academic debates, the work draws upon the Guidelines to overcome architectural barriers in cultural heritage, issued by Ministry of culture in march 2008 [2], which was drafted by some of the members belonging to the research team.
The aim of the research was to take on an experimental stance in investigating new ways to improve accessibility in Pompeii in its broadest sense, not only in terms of removing architectural and perceptual barriers in some areas, but also in relation to a more general enhancement of the site. The

latter includes guaranteeing higher safety and comfort in order to allow for a conscious perception of Pompeii, which is one of the most visited archaeological sites in the world.



Fig. 1 : Pompeii. Archeological area. View of the Honorary Arch with the Vesuvius on the background. Photo Serena Borea 2012

The research methodology started from a thorough examination of the state of the art on the topic of accessibility, both in terms of debate and critical literature, and of Italian and international legislation regulating this issue. The research has also discussed the main projects on accessibility in archaeological sites abroad and in Italy.
The historians of the research team have also carried out a critical study on the use of the Pompeian site across history through the descriptions of travellers, artists, and architects from the *Grand Tour* to date.
These surveys based on 'indirect sources' have been integrated by a thorough field survey, which has described the status quo of some sample areas selected as case studies, with the detection of differences in height and in physical and perceptual barriers. These data have been obtained through the material survey on the pavings and elements up to 90 cm of height in detailed scale and in some cases with complete surveys using 3D laser scanners.
In sample areas, the researchers have identified not only the physical and perceptual barriers, but also the main morphological and material criticalities that prevent a broader use of the Pompeian site. The research has also identified the strategic nodes to be implemented in the system to support the use and enhancement of the site, also by experimentally outlining some guidelines and shared solutions in response to specific or frequent criticalities.
Thus, the research started from the field analysis of some case studies and from the 'hermeneutic' exercise of conceiving some possible solutions in line with the most updated and shared criteria of restoration, respecting the parameters of restoration, such as the principle of minimum intervention, reversibility, material compatibility with the 'fragile' ancient materials of Pompeii, as well as the *figurative contemporaneity* of modern elements added to increase accessibility [3].
Then it merged into a project of preservation and adaptation that, without claiming to achieve full accessibility of the archaeological site, has tended to increase as much as possible the number of people who can access and enjoy the archaeological city, while improving the quality of the overall cultural experience.



Fig. 2: Pompeii. Archeological area. General view of the Basilica. Photo Renata Picone 2008

2. A multidisciplinary approach. Aims and methodology of the research

From this perspective, the research focused on physically challenged users, that is to say people with disabilities, not considering them as a separate category, but as part of a whole.

The research took on a strong interdisciplinary slant, involving experts in the field of restoration, history of architecture, urban planning, design, and structural and materials engineering. The issue of accessibility and enhancement of historical heritage is part and parcel with the restoration project, which, interdisciplinary by its very nature, needs a complex approach that requires awareness of the issues involved, ability to listen and dialogue with specialists, but also conciseness, which cannot be overlooked when it comes to designing solutions. The restoration works done in Pompeii over the last century proves that the combination of incompatible materials or the use of materials that do stand the 'test of time' can lead to the degradation of archaeological ruins, or even to the collapse of entire parts of the ancient *domus*, as recent events have shown [4].

Collaboration with the institutions for the preservation of archaeological sites (Ministry of Heritage and Culture, Directorate General and Regional Archaeological Superintendence of Pompeii, etc.) has been crucial for the development of our research as their officials were involved as external experts on the site. The collaboration between scholars and officials also meant the possibility to have access to: an updated knowledge of the programs already implemented by the Ministry of Heritage and Culture and by the Superintendence to improve accessibility and remove architectural barriers in the archaeological site ("Friendly Pompeii" and the "Empler" project, etc.).

The ancient city of Pompeii has an urban dimension, is first and foremost a cultural experience, and this cannot be separated from its enjoyment, which involves walking through its paths, intersections, living within the antique city in complete safety and comfort. On the other hand, culture presupposes some sort of exchange, open communication with mankind in the broadest sense, without distinctions of any kind, disabilities included. Heritage conservation has the purpose to educate and keep the historical memory alive for future generations, it concerns every citizen's education and quality of life, in the broadest spiritual and material sense [5].

The design solutions proposed to upgrade the Pompeian site therefore arise from a thorough knowledge of the current state of the individual areas under examination and of their accessibility-

related problems, identified by means of an urban scale approach to the site, which is considered as a city and a urban system rather than a collection of *insulae* and public and private spaces.

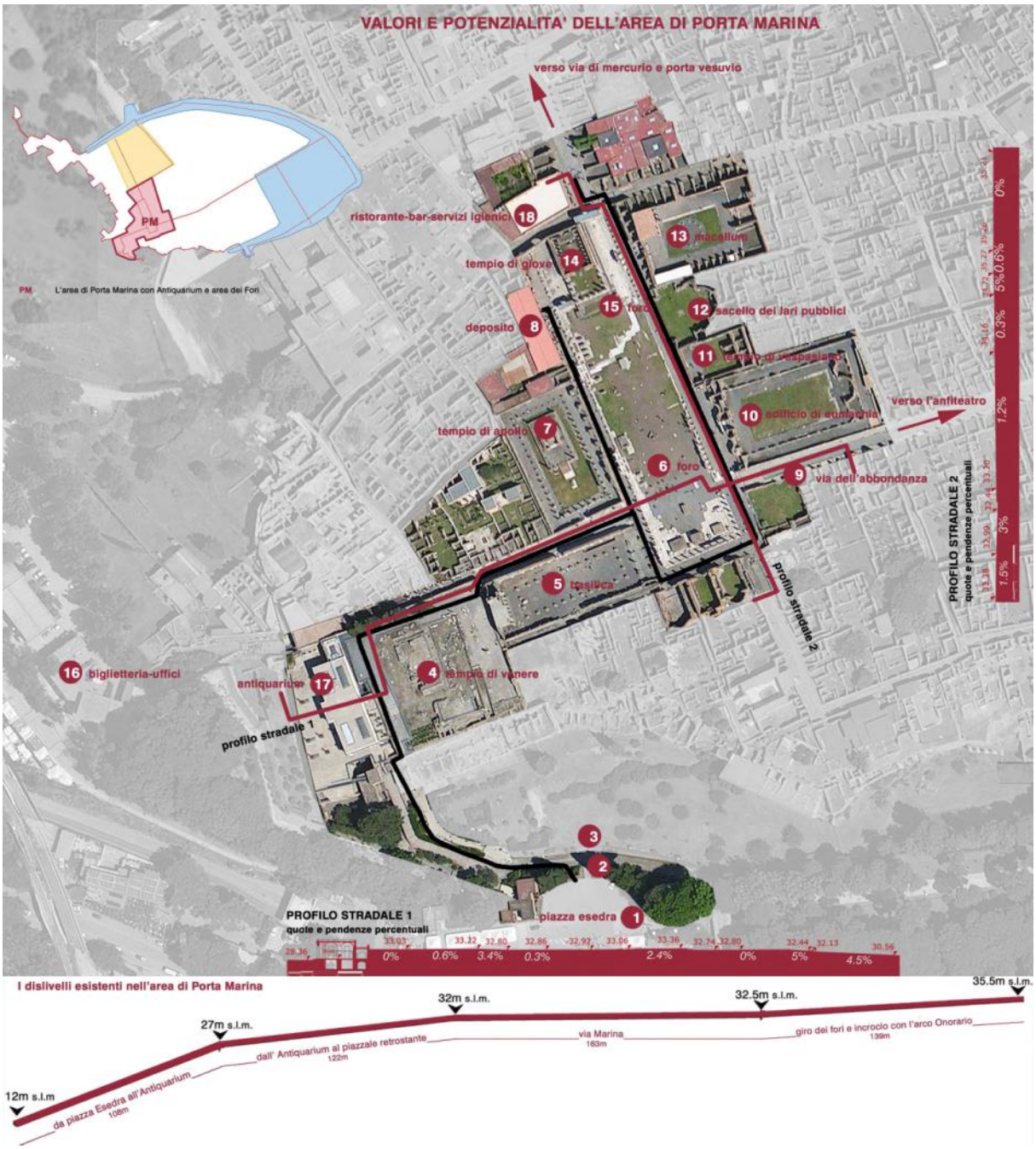

Fig. 3: **"**Accessible Pompeii. Guidelines for a broader use of the archeological site". (2011-2013). Table with the recognition of the hubs and paths of the Porta Marina area. Renata Picone, Andrea Pane, Paolo Giardiello, Arianna Spinosa, Luigi Veronese, Maria Falcone, Viviana Saitto.

It was also necessary to analyse the archaeological site as part of the entire city of Pompeii, paying attention to its interaction with other urban structures and flows of religious tourism, which also characterise the city.
Within the archaeological site, the solutions that our research has identified are intended not only to facilitate accessibility to the various parts of the ancient city by a broader number of people, but also to give visitors the possibility of 'living' the site in a conscious way and continue to perceive the message of the time they recall. This is the reason why, for example, in the House of Meleagro in Via di Mercurio visitors can experience what living in a Pompeian house was like, moving safely inside it and respecting its values.

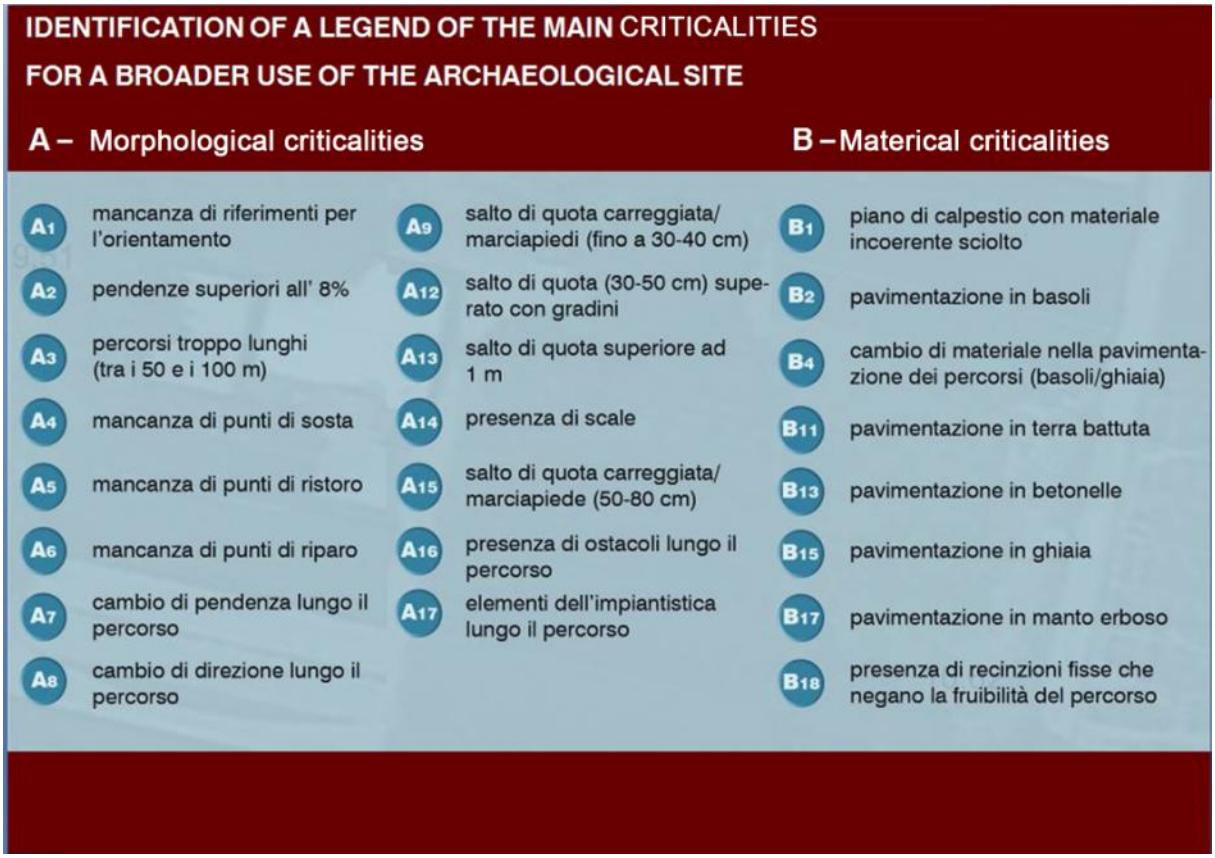

Fig. 4: "Accessible Pompeii. Guidelines for a broader use of the archeological site". (2011-2013). Table with the recognition of the morphological and material criticalities.



Fig. 5: Pompeii. Archeological area. View of the Foro. The materical criticalities of the paving. Photo Renata Picone 2008

The conservation of the archaeological heritage remains the primary objective: Pompeii is a world heritage site and the project of improving its accessibility and use should be respectful of the pre-existing structures, keeping high standards of design quality for any type of intervention. The relationship between archaeological heritage and accessibility has been brought to the attention of experts in restoration about fifteen years ago, in the wider framework of the connection between preservation and accessibility, to the extent that accessibility is now widely recognised as part of the project of conservation and restoration [6].



Fig. 6: Pompeii. Archeological area. View of the Basilica. The morphological criticalities and height gap. Photo Serena Borea 2012

3. The four study areas

Once having surveyed the conditions of the areas on a urban and architectonic scale, indicating all the parts of the site that could be visited, the research work shifted to the drafting of some thematic maps, which would highlight the various forms of architectural barriers found in the historical site, starting from physical obstacles - such as stairs, ramps, paths with slopes, elements creating discomfort, danger, and obstacle for people with reduced mobility, as well as 'perceptual barriers', relating to people with sensorial disabilities

The study then focused on four pilot areas, showing different characteristics:

1-The area of Porta Marina with its access to the Forum and the Basilica and the node with Via dell' Abbondanza;

2 - The area of Porta Vesuvio and its system of ancient walls;

3 – Via di Mercurio with the House of Meleagro;

4 - The area of Porta Nocera and the Eastern walls.

In this way, we have identified three routes within the ancient city, with accesses respectively from Porta Marina, Porta Anfiteatro (Porta Nocera), and Porta Vesuvio to the north, and a 'path' through along the walls and the towers - already indicated by Amedeo Maiuri [7] in the forties of the twentieth century as a way to visit the city – which should be made accessible.

The four study areas are all linked together, so that they can be viewed comfortably in their entirety, going through the excavations from Porta Marina to Porta Vesuvio, or can visited separately, also at different intervals.

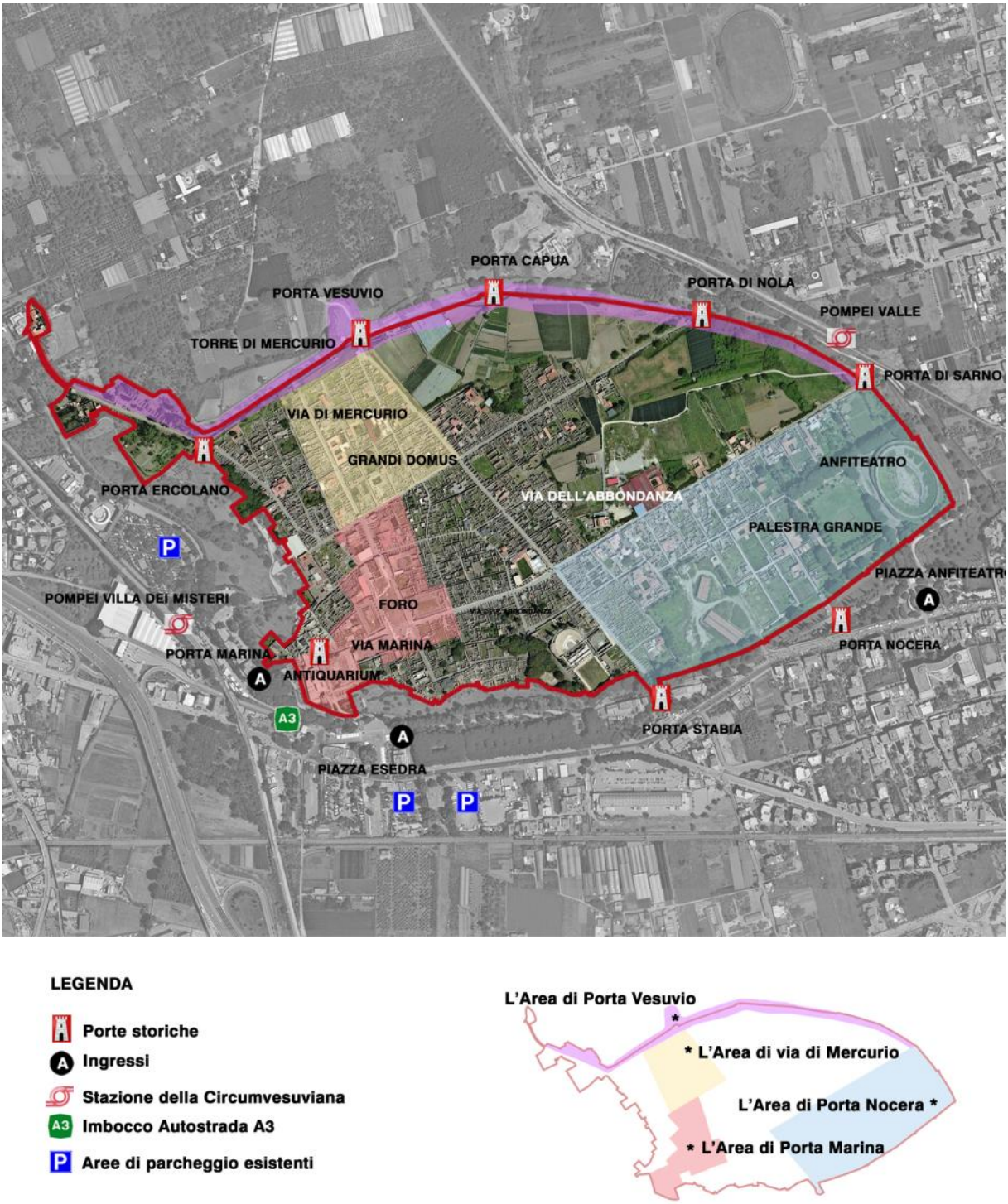

Fig. 7: "Accessible Pompeii. Guidelines for a broader use of the archeological site". (2011-2013). The recognition of the four study areas.

To avoid the presence of unsuitable materials being used in the archaeological site, these were selected on the basis of:
- physical, chemical and mechanical compatibility with ancient materials;
- durability, given the continuous exposure to atmospheric agents; laboratory tests were conducted at the former Department of Materials Engineering, University of Naples 'Federico II'. Given the specificity of the site under examination and a limited literature in the field of physical and chemical compatibility of innovative materials with materials of archaeological interest, some of the expected results had special scientific relevance.

- easy maintenance, also by unskilled labour;
- reversibility;
- recognisable devices for people with sensorial disabilities, also for innovative materials, such as structural glass.

For the four study areas identified, the main outcome are the guidelines for a broader use of the site and specific design solutions.

This has enabled to focus on a methodology which can be later on extended to other areas of Pompeii and, above all, used in other archaeological contexts.

This latter aspect has high scientific relevance: the product of this research will constitute an essential reference for other studies in the same field, and will also be used to define a ‘pilot project’ in the context of the current guidelines of the Directorate General for the Promotion of Cultural Heritage.



Fig. 8: Pompeii. Archeological area. The current access by Porta Marina. Photo Serena Borea 2012

Bibliographical References

[1] The research was conducted by professors and young scholars of the former Sciences and Technologies Centre, University of Naples 'Federico II', consisting of the former Faculty of Engineering, Architecture, and Mathematical and Physical Sciences: Aldo Aveta, Benedetto Gravagnuolo, Leonardo Di Mauro, Pasquale Miano, Paolo Giardiello, Rosa Anna Genovese, Carmine Colella, Domenico Caputo, Valentina Russo, Bianca Gioia Marino, Andrea Pane, Giovanni Menna, Gianluigi De Martino, Francesca Ferretti, Tullio Monetta, Barbara Liguori, Paolo Aprea, Gian Piero Lignola, Arianna Spinosa, Marida Salvatori, Claudia Aveta, Raffaele Amore, Francesco Delizia, Emanuela Vassallo, Giovanna Ceniccola, Gianpaolo Vitelli, Maria Falcone, Francesca Avitabile, Daniela Piscopo. Collaboratori: Serena Borea, Stefania Pollone, Viviana Saitto, Luigi Veronese, Vincenzo Giamundo, Alberto Zinno, Giovanni Fabbrocino, Gioconda Cafiero. In particular, for the Ministry for Cultural Heritage and Activities, Directorate-General for the architectural, historical, artistic, and ethno-anthropological heritage, engineer Maria Agostiano has participated in all the different stages of the research. She is also one of the editors and authors of the Guidelines issued by the Ministry of Culture in 2008; dr. Antonio Varone, the director of the excavations of the archaeological site of Pompeii at the time of the research; and other officials who contributed to the research by providing accessibility to the site and the possibility to consult the necessary documents relating to the issue of accessibility of the archaeological area.

[2] Ministero per i beni e le attività culturali, Direzione generale. Linee Guida per il superamento delle barriere architettoniche nei luoghi di interesse culturale, 2008., Roma: Gangemi. Guidelines to overcome architectural barriers in cultural heritage sites*, Roma: Gangemi, 2011. ISBN 978-88-492-1794-0

[3] STEFFAN, Stefania. Design for all: Il progetto per tutti: metodi, strumenti, applicazioni. Santarcangelo di Romagna: Maggioli, 2012. ISBN 8838761809

[4] PICONE, Renata. Pompei alla guerra. Danni bellici e restauri nel sito archeologico. In CASIELLO, Stella. *I ruderi e la guerra. Memoria, ricostruzioni, restauri.* Firenze: Nardini, 2011, p. 19-42

[5] CARBONARA, Giovanni. Restauro e accessibilità del patrimonio monumentale. Un valore di solidarietà e condivisione. In «Annali della Pontificia Insigne Accademia di Belle Arti e Lettere dei Virtuosi al Pantheon», II, fasc. 2, Città del Vaticano, p. 91-96.

[6] PANE, Andrea. Accessibilità e superamento delle barriere architettoniche. Alcuni problemi ricorrenti. In *Arkos,* n.11, luglio-settembre, p. 39-46.

[7] MAIURI, Amedeo, L'isolamento della cinta muraria fra Porta Vesuvio e Porta Ercolano. In «Notizie degli Scavi di Antichità», 1943

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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ORNAMENTS AND VIBRATIONS IN THE GEOMETRY OF THE SOUND

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Abstract
The musical instruments are not simple mechanical objects. They express specific formal qualities and evocative that go far beyond their function vibrating. They are sometimes complex objects that are derived from empirical cultures, craft skills handed down from ancient folk traditions, spontaneous demonstrations of artistic vocations, ethnic and tribal residue, reminiscences to ancient myths and symbolic universes, spontaneous studies of geometric harmonies and "topological" shapes. Are obvious references to the forms of nature, from which they draw a vocation to production and transmission of sound.
To analyze shapes, patterns, decorations, materials and the mechanical of sound instruments, means tracing a path through history, mythology, material, empirical and figurative culture of peoples. They reveal themselves as inclusive material entity, where multiple expressions of arts and crafts converge.
The sound instruments manifest themselves as an expression of an ethnic design that does not derive from an aulic and cultured language. It stems from the layering of popular traditions, the most genuine and far from dominant cultures, but capable of expressing the deepest essence of a people.
The research collects and elaborates some thoughts about music, art, myth, geometry, architecture, resulting from the didactic and research practices carried out by the University "Mediterranea" of Reggio Calabria. The instruments, surveyed and drawn by the students, belong to the collection of the *Museum of Musical Instruments* of Reggio Calabria.

Keywords: drawing, relief, musical instruments, organology, music.

1. Introduction to Research
In the definition of sound experience, involved multiple factors that contribute to define an perceptual universe broad and inclusive. Arithmetic, geometry, shape, proportion, harmony, rhythm, vibration, are all determining factors. It is from them that comes a common territory where art, architecture, poetry, literature and music enter into a virtuous dialogue, expanding their potential evocative and emotional.
The music expresses itself in an intangible, like the emotional feelings that arise from the use of the visual arts. Every visual or sound emotion comes from an objective referent that produces it. The painted canvas suggests a symbolic path to the soul; both rational and emotional. The material space of architecture evokes impressions and sensations that go far beyond the function of the space built. Similarly instruments produce incorporeal sound vibrations that stress passionate emotions perceptual. All this comes from material!
The shape, the material, the geometry and size determine the type of vibrations that generates sound. They affect the sound characteristics to the instruments, revealing a close connection between geometry, material, vibration and tone.
The shape, the material, the geometry and size, determine the type of vibrations that generates sound. They affect the sound characteristics of the instruments, revealing a close connection between geometry, material, vibration and tone.
Musical instruments are not simple “vibratory mechanisms”, they have hidden formal qualities and evocative inside, that go far beyond their sound function. They are mechanical objects which are



Fig 1: *Septem Artes Liberales* (The Seven Liberal Arts), 1590-1658. London, The British Museum.

sometimes complex; empirical expressions of cultures; manifestations of craft skills; instinctive revelations of artistic vocations; spontaneous narratives of ethnic and tribal cultures; references to mythological and symbolic universes; unaware studies of "topological" forms that, in an obvious derivation of the forms of nature, replicate the spontaneous vocation for the production or transmission of sound.
It is in this unusual area, analysing geometry, patterns, materials and mechanical musical instruments, a path that runs along the history, mythology, empirical and figurative culture of peoples.

2. The arts, harmony and multisensory trials

The sensations produced by sound, as well as the effects that result from the use of a work of visual art, can't be reduced to trivial acts of perception. Hearing and vision take on meanings that go far beyond their intrinsic functional vocation. Through them we express spiritual implications that lead inevitably to deep contamination. It is a progressive path that leads to virtuous and profitable relationships between disciplines and art forms, arising from distinct bodily sensations. Gradual integration that leads to the most recent multi-sensory experiences.
Martianus Capella, in his academic treatise *De Nuptiis Mercurii et Philologiae* – the first quarter of the fifth century – provides a description of the ascent to heaven of Philology to marry Mercury; the Eloquence. The seven *artes liberals* [1] take part in the wedding, as guests. The allegorical narrative proposes, de facto, an encyclopaedia of classical learning which will then become widespread in the culture of the Christian Middle Ages. Inside a canonical classification is found which will be crucial for the medieval encyclopaedic education that will continue, thanks to the commentaries and scholastic traditions, until the Renaissance and beyond.
In most of his manuscripts Martianus Capella attributes the term "Harmony" to the music, assigning a synonym that will prove decisive for the understanding of the essence of music. It is not just a play of sounds but superior cosmic principles aimed, in fact, towards the harmony of celestial space.
Among the seven *artes liberales* there are no traces of the figurative arts, which have been relegated to simple *artes mechanicae*. Music, by contrast, occupies the absolute role of respect. The organization of medieval studies and the resulting prestige accorded to the disciplines that were deemed necessary to the formation of *free men*, leaves no room for doubt. If arithmetic, within the *quadrivium*, is the foundation of scientific knowledge, then music determines its completion. In it lie the science of numbers, the science of the motion of celestial bodies, verbal metrics rules derived from rhetoric. The art of music offers itself as knowledge to the understanding of reality, but at the same time recognized as an applied science. It is capable of revealing the order present in relationships between numbers, transferring them to the soul. «Without music – says Isidore of Seville – no discipline can be considered perfect, nor is there anything that is without it» [2].
It will be a long and arduous path, however, that will lead to the recognition of the status of a discipline, such as figurative art, which will begin to feel more and more the need to relate to teachings which are already included among the *artes reales* (the arts of the *quadrivium*). The discovery of perspective and the study of its geometric laws approach the pictorial forms to the geometry; while the arithmetic and the consequential analogy with musical relations.
The relation between music and painting is a constant in the world of figurative arts. Pictorial forms are not simply myths and instruments relating to the musical tradition, but a strong tightening relationship between arithmetic, geometry and music. They express, in such a 'visible' manner, the harmony of human elements with mathematical, harmonic and rhythmic rules, in a word the *concinnitas*.

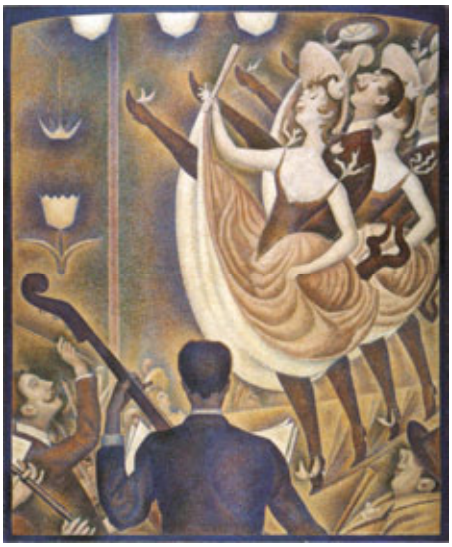
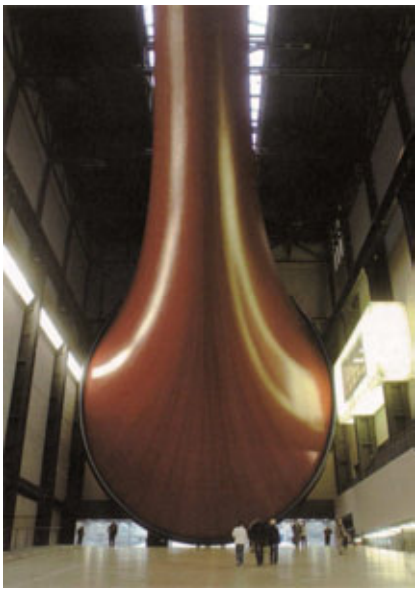




Fig. 2: Georges Seurat, *The chahut*, 1889-1890. Otterlo, Rijksmuseum Kröller-Müller.
Fig. 3: Jean Dubuffet, *Jazz orchestra*, 1944. Paris, Centre George Pompidou, Musée National d'Art Moderne.





Figg. 4-5: Anish Kapoor, *Marsyas*, installatione, 2002. London, Tate Modern Gallery.

All of this, together with the theoretical studies about perspective of Leon Battista Alberti, Piero Della Francesca and other Renaissance treatises, contribute to the elevation of the figurative arts and their final acquisition among the *liberal arts*.
The upheavals in the visual arts in the late nineteenth century, which continued with the historical avant-gardes of the early twentieth century, will have an influence not only on the techniques of expression, but even on the themes and content of pictorial representations. Paintings with mythological or contemplative characters, with some rare exceptions, will be eliminated from much of the scene. The focus shifts from the programmatic intentions of mystical and religious to the scenes that recall the pleasures of bourgeois life. Music and musical instruments become significant in this thematic program.
The conceptual and operative mutations introduced in art in the twentieth century, however, do not only produce effects on the subjects and themes of the representations, but introduce new techniques of artistic expression which were not necessarily limited to painting. The use of musical instruments – elaborated, transfigured or merely 'alluded' – is of considerable interest in the realization of non-conventional works, performances and installations of modern and contemporary art.
The multisensory integration that over the centuries aspires to greater intimacy between music and visual arts, hearing and visual perception, is enriched with more complex relationships which are able to express, but also to solicit, the motions of the spirit. It is a music that, in the expansion of perception and of expression, seems to realize the prophetic definition that Thomas Mann writes in *Doktor Faust*:





Fig. 6: *Gamelan Garasi Seni Benawa*, Indonesia. Festival of the imagination, House of World Cultures. Entertainment at the Opéra Bastille, Paris. Photo by Jean-Pierre Dalbera.
Fig. 7: *Kora* player.

«[...] perhaps the most intimate desires of music is not being heard nor seen nor sensed, but, if possible, understood and contemplated in a manner beyond the senses, and even the soul, a spiritual purity» [3].
The cosmic order, the harmonic relationships, the numerical proportions, ethical and mythological references, rhythmic and formal balance, variations in tone and colour are readable translations of an incorporeal experience: legitimate aspirations for a song that refuses to be only “seen or heard” but that aspires towards an intimate dimension, intently spiritual and contemplative.

3. Places of sound and ethnic affiliation

The proposed study underlines two essential elements of the sound linked to the anthropological and ethno-musicological aspect. The historical-cognitive survey focuses on the factors of origin and on the practical use of the instruments [4]. This involves the study related to traditional motives, technical skills, languages and constructive operations. It is a route that highlights the anthropology of musical instruments and the traditions connected to them, including sound function and ritual practices, together with concepts related to sound and the musical taxonomies [5] of different cultures.
Drawing means knowing how to observe and document the tradition of various peoples, by completing and formulating a species of mini atlas of the different cultures of the sound. It results as a flow of information and observations on forms, instruments, changes, repertoire and modality of the musical use.
Changes or cultural influences are an area of interest through which it is possible to undertake a study of traditional music involving multiple geographic areas, with many musical cultures which belong to the whole world. Musical practices are continually changing and generate new experiences and musical traditions. Technical and formal innovations are accompanied by structured processes that affect the conceptual and symbolic universe of sound expressions.
Ethnic instruments, made with “rudimentary” techniques, which express a virtuous relationship between sound, art, technique and instrument, which transmit the ethnic identity of *genius loci*. Constructing, albeit in miniature, means dealing with the technical and aesthetic problems of detail. There are complex constructions that result from a spontaneous culture, made up of materials and shapes, curves and strings, casings and joints. Musical instruments are stories and histories that mark a post production on the anonymous space of tribal art. Mechanisms and tasks where physical contact enters into the production of sound objects.
Territories are often a testimony to the peoples who settled them where sediment traditions remain according to a cultural identity. In the same places at the same time the migratory flows transfer cultures and traditions in a virtuous cycle of contamination. The cultural wealth of a people and the processes of development are based on their ability to understand and accommodate multiple identities.



Fig. 8: *Bandoneón* player.

"Sedentary" peoples and "transplanted" peoples are vehicles of identity and contamination: two major pillars of history and culture of the territories.
The Mediterranean basin is an exemplary place of cultural syncretism. Trade flows and alternating dominations have allowed widespread contamination that has affected the peoples of southern Europe, North Africa and the near Middle East. Europe welcomes musical instruments from Asia – mainly chordophones and aerophones – while the lyre is the only instrument that can categorically be considered of European origin.
There is an equally strong influence from Asia and the Middle East on the Mediterranean coast of Africa, which is relevant, as well as the Arab influence in southern Italy. In sub-Saharan Africa, less affected by migration flows, there is a larger consolidation of features more native, linked to indigenous tribal rhythms. Musical instruments with a strong identity are the drum, a means of communicating rhythm, and the kora, a symbol of oral communication entrusted to the *Griot* or *Jali* that narrates ancient tribal legends. Another peculiarity related to African musical culture is the strong relationship between music and dance, a strict association of the arts, an alternative to the European idea of separation. Rhythm, on the other hand, is a distinguishing feature both for music and for tribal dances. Rhythm and Polyrhythm, vocal and instrumental, are also found in some Latin American countries.
African and European influences are particularly present in the tradition of Brazilian music. The typical instruments of percussion such as the *Chocalho* and certain dances such as the *Fandango* and *Catimbó* are typical of an autochthonous culture. Later these traditions blend with the syncopated rhythms from Africa, enriching the instrumental tradition of the Indians with drums (*atabaques*) and the metal bell (*agogo*). Towards the sixteenth century popular Brazilian music is enriched by the influence of European music, but we will have to wait for the early nineteenth century to witness a process of integration between indigenous musical culture and tradition from the Old World, the result of the processes of colonization.
There will also be strong African influences on North American music. Both blues and jazz are direct expressions of an evolutionary contamination that combines African rhythms of colonial origin with the traditions of European and American music, creating highly expressive new musical forms.
The musical intertwining express a cultural commingling in which identity and evolution coexist. The sound instruments often become concrete evidence of this hybridization. The production techniques, the decorative traditions, are signs of identity of places, but at the same time receive and manifest virtuous contamination among sedentary populations and civilizations migrants. There are flows of people who, in their voluntary or induced search for new lands, do not relinquish to the confirmation of identity. They receive, along with earth's substance, also its spirit, culture and tradition, which transforms sound waves into the harmonic fruits of the "territories of sound".

4. The organology, measurements and analyzes

There are several criteria for the classification of musical instruments: from the more empirical methods to those related to more technical or functional aspects, depending to how sound is produced. The main distinction, which is especially widespread in Central Asia, is based on the material used: metal, wood or other.



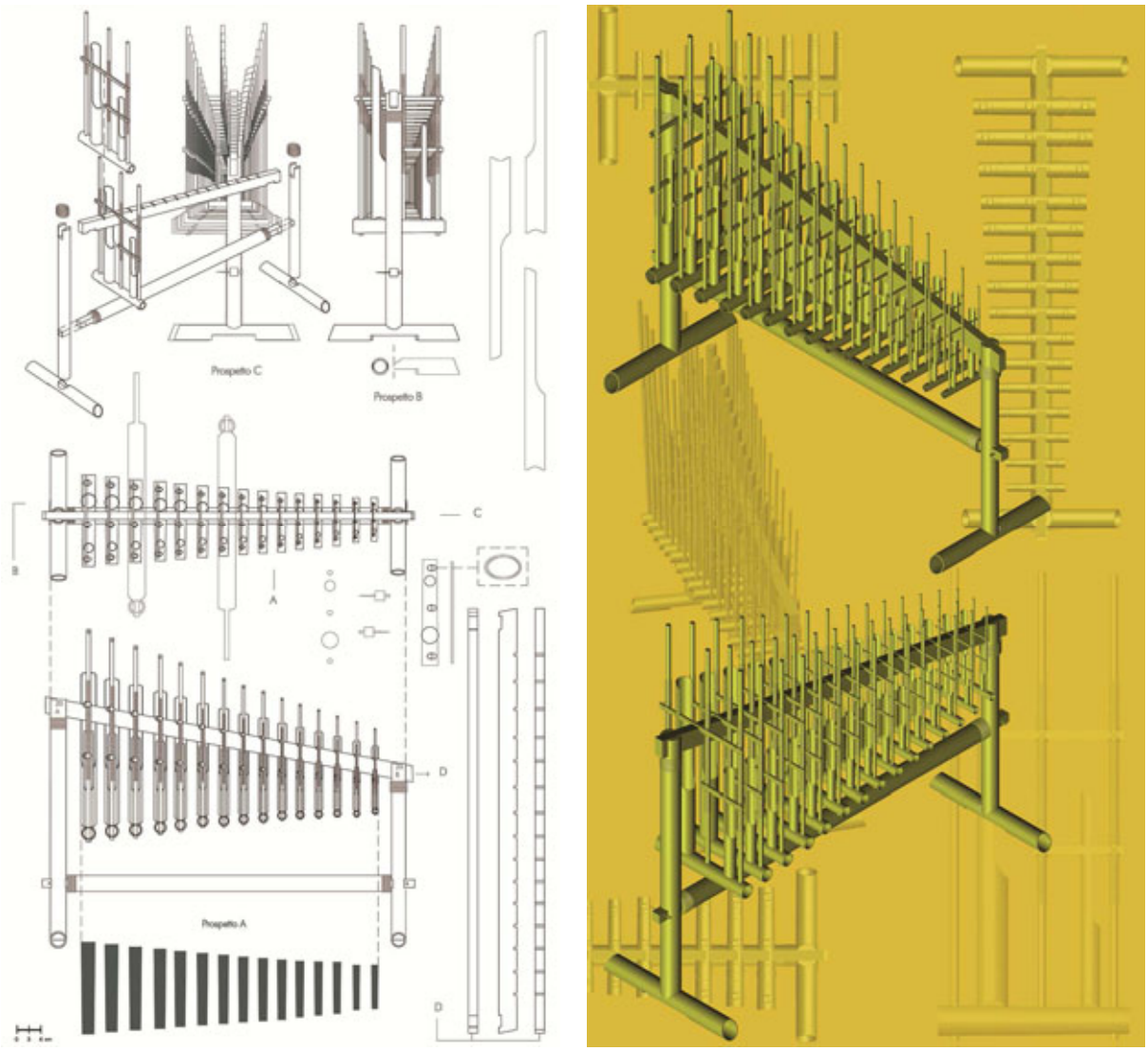
Figg. 9, 10: *Ciaramedda "key"*, Bagpipe, Aerophone, Samo, Italy. Survey and drawings by Federica Angelelli and Milly Basile Rognetta.

This classification was spontaneously adopted in most ancient cultures; it has actually been partially used in the Western classical orchestra for the distinction between *woodwind* and *brass*. A taxonomic methodology that reveals an obvious incoherence, denounced by the fact that between the wood include tools - such as the flute - originally made of wood material but which today are constructed in metal alloy.
Other types of classification, however, assume empirical and functional parameters which are tightly connected with the use of the instrument. The destination for religious or devotional purposes, rather than for domestic use or military use, determine distinctions of class purely based on functional criteria. More relevant to the sonic characteristics of the instrument is the classification that takes into account the non-use function, but the musical function that the instrument uses during execution: rhythmic, melodic or harmonic.
A decisive contribution towards a widening of the horizons of organology study is provided by Erich Moritz von Hornbostel and Curt Sachs in 1914 in the book *Zeitschrift für Ethnology*, in an article entitled *Systematik der Musikinstrumente. Ein Versuch*. They publish a cataloguing system, which takes the names of its authors [6]. This system is still widely in use for the classification of musical instruments today. Compared to developed a few years earlier by Victor-Charles Mahillon, the new method offers the advantage of greater flexibility, allowing the insertion of any instrument without geographical or cultural barriers. It is based on the physical modalities with which one determines the vibration that generates the sound. The four top level categories – *aerophones*, *chordophones*, *idiophones*, *membranophones* – branch out into additional groups and subgroups, allowing a subsequent option of upgrading and the inclusion of additional classes and subcategories [7]. A few years after the initial formulation of the system, in fact, an additional class of *electrophonic* is added to the original four, and



Figg. 11,12: *African violin*, Popular fiddle, Chordophone, North Africa. Survey and drawings by Caterina Candido.

includes modern instruments in which the sound is no longer generated by mechanical vibrations but by electrical circuits.
A turning point about musical studies is imprinted in the late nineteenth century after the birth of a branch of musicology which took its name, too generic of *comparative musicology*. This discipline, which moves in close relationship with the contemporary ethnographic studies, deals with the oral musical traditions of all peoples, with particular attention to those outside Europe. The term "comparative" is derived from a systematic comparison between different types of music outside Europe and between them and those of the European peoples.
Studies on comparative musicology, after 1950, will take the name of *ethnomusicology*. This renaming coincides, among other things, with a redefinition of the research methods and the role of the scholar. If before there was a clear distinction between those who collected the documents in the field and these who would have done, subsequently, the operations of cataloging and analysis. By this time the two roles merge into a single figure of a scholar. This leads to a greater awareness of the importance of all aspects, hitherto neglected, which are closely related to the musical episode studied. Contemporary scholars of ethnomusicology can't ignore the contextual study of popular culture and the traditions that concern the event itself.
The studies proposed here, result from the didactic and research experience carried out at the *Mediterranean* University of Reggio Calabria, during 2004-05, as part of the *Laboratory of Basic Drawing*, conducted by Rosario Giovanni Brandolino e Domenico Mediati.
The drawings, made by the students, adopt and specify further classification by Erich Moritz von Hornbostel and Curt Sachs, focusing in particular on the four original categories of this classification

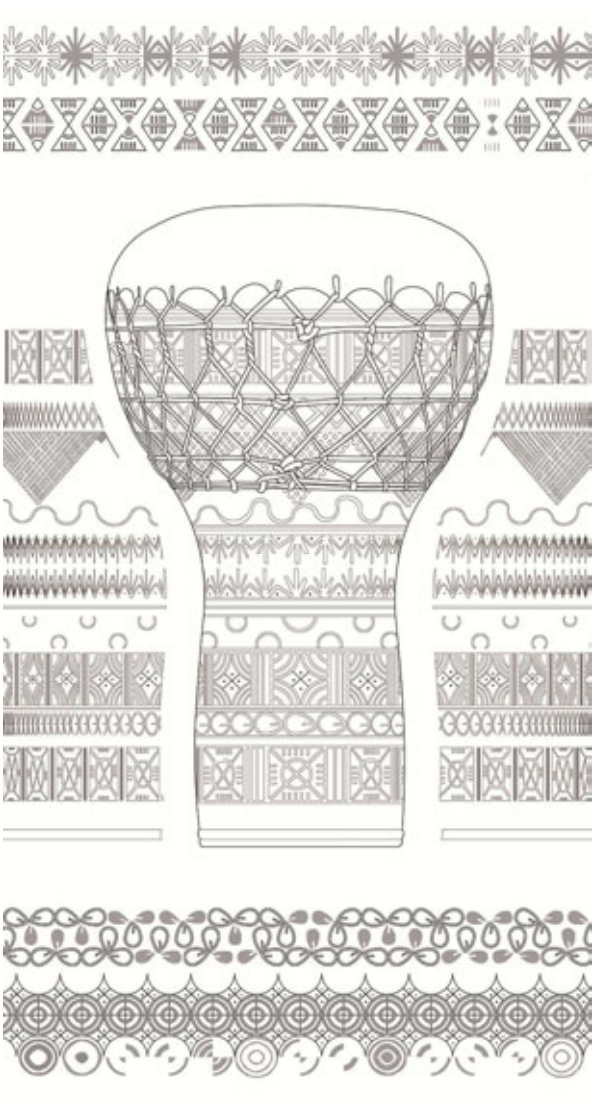


Figg. 13,14: *Angklung*, Idiophone percussion – Xylophone, Island of Java, Thailand. Survey and drawings by Angela Fazzari.

system, which are more closely anchored to a craft technique that allows us to express hidden or explicit artistic qualities: *aerophones*, *chordophones*, *idiophones* and *membranophones*. The subcategories further adopted, resulting from trends that science of organology has produced in recent times.

These instruments belong to the private collection of the *Museum of Musical Instruments* of Reggio Calabria founded by Demetrio Spagna. It represents a rare documentation of artistic and techniques cultures, going back to multiple times and locations. A sort of historical and ethnic sample collection of arts considered "minor" but, on the contrary, it reveals an extraordinary ability to combine utility and aesthetics, form and geometry, art and technology, innovation and tradition, vision and hearing. They present themselves as objects of an ethnic design in which the sound function does not renounce to attention to the decorum. The same form of manufactured goods, with the geometric complexity that characterizes them, respond to functional needs and requirements harmonics, but at the same time adds to the objects formal quality. The profile of the resonance chambers allows a correct amplification of the sound, but it is also the identifying characteristic of many tools. They are often the result of an unconscious and "uncultivated" search of topological geometries, similar to the forms of nature. It is no coincidence that many of the sounding instruments - mostly ancient but still present today in the musical traditions of primitive peoples - were built with remnants of natural elements: shells, animal armors, peel of coconuts, hollowed and dried gourds, etc.

The shapes of the instruments replicate the soft geometry of nature. They respond to the demands of function and give enphasis to the objects: a kind of prelude to the sound harmony that they are able to release. It's the same harmony that pervades the geometric laws of nature products. They have no rigid rational mesh but are dense of a spontaneous logic. They represent an intrinsic process of evolution





Figg. 15,16: *Darbuka*, Calyx tubular drum, Membranophone, Iran. Survey and drawings by Angela Campi and Maria De Sensi.

and growth that translates the function in geometry "flexible". The polycentric curve dominates the profiles marking a formal continuity necessary for a correct reproduction of the visual and sound harmony.
The instruments surveyed were analyzed with a view to reinterpreting the hidden geometries. A volumetric analysis, recurring matrices, mechanical reproduction, a reinterpretation of the decorations, three-dimensional modelling, help to illustrate a technical, formal and artistic image of the instruments. They are broken down into their constituent elements, analyzed in detail, the underlying geometric matrixes are identified, the chromatic character is reproduced, and the decorations are redesigned and enhanced to explain their explicit ethnic identity. They are not just technical reproductions of artefacts but aspire to be a narrative that brings together mechanics, geometry, ornament, tradition and harmonic emphasis. The detail drawing and the geometric and formal analysis intertwine with the study of the decorative qualities of the objects. They sometimes manifest themselves through ethnic drawings; other times are determined by the skilful use of the interlacement for the tuning of the membranes, or by reuse of elements derived from natural or artificial scraps.
It is an unusual and complex analysis that led to grips with survey, representation, geometry, design, lute art, decorative analysis and ethnic traditions. It's an attempt at cataloguing – non-exhaustive – that makes use of innovative techniques and methods, three-dimensional modelling and geometric analysis, to give shape and concept to the sound of tradition.

5. Conclusions

The experience of relief has proposed an in-depth analysis: functional, metrics, geometric and decorative. A progressive path: from the relief of shape, size, underlying geometry, to the analysis of

decorations that characterize the geographical and cultural affiliation. A theme of "small scale", little explored: between functional detail, popular tradition and ethnic design. An unusual experience that – away from "large-scale" themes like urban planning and architecture – gives weight to the most spontaneous expressions of popular cultures, from various geographic areas.
These are the areas in which it is expressed the persistence of traditions and cultures, sometimes now lost. This is where we highlight the fruits of cultural influences between different peoples. The "sound objects", for their "vocation" of the border between music, art and crafts, show a contact between multiple experiences and multisensory expressions. They are objects of daily use but at the same time instruments of socialization and public images to display in the popular festivals. The sound instruments manifest themselves as an expression of an ethnic design that does not derive from an aulic and cultured language. It stems from the layering of popular traditions, the most genuine and far from dominant cultures, but capable of expressing the deepest essence of a people.

Paragraphs 2 and 4 of this essay has been edited by Domenico Mediati. Paragraph 3 has been edited by Rosario Giovanni Brandolino. Paragraphs 1 and 5 by both authors.

Bibliographical References

[1] SCHERLIESS Volker, *Musica picta*. In FERINO-PAGDEN Sylvia, *Dipingere la musica. Strumenti in posa nell'arte del Cinque e Seicento*. 1ª ed. Milano: Skira, 2000. pp. 23-29. ISBN 88-8118-853-8.
The liberal arts were divided into two categories: the arts of the *Trivium* (*artes sermocinales*) which was based on the philosophical and literary knowledge; arts of the *Quadrivium* (*artes reales*) related to the sphere of mathematics. Grammar, rhetoric and dialectic belonged to the first category; arithmetic, geometry, astronomy and music were part of the second.

[2] ISIDORO di Siviglia, *Etymologiae*. III, 16.

[3] MANN Thomas, *Doctor Faustus*. (Translate by POCAR Ervino). 1ª ed. it. Milano: Mondadori, 1949. 131 p.

[4] MERRIAM Alan P., *Antropologia della musica*. 3ª ed., Sellerio: Palermo, 2000. 344 p. ISBN 978-88-389-15901.

[5] FABBRI Franco, *Il suono in cui viviamo: saggi sulla populr music.* 1ª ed., Il Saggiatore: Milano, 2008, p. 140. 387 p. ISBN 978-88-565-00400.

[6] OLING Bert, WALLISCH Heinz, *Enciclopedia degli Strumenti Musicali*. 1ª ed. it. Vercelli: Edizioni White Star, 2007. p. 37. ISBN 978-88-540-0689-8.

[7] SACHS Curt, *Storia degli strumenti musicali*. 1ª ed., Mondadori: Milano, 1980. pp. 539-555. The History of Musical Instruments. ISBN 978-88-04-40744-7.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Architectural conservation in China. The master plan of *Nanjing heritage park*

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Abstract
Architectural conservation in China is analyzed by an important international conservation project: the master plan of *Nanjing Heritage Park*. The topic is the accommodation of a large urban area extensively damaged by modern interventions, where the ancient monument is now deprived of the its dignity, identity and symbolic value, that should be at least partially evoked. The project covers three different aspects: urban and landscape restoration, museum design (with reconstruction of the lost volumes) and conservation of the ancient pre-existences. A theoretical coherence join the restoration project on the ancient parts (conservation and re-integrations of lacunae) and at the landscape level (re-integrations of volumes), proposed with two different technologies: one for protective structures of ancient parts (in glass) and other for volumes reconstructions (traditional, in accordance with the ancient phase). The choice of a transparent material, as well as to qualify unequivocally as a modern intervention is motivated by the desire to render to the visitors the charm of the open excavation. The size and the profiles of these structures allow easy understanding the unearthed relics through their inclusion within a space which is evocative of the original. The most significant element is the great pagoda, the visual centre of the complex with its 100 m. high, where exhibit Sakyamuni's relics, highly sacred for Buddhists, which symbolically represents the sign of the new foundation of the site.

Keywords: Heritage Conservation, Nanjing Bao'en Temple, Critic conservation, Heritage resources and local development, archaeological heritage park.

1. Architectural conservation in China

The protection of historical and cultural heritage in China is a very complex problem. In this respect Heritage conservation it has not yet been considered an independent discipline (I say this even though I myself have taught in 2011 Architectural Conservation at the *School of Urban Design* of the Whuan University in China).
In Beijing, for example, not until people have demolished the ancient Walls a few decades earlier, they were conscious of the value, as noted by an eminent historian: «When they were lost or damaged, we begin to pay much attention to them»[1].
Moreover the same idea of architectural conservation is not of univocal translation. With two ideograms (pinyn: *xiù*) 修 and (*fú*) 复, you approach a conservation idea next to restoration: the first ideogram indicates the action of "repair" while the second stands for "turn back to a previous state". Understood in this way conservation coincides with the operation of restore something that has been damaged (a physical degradation), interrupted (a figurative lacunae or a lack of parts) or entirely lost.
Two other logos, however, could make better sense of works on the cultural and historical heritage: those of 保 护 (*bao hu*), where (*bao*) 保 is for "protect" while (*hu*) 护 means "keep to defend".
Their union expresses an idea similar to our "preserve", something better suited to operations aimed at conservation and perpetuation. The difference between these two logos is great. We need to understand it while working in one direction and in another, or rather, to possess a shared method.

The aim is the conservation and re-evaluation of the authentic object, preserving its historic stratification and original material, and avoiding falsification.
The Nara Document [2], however, could become a dangerous alibi in front of a development which is too fast and attentive only to economic values[3][4]. Harmonizing the European authenticity concept with the Chinese culture is possible to reach at a harmonious development of ancient and new, as in the thought of a great Chinese historian of architecture as Liáng Sichéng [5][6][7].
The focus reaching a new definition of conservation is the expression of contemporary Chinese culture and not only an imported aesthetic expression without roots. The theme will be developed with a recent example: the master plan of Nanjing *Da Bao En Temple Heritage Park*.

2. The master plan of Nanjing heritage park

2.1 Introduction

The project explained is the same 2nd prize winner in 2012 international design competition for Nanjing Jinling Giant Bao'en Temple Heritage Park on Chinese city of Nanjing.
The project team presents a mixture of Italian expertise (ranging from archaeologists, restorers, experts of Chinese art and culture, museum designers, exhibition designers, museography experts, lighting designers, economists for cultural heritage and structural engineers) to obtain an organic whole project of new architecture and conservation of ancient monuments.
The aim of the team was solve the problem of studying the place with his historical architectures in order to arrive, with perfect consciousness, to the project of restoration.
Project team members are: *n!studio*, Mu Xingyn e Li Jinwen (Chinese consultants), Marcello Minuti - Struttura Consulting, Alessandro Leon - CLES srl (economists), Maria Luisa Giorgi (Chinese art consultant), Alessandro Pergoli Campanelli (conservation consultant), Engram – FAENZA (pictures).
International design competition was published on September 2011 from Nanjing Municipal Culture and Broadcasting Administration, Nanjing Municipal Cultural Investment Holding Group, Nanjing Daming Cultural Industry Co. Ltd. The master plan of Nanjing heritage park covers three different aspects: urban and landscape restoration, museum design and reconstruction of the lost volumes, conservation of the ancient pre-existences.

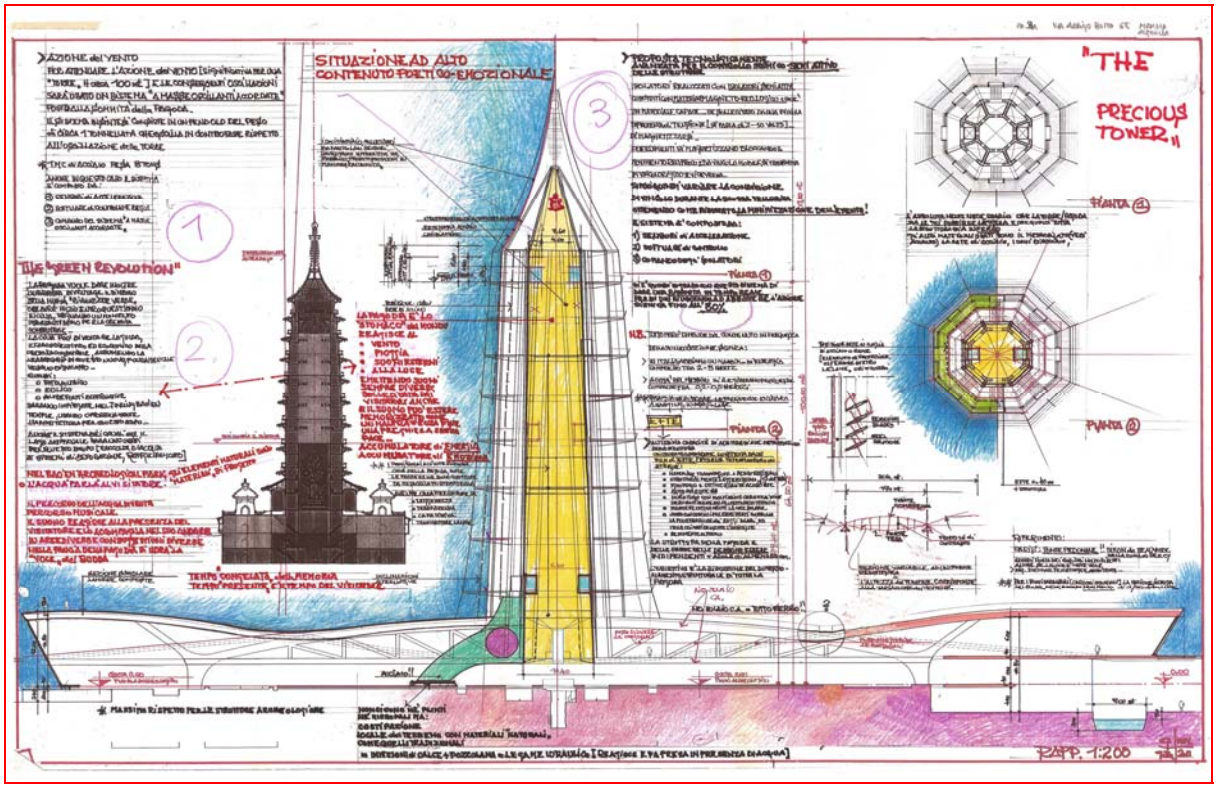

Fig. 1: Preliminary sketch of the new tower.

2.2 The methodical approach to conservation and restoration

The approach to historical and cultural heritage and the enhancement of historical centres, has been increasingly consolidating in Europe since 1964 when the *Venice Charter* was approved. It was to conclude a long and winding process that lasted a century and a half, which had finally asserted a more culturally advanced and functional attitude based on a 'critical' rather than dogmatic and

ideological approach. In this process a key position had been taken since the late nineteenth century by the Italian culture of restoration, which had found its highest expression and coherent development in the "theory of the restoration" set up by Cesare Brandi in the 50's and the consequent activity he performed at the direction of Central Institute of Restoration (ICR).
The *International Charter for the Conservation and Restoration of Monuments and Sites* [8] was introduced in 1964 in Venice (and so called the *Venice Charter*) with the following words: «Imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions. People … regard ancient monuments as a common heritage. ... It is our duty to hand them on in the full richness of their authenticity. … The concept of a historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or a historic event».
It is the application of Italian consolidated methodology to the analysis and conservation of historical heritage. Cesare Brandi wrote that «restoration constitutes the methodological moment of the recognition of the work of art in its physical consistency and in the two-fold aesthetic-historical polarity, in view of its transmission to the future»[9].Restoration works are not fully reversible, so every mistakes made during interventions may cause further damage, consequently putting at risk the entire project. It is necessary, therefore, to carry out conservation work step-by-step, according to an established process where each criteria is a step that, if correctly implemented, becomes the starting point for the next one.

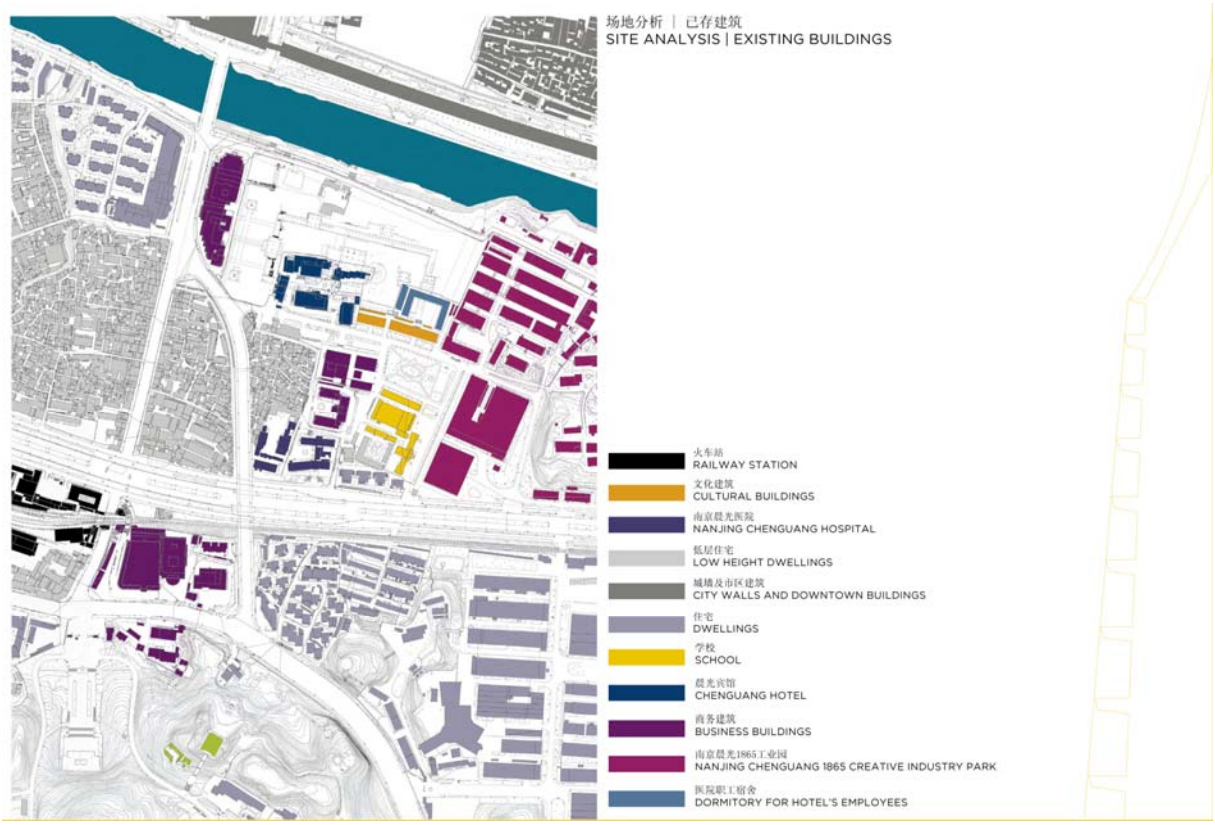

Fig. 2: Site analysis.

2.3 The principle criteria

According to Italian methodical approach were specified the most important theoretical precepts useful for correct design aimed at conservation and usage renewal. It is worth recalling the following points of the fundamental criteria of methodology in the field of protection and restoration of cultural heritage:
1) Conservation. First aim is the best possible transmission to the future of a historical-artistic heritage that is by definition unique and unrepeatable (the functional issues and other practical problems are the means and not the end of the intervention); everything should be based first of all on justifications of a cultural and conservational character, with all other considerations remaining secondary.
2) Minimum intervention. From this criterion follows a design work that maximize the efficacy and minimize the weight of each intervention. 3) Authenticity. The universal value of historical heritage depends on its authenticity. The restoration, as it regards authentic historical heritage, must be connected to the philology and critical analysis of the textual evidence; therefore any temptation of falsification involving imitation of styles must be avoided, in the awareness that we are not operating

with historical certainties, but at best on the basis of valid critical hypotheses. 4) Distinguishability: any additions should clearly demonstrate their modern character, with their own contemporary expressive efficacy, so that the new and the old will remain such, without any risk of introduction of counterfeit parts. The reconstruction of original parts or reinsertion of architectural and decorative elements should be visibly distinguished from the original parts. A reintegration is allowed under specific conditions, if it can be achieved without committing an artistic or historic fake. 5) Reversibility of any new intervention. 6) Compatibility (physical, chemical and aesthetic) of the restoration. 7) Adaptability of the new buildings to the progress of archaeological excavations. 8) Maintenance program.
The aim was to restore the monument to its history and to the city, making it comprehensible and usable, increasing knowledge of the place and intervening in its internal and external conformation and presentation. This is to be accomplished through careful restoration and also a rethinking of the spaces, the levels and the accesses. Particular care should go into questions of the overarching plan for development of the site, (i. e. avoiding architectural barriers) to permit a full and safe utilization of the monument, and also a plan of relations and modes of connection of the monument with the surrounding edification, and with the urban and archaeological context. In conclusion, the definition of a project of restoration of the monument that reflect its different functions today (as an archaeological site, a place of worship, a museum and an urban centre) that bring out the historical-artistic and landscape setting in which it is inserted and that identify paths of access and visiting that are consistent with the historical values of the site.

2.4 The restoration project

The project concerns a wide area of the city devastated in modern times (Fig. 2). The large archaeology parterre is planned in a context that proposes volumes alike with those monumental buildings whose the remains were part of. In November 2008, archaeologists unearthed a little pagoda in the site of Dabaoen Temple; a stupa-shaped casket, which is believed to be one of the 84-thousand stupas of King Asoka that contain relics of Sakyamuni (according to legend, it is a pearl-like Shelis from the cremated ashes founded when Supreme Buddha Sakyamuni died two and a half thousand years ago). That's why the most significant element of the project is a modern pagoda, (Fig. 1, about 100 mt. high, it's the visual centre of the complex) where exhibit the relics, which symbolically represents the new foundation of the site.



Fig. 3: Aerial view of the project from north.

There is also a theoretical coherence between the restoration project on the ancient parts (conservation and re-integrations of lacunae) and at the landscape level (re-integrations of volumes), proposed with two different technologies: one for protective structures of ancient parts (in glass) and other volumes reconstructions (traditional, in accordance with more ancient phase, philological known and documented).

The archaeological area (Fig. 4) includes remains of buildings of different materials, from stone to clay. The first step of the project was to characterize the ancient materials employed, adding all the necessary analysis to help understand their current performances. The results of this analysis will allow to draw a detailed plan with no harm to the ancient remains, the methods of their use and functions within the planned archaeological park. It is expected that the stone structures can still bear a controlled walking, while the clay must be protected against atmospheric agents and can withstand only carefully calculated loads. Stone structures need a continuous maintenance, also in order to avoid the roots of vegetation between the joints. Temperature may cause cracks, which can be compensated and stabilized with appropriate consolidation works. Greater attention should be paid to the stone used in ancient structures for water supply: as a matter of fact, the effect of consumption of water and the growth of mosses and similar is well known. Clay structures in general must be protected against atmospheric agents through a comprehensive and careful study aimed at improving the flow of rainwater and avoiding the stagnation of ground water.
A methodological approach to the restoration is primarily concerned with three aspects: the so-called “urban landscape” restoration, the true restoration of the ancient pre-existing and, finally, the - the reconstruction and musealization of ancient destroyed assets. This is only a preparatory division to a better description of the project, since each different theme is closely dependent on the others and never entirely separable; during the development of the project, in fact, thanks to the interdisciplinary composition of the team, all the different aspects are been evaluated and resolved at the same time always in search of a full harmony between the various requirements (composition, exhibits, plant, structural, etc..) keeping clear the primary purpose of conservation.

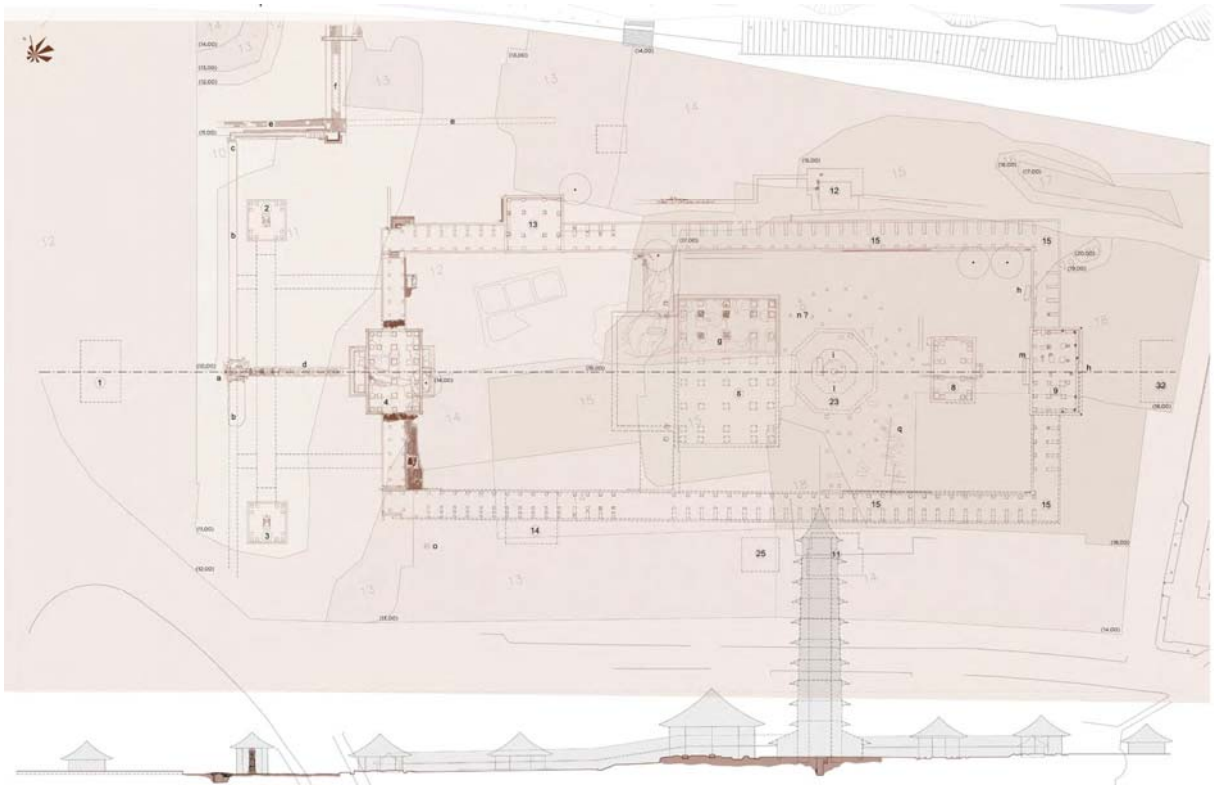

Fig. 4: Archaeological site analysis.

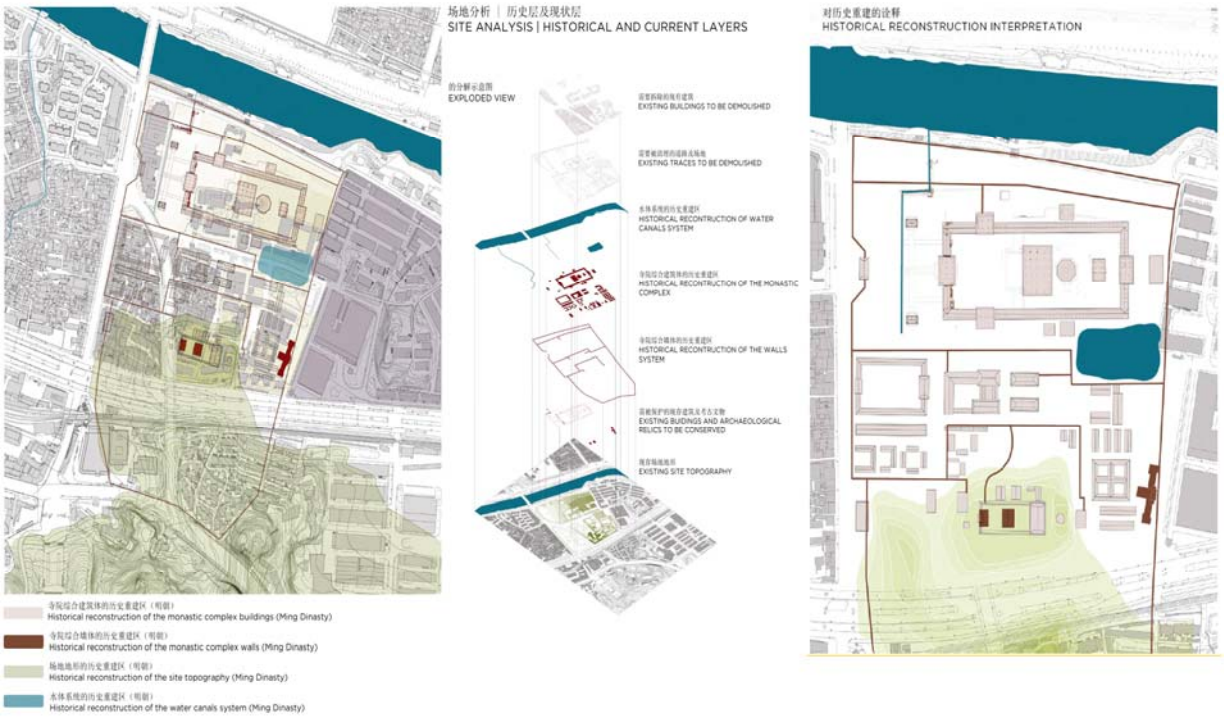

Fig. 5: Site historical analysis and interpretation.

The final result (Fig. 3) is, therefore, a whole organic and not a simple summation of several project parts that, only for greater synthesis and clarity, are hereby described separately. As for the urban and landscape aspects of the restoration, the overall theme requires the accommodation of a large urban area, with particular attention to the adjacent pre-existing historical context. The project aims to redevelop the historical context of the site, extensively damaged by modern interventions. The ancient monument, in fact, is now deprived of the its dignity, identity and symbolic value that should be at least partially evoked. The most relevant aspect of the project is the rediscovery of the archaeological site unearthed after those modern buildings have been demolished (Fig. 6).

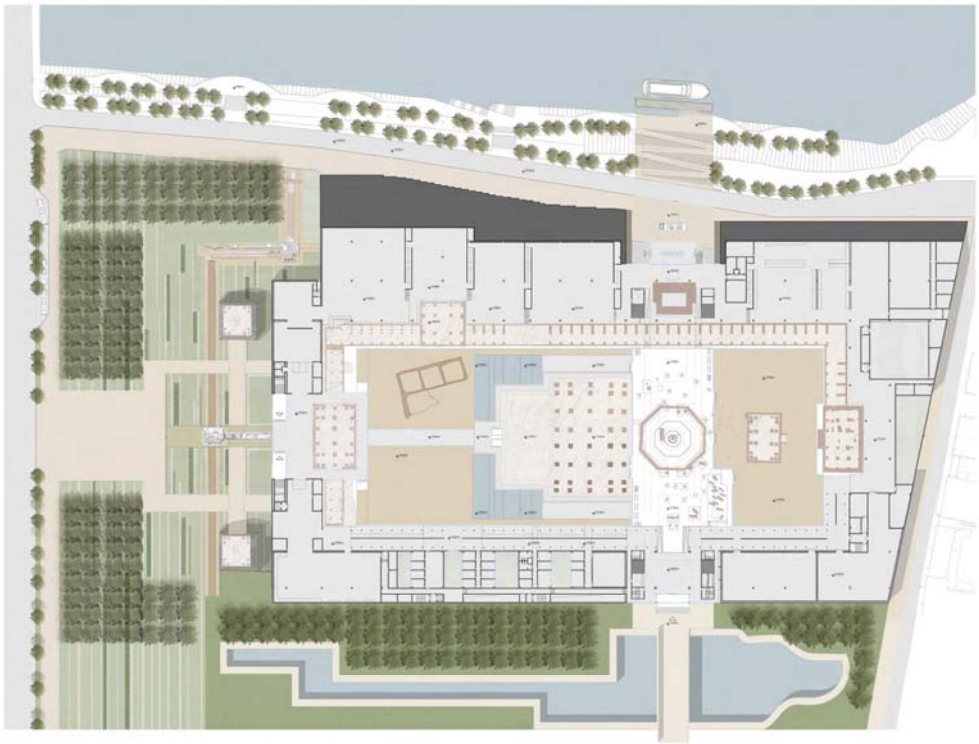

Fig. 6: Archaeological site master plan.

This set of archaeological remains, in order to be fully understood, needs to be included in a spatial context, which redefines new buildings consistent with those same monumental buildings that were part of these remains (Fig. 5). From this the choice to redefine the urban landscape of the site, recreating the lost axial system along with the progression of green spaces that comes from the hill up to the system of waterways (canals). The main sacred area, in fact, was located into a structure included between the protection of the mountain and the flowing water of the canals. The hill system - now illegible - is then repeated in the buildings of the south area, with their green roof echoing its memory. Moreover the project aims at restoring the original continuity of the hill interrupted by the great road structure and restoring the pedestrian link with the summit. The most significant element of the complex is spatially represented by the reconstruction of the great pagoda, with its height of 100 meters recalls the old image of spatiality, restoring the visual centre of the complex. Its structural characteristics, and spatial composition are the result of complex design choices guided by precise restoration. First of all the attention to the sense of the place. A careful study aimed to recognize the historical and cultural characteristics that distinguish the site in a symbolic, typological, morphological, construction, environmental and urban sense has led to the choice to reproduce the shape and the size of the best known phase of the pagoda among the various one historically documented. In doing so two instances, apparently conflicting with each other, the more strictly archaeological on one hand, (related to scientific investigation and restoration of existing buildings) and architectural on the other (the identification and qualification of the modern urban space) are solved together in a single gesture that is modern and, at the same time, evocative of ancient spaces. Throughout the site a modern element of connection and continuity typical of these places (water) has been designed with the double purpose of keeping the memory in its path of the lost lines of ancient boundary walls and at the same time, re-inserting into the landscape the water element that was originally present close to the monumental complex. The rationalization of the access system will also allow the connection to the rest of the city and, in particular, with the close system of industrial archaeology, thus recreating a layered fabric of the city placed inside a large, modern complex of museums. With particular regard, however, to the aspects of the restoration of the existing buildings, the guidelines suggest, first, to act in full respect of the preserved assets operating minimal actions that are aesthetically, physically and chemically compatible with the ancient materials. Each new addition has also been designed to be reversible, so as to ensure the least possible invasiveness and the possibility of future changes or corrections without damaging the old parts. The structures for the protection of archaeological remains present themselves as modern and ‘smart’ glass volumes that ensure optimal environmental parameters. The choice of a transparent material, as well as to qualify unequivocally as a modern intervention is motivated by the desire to render to the visitors the charm of the open excavation.

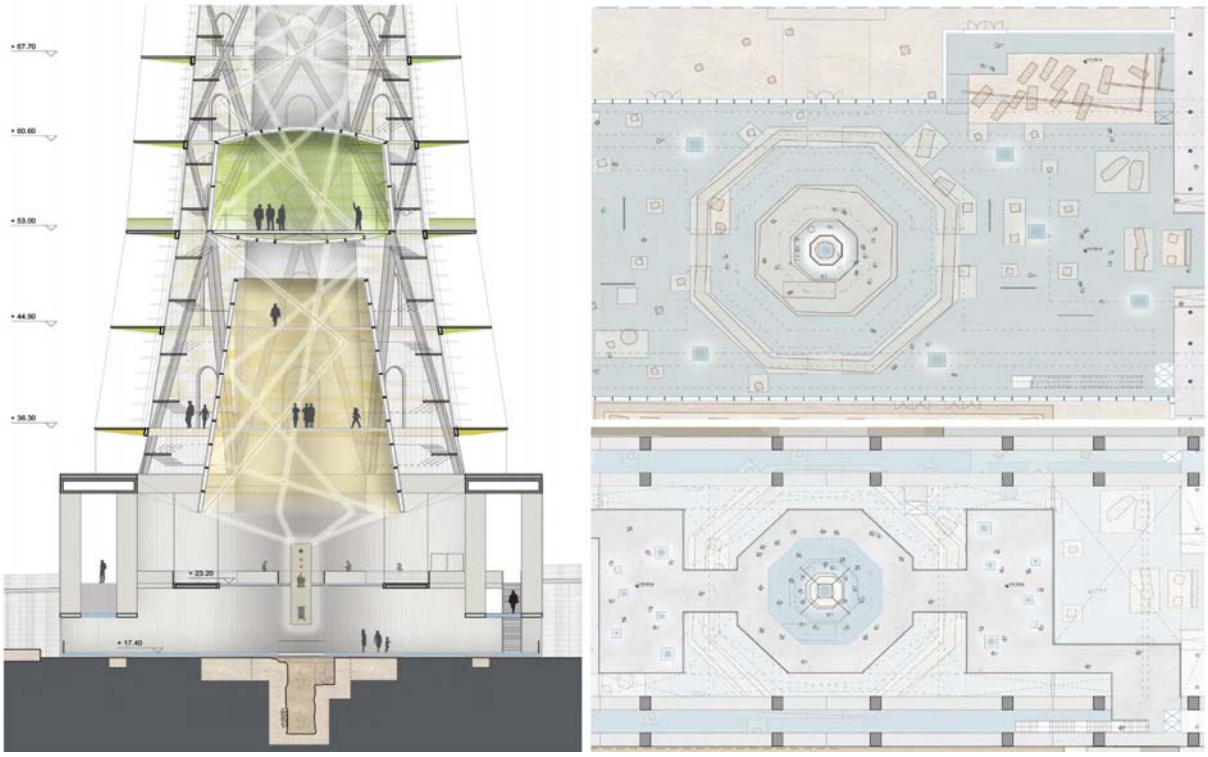

Fig. 7: The new pagoda and the exhibition area with the ancient pagoda of King Asoka (273 BC - 236 BC) that It is believed to contain Sakyamuni's sarira relics, highly sacred for Buddhists.

The size and the profiles of these structures, however, reproduce those of historic architecture to allow easy understanding of the old functions of the unearthed relics through their inclusion within a space which is evocative of the original. To facilitate this understanding in the new structures there is a wide exposition of the results of the studies on the monument and an equally copious documentation of the stages of restoration. It is important to recall, however, the principle of distinctiveness of the new integrations, that is present in both large and small scale: one of the strengths of the project is, in fact, the theoretical consistency between the detail on the intervention on old parts (reinstatement of gaps) and volumetric one at the urban scale (re-integration of the image). The principles adopted refer to the substantial unity of method and, therefore, there is a similar distinguishability of the modern restoration, whether it is directed to individual stones of the monument or to the revival of the lost volumes. Two different reconstructive procedures have been adopted, one for those structures that cover the remaining parts (glass) and one for those structures that have nothing to hide beneath them. In the latter case, these new museum buildings (for educational purposes only) are not meant for the protection of relics, and the design choices deliberately preferred to reconstruct the lost volumes in the traditional manner, in accordance with more ancient, better known and philologically documented phase of the complex. This restoration has purely didactic and educational scientific purposed, through careful research of materials similar to the original ones. There will be two clearly distinguishable parts of the same building, though spatially identical: one made according to traditional materials and methods and another one made with contemporary materials and forms that covers the ancient relics. The continuity between the two parts is guaranteed by the glass closure of the 'traditional' building that recreate, seen from afar, a single continuous surface with the 'modern' part (the one that protects of the archaeological excavation); moreover, the use of glass ensures a comfortable interior space management for museum exhibition even for those parts made according to traditional techniques.



Fig. 8: Night view of the exhibition area.

The distribution of interior space aims to ensure the best visibility and accessibility of archaeological excavation, even during the excavation and restoration phase, and to host a large restoration workshop (maintenance, testing new materials, teaching, etc..). The care of the places will be ensured by the choice of locating appropriate functions inside the museum buildings out of the archaeological area: as a matter of fact a wide range of exhibition space will be located south of the site for any new acquisitions, exhibitions, libraries, media etc. The core of the complex is represented now, as it was in ancient times, by the reconstruction of the main vertical element, the pagoda, reinterpreted in the new project starting from the historical record of previous phases of the monument. The principle of restoration of the new intervention is resolved with clear contemporary aesthetic choices, as evidenced by the use of materials in some cases even futuristic. Modern tools and technologies are always used with the ultimate goal of protecting and preserving the ancient site.



Fig. 9: View of the project with the great pagoda on the right.

The use of highly advanced technologies, in fact, allows the pagoda (Fig. 9), despite its height, to have its structural supports outside the ancient perimeter, without foundations that may damage the archaeological relics.
Particular attention is posed in the recall, through contemporary choices (with a resonant steel cable system) the sounds that were originally produced by the vibration of the wind around the pagoda bells. Likewise, the possibility to illuminate the pagoda at night will recall the main role of the ancient tower as urban element of recognition.
The most important treasure of the site will be located, once again, in the hollow space of the new pagoda, suspended above the pit of the foundation (Fig. 7-8) from which it has been recently extracted. Besides being fully visible and accessible the relics will symbolically represent the sign of the new foundation of the site.

Bibliographical References

[1] WU, Jianqun. *Find the old Beijing,* w.l., China Nationality Photographic Art Publishing House, 2005, p. 10.

[2] ICOMOS, *The Nara document on Authenticity,* Nara, 1994.

[3] AGNEW, Neville, DEMAS, Martha, *Principles for the conservation of heritage sites in China,* Los Angeles, the Getty Conservation Institute, 2002.

[4] DU, Xianzhou*,* [*the conservation of ancient architecture*], in *Zhongguo gu jian zhu xue shu jiang zuo wen ji*, Beijing, Beijing xin hua shu dian fa xing, 1986, pp. 335-340.

[5] SICHENG, Liáng. *Zhong guo jian zhu shi.* Beijing, China Baihua Literature and Art Publishing House, 2005.

[6] SICHENG, Liáng, LIU, Tuntseng, [the restoration of Wanchun pavillon], *Zhongguo ying zao xui she hui kan* (*Bullettin of the Society for research in Chinese architecture*) 5, 1, pp. 81-92.

[7] *Liang Sicheng xian sheng dan chen ba shi wu zhou nian ji nian wen ji, 1901-1986,* Beijing, Qing hua da xue chu ban she, 1986.

[8] ICOMOS, *The Venice Charter, International charter for the conservation and restoration of monuments and sites,* Venice, 1964.

[9] BRANDI, Cesare. *Theory of restoration*, (edited by BASILE, Giuseppe). Firenze, Nardini, 2005. Translation of original book *Teoria del Restauro*, Torino, Einaudi, 1977.

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COMMUNICATING REGIONAL IDENTITY, EMPOWERMENT AND PRESERVING CULTURAL HERITAGE OF SANT'ELIAN CIOCIARIAN CUISINE THROUGH SLOW FOOD TOURISM

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Abstract:

Tourists are now seeking alternative forms of experiencing cultural authenticity by redirecting the "tourist experience" at a slower pace in rural communities. Slow food tourism provides an opportunity for tourists to gain knowledge of the local culture from a "bottoms up" mind frame of experiencing food of a community. However, slow food tourism is a significant strategy for community empowerment to preserve regional cultural identity and local products that would otherwise not be experienced by tourists. This inquiry examines Ciociarian cuisine as practiced by the peoples of Sant'Elia, Fiumerapido, in the province of Frosinone, Italy. Ciociaria is derived from the Italian word *ciocie* meaning "primitive lace up boot" that local sheepherders once wore indicating this cuisine is framed in humbleness and simplicity by honoring the products of the region. This paper addresses how Sant'Elian's are empowered by communicating their regional identity while preserving Ciociarian cuisine through slow food tourism objectives: (1) Economic sustainability and collective empowerment through tourist entrepreneurship, creation of employment, and establish business networks to draw in tourists to Sant'Elia and other Ciociarian cuisine regions; (2) Distinction of local commodities, revive community pride as Sant'Elians; and (3) Inscribe as well as safeguard the preservation of Sant'Elian Ciociarian cuisine as an intangible and tangible cultural heritage.

Keywords: slow food tourism, identity, cultural heritage, empowerment, entrepreneurship

1. Communicating Identity, Authenticity and Preserving Cultural Heritage Through Slow Food Tourism:

According to the website, *Create the Good Life*,

> "The 'Slow Food Movement' is a term describing a wide range of efforts taking place around the world that seek to connect us more meaningfully with others, with place, and with ourselves. It emerged as an effort to counteract the fast-paced, commodity-focused unbalanced, and impersonal nature of much of modern human culture. The main tenet of the Slow Food Movement is that by taking the appropriate amount of time to experience the various activities of our lives, we are able to get in touch with what is deeply satisfying and fulfilling."

The "Slow Food" movement was born in 1986 when Carlo Petrini protested against "fast food" in Italy when McDonalds' opened its first store at the Spanish Steps (Square). Petrini established the "Slow Food" movement to promote the use of fresh local foods, grown with sustainable farming methods, prepared love, and consumed in a leisurely manner in the company (conviviality) of good friends and family. For Petrini and others, food was just one more aspect of life that benefitted from this type of "slow cultivation." The Slow Food movement is also a philosophy and way of life that can be applied to daily activities and all aspects of life to travel on a road less traveled or what is also known as "Slow living" (Petrini, 1986). The Slow Movement is not about moving slowly but a practice to focus on quality, long term benefits and well being in our daily lives and how we connect more thoughtfully with nature and human kind. The Slow Food movement has a social conscience, a love of delicious food through political activism by protesting against globalization and the spread of Genetically Modified Organisms or GMO's. Petrini and Slow Food efforts are also opposed to the homogenization of food around the world and are determined to assist the small producers from becoming extinct and to stimulate, revive and celebrate flavors and localism via national associations, charters and conviviums. Slow Food movement is comprised of a network of collaborators to promote and preserve traditional sustainable local food and regional cuisine, and encourage the farming of plants, seeds, and livestock characteristic of the local market.

In response to tourist marketing, economy and society in the Mediterranean area, tourism can no longer be viewed as a leisure activity of only promoting and experiencing popular urban cities. Tourists are now seeking alternative forms of experiencing cultural authenticity by forgoing urban settings and redirecting the tourist experience at a slower pace especially in rural communities. Slow food tourism aims at the "unhurried experience" by providing an opportunity for tourists to gain knowledge and experience the local culture at a slower pace from a "bottoms up" mind frame of experiencing food of a community. However, slow food tourism is a significant strategy and serves in other capacities especially for local empowerment to encourage, reify and preserve regional cultural identity. In addition, slow food tourism supports the commodification of local products and service that would otherwise not be brought to the global forefront for tourists to experience and serve as markers of cultural heritage. According to Timothy and Ron (2013), the end result is the production of culinary food service and food products that is a mixture of tangible (local products) and intangible (eating traditions, smells, recipes, etc…) assets that frame a regional cuisine and is preserved as a cultural heritage as well as celebrated as a heritage food. Van Esterik (2006) adds, "Heritage foods become the commodities through which national and regional traditions are identified and preserved."

The cuisine of a region also communicates, authenticates and preserves cultural identity. Food is a temporal tangible and intangible product that links the past (what is preserved), present (what is currently celebrated) and to some degree the future (what may be perpetuated) and like cultural narratives or stories, recipes are passed on from generation to generation. Ethnic foods establish or reinforce, (temporal, physical and mental) by sight and smell from direct experience with regional gastronomy to further support and preserve indigenous identity (Timothy & Ron,

2013; p. 101). Even immigrants who have been displaced or moved from their homelands are temporally linked back to memories of home at the trigger of sight and smell of their native foods (Bhaba, 1994; Alonson & Krasjic, 2013); thus, authenticating their cultural identities wherever they are. Cuisine authenticity can be a contentious space of power of who gets to claim "authenticity" of regional foods and what is considered as legitimate cultural cuisine continues to be debated. However, Presenza and Del Chiappa (2013) in their studies of Italian cuisine in Sardinia and Molise do provide insight that local foods mean more than "authenticating" the regional gastronomy but is also a strategy to create community cohesiveness and can revive cultural pride of the local peoples to be active in preserving their cultural heritage (Timothy & Ron, 2013).

2. Ciociarian Cuisine:

Ciociaria is a culinary region in central Italy, south of Rome, north of Naples, between the Tyrrhenian coast and the mountain of Abruzzo. The cuisine of Ciociaria is grounded in the rural, slow, bucolic life of the shepherd and praised for its simplicity and authenticity as well as for the importance it attaches to friendship, conviviality, and to the family. Ciociaria has a long culinary history, as the area was once the breadbasket of the Roman Republic and Roman Empire until the 4th Century. The name Ciociaria was imposed on this area much later, and is derived from the Italian word *ciocie* meaning "primitive lace up boot" that the local sheepherders once wore. It indicates that this cuisine is framed in humbleness and simplicity. Ciociarian cuisine honors the products of the earth and local vegetable specialties such as sweet red peppers known as the Sant'Elian beefsteak because they are so meaty and *broccoletti* a type of broccoli particular to Sant'Elia and cannellini beans from nearby Atina as according to *Food and Travel* (2013), "that in the final state of culinary presentation are rarely mixed with one another and are devoid of being smothered by fancy sauces." The article also adds there is an explanation that continuity and tradition are all-important in this Ciociarian region, which may be why the food, while simple, tastes so delicious because there are no fanciful sauces but the mixture of pure ingredients such olive oil, spices, local cheeses, vegetables, fruit, and meat. 'It's all about the earth" says Salvatore Tassa, chef of Michelin starred *Le Colline Ciociare* (2013) as he adds, "This is such a poor region that we make the most of all the ingredients we have. Everything tastes so good because of the soil in which our produce grows and because of what we feed our animals".

The Ciociaria culinary region encompasses not only Sant'Elia Fiurmerapido but other towns such as, Cassino, Aquino, Alvito, Frosinone, and other more touristic sophisticated towns like Atina and Picinisco in the Val di Comino who have a large population of returning immigrants that bring with them business ideas that they learned abroad (pp.1-2). One example is entrepreneur Cesidio de Ciacca who had great success in Scotland and has now returned to his home town of Picinisco to invest by buying up separate but adjoining structures in the historical center of Picinisco. He has transformed these luxurious 5-star town homes into a hotel under the name *Sotto le Stelle* meaning "under the stars." To lure and attract guests to the region, Di Ciacca created an effective network of Slow Food--Slow Travel businesses that include the nearby winery *Cominium* that adheres to the Slow Wine philosophy. The network includes hotel arranging Spa services, tours to nearby points of interest, cooking classes with master chefs and local cooks of the region. In addition, *Sotto le Stelle* can arrange wine and marzolino cheese tasting at Casa di D.H. Lawrence, a restored farmhouse that belongs to the Sora Slow Food Presidia convivio chapter. As a result, Di Cicacca has benefitted from Slow Food tourism support and collaboration from like-minded businesses by creating a gastronomy cluster for easier branding and marketing of the Ciociarian region.

2.1 Sant'Elia, Ciociarian Cuisine and Slow Food Movement Tourism:

Sant'Elia Fiurmerapido is part of the Ciociarian region and has a long history of food production as it was once part of the breadbasket of the Roman Republic and Roman Empire that produced wine, olive oil, wheat, and a variety of fruits and vegetables. Even the Sant'Elian *Rapido* river was once named *Vinius* during the early Roman times because of the abundance of wine that was produced from the vineyards in this fertile area of the Roman countryside. In the early 1800's Sant'Elia's river produced electricity (the first Italian town to have it) which gave rise to flour mills, olive mills, a Merino wool factory, and a paper mill which supplied the scriptorium to the Abbey of Montecassino. During the Unification of Italy in 1870, Sant'Elia's industries were transferred to the North and the town suffered a major economic set back. However, increased economic devastation continued with World War II as Sant'Elia was 93% destroyed during the bombing of the Abbey of Montecassino. This economic devastation created an outmigration since there was minimal source of employment after the war. Sant'Elia is continuing to experience massive outmigration due to the more than 40% unemployment in the town, especially among young Sant'Elians. The result of high unemployment in Sant'Elia has had a systemic effect of deflated pride and lack of communal involvement by the town locals. The *mordi e fuggi* or "eat and run" tourists that visit nearby Montecassino is only a few kilometers from Sant'Elia but unfortunately, Sant'Elia has been not provided tourist benefits. However, Slow Food Tourism offers a glimmer of hope to arrest the outmigration, preserve the local culinary and cultural traditions, and save the surrounding mountains that are covered with olive trees from being destroyed by sand excavators.

In the footsteps of Picinisco's Slow Tourism entrepreneur, Cesidio de Ciacca, Sant'Elian born Liza Salvatore, has created her California based *TerraBellaTravel Services* primarily to help her revitalize Sant'Elia. She has been operating her Slow Food style of tourism in Sant'Elia for five years by bringing groups of people for week-long cultural programs that include cooking classes with chefs from the nearby culinary institute as well as lessons from local cooks. In addition, her cultural programs include a half-day of olive harvesting, then a visit to an olive mill to see how Sant'Elia's prized extra virgin olive oil is made. The olive harvest and olive mill visit is followed by olive oil tastings and a cooking class. Dinner is always served with local wines such as *Cominium* winery's special white wine or Atina's award-winning Cabernet Sauvignon as well as *Tullio* Winery's rose` which is currently having a resurgence in the area. *TerraBella* tours also includes guided visits to the historically important Abbey of Montecassino where the Gregorian Chant and the Italian language began, manuscript illumination and Benedictine art was created, as well as a train ride to Rome for an all-day historical tour. More importantly, participants in *TerraBella's* week-long programs immerse themselves into the local culture by cooking and dining with the locals who proudly share their tradition and history, in a convivial setting around the table, as the program participants contribute much needed tourist dollars to local cafe's, trattorias, pizzerias, country Relais, and local transportation providers. Liza Salvatore's program provides an authentic and unique mutually beneficial cultural exchange to the visitor who works side by side with Sant'Ellian locals who proudly transmit their history, cuisine, and culture to the visitors, thus preserving it and disseminating Sant'Elian Ciociarian cuisine for future generations.

2.2 The Politics of Sant'Elian Ciociarian Cuisine Slow Food Tourism:

Sant'Elian Slow Food tourism operator Liza Salvatore of *TerraBella Travel Services* sees Slow Food travel as a way to save Sant'Elia's culture by creating jobs and provide entrepreneurial opportunities for Sant'Elians. Salvatore believes Slow Food Tourism is one way to stop the decline of Sant'Elia but there needs to be local administrative support as she had to start from

scratch to create *TerraBella Travel Services* without the assistance of those in charge of tourism on the local, provincial, and regional level. In her five year involvement, she has had to establish a business network by initiating several alliances such as creating a Sister City agreement between Sant'Elia, Italy and Santa Monica, California. In order to reignite and revive the pride of local Sant'Elians, Salvatore has donated prize money for local flower competitions for beautification as she has also donated a monumental welcome panel at the entrance to the town to spark tourist interest. These initiatives have endeared her to the townspeople, but she has received very little support from the regional, provincial, and communal tourism "ministers", who have not in any way assisted her in finding service providers for her programs, such as cooks, wineries, farmhouse and Relais hotels, and local transportation. Salvatore has also encountered a little enthusiasm from a few locals, but a lot of skepticism from most of the 6,400 Sant'Elian inhabitants. At the moment, Sant'Elians are very cynical that the local administration will change its policy toward allowing sand extractors to continue mining for sand in their mountains and excavating historic olive trees, since the mayor has a personal interest in continuing that activity rather than supporting tourism. For example, in Sant'Elia, the minister of tourism, Gian Carlo Vacca was also in charge of small businesses and was asked by Liza Salvatore of *TerraBella Travel* to collaborate in developing and promoting Slow Food Tourism in Sant'Elia. This type of collaboration would bring small tourist groups to Sant'Elia to engage in week long tourism programs and support the local economy by staying in local hotels, eat in the local restaurants, as well as use local transportation businesses. However, Vacca's reply to Salvatore (2013) was that he would rather collaborate on initiatives that help other small businesses as he did not consider Slow Food Tourism as a reputable type of business that could encourage local; especially, young entrepreneurs to enter the tourism niche in Sant'Elia. For Salvatore, this was an opportunity to lower high unemployment, while preserving Sant'Elian Ciociarian cuisine, cultural traditions, and save the local mountains from the uprooting of hundred year old standing olive trees in lieu of sand excavation. Sant'Elian residents are now at the crossroads and must now act if they want to vote out the leaders who have ruled for decades in order to preserve their culture, their mountains, and their culinary-cultural traditions, or allow sand extractors to turn Sant'Elia into a quarry. For many Sant'Elians; especially, for Salvatore, the two activities cannot co-exist without severe impact on the peoples and environment of Sant'Elia Fiurmerapido.

Additional politics of the Ciociarian Slow Food Tourism in Sant'Elia include "institutional traps" (Rizza, 2013) which are powerful obstacles created by specific groups of people belonging to socio-cultural institutions within society preventing further economic development. Often local officials (LO's) establish perverse intersections that result in unequal transactional exchanges occurring among local politicians, central governments, state enterprises and elite townspeople. For these specific groups, there is no compulsion or feelings for any incentive to change the *status quo* because of supporting their own agendas that are only beneficial to exclusive individuals. Bargains are implemented between and among elite groups to support the *status quo* even if this would mean additional jobs would be created for economic growth in Sant'Elia. Over time, such bargains are molded and establish an underground scheme that reinforces the distribution of resources and local elite power to continue to stay at the top in support of the *status quo* and not embrace any change. This could be exemplified in the case of exchange through "voting blocks" during general elections that create "Double-Binds" for many Sant'Elian who wish to establish any tourism business in Sant'Elia. In order for local townspeople or local businesses to conduct *any* type of business or business survival, Sant'Elians are often forced into compliance to support inequitable bargains. Regardless*, all* participants either local politicians, government officials, state enterprises and elite and local townspeople "fall into these institutional traps" resulting in a vicious circle of severe underdevelopment that will have a socio-economic impact on Sant'Elia.

3. Future of Sant'Elian Ciociarian Cuisine Slow Food Tourism:

The future of Sant'Elian Ciociarian cuisine through Slow Food tourism is promising but there is much need for infrastructural support and organizing. Currently, there are not many slow food networks, national associations, charters and conviviums in the Ciociarian region. There are some emerging "slow" tourism areas such as Atina and the Val di Comino but they are not using the "Slow Food" name; although, they practice a similar philosophy, which raises the question is it an advantage to use the Slow Food name and logo to attract Slow food travelers to Sant'Elia and the Ciociarian region or is it enough to simply adhere to the slow philosophy and forego the rest? It appears that the vast network of Slow Food tourism with convivio chapters could be very helpful to Sant'Elia and the Ciociarian region in creating gastronomic clusters and branding which could aid in developing a more thriving Slow Food and Slow Travel industry. Thus, ensure success to Slow Food entrepreneurs such as Sant'Elian Liza Salvatore and Piconisco's Cesidio de Ciacca. Interested upcoming Sant'Elian Ciociarian Slow Food Tourism entrepreneurs and practicing operators need to create an association of joining the European Slow Food Tourism network that already has over 100,000 members worldwide and who are all part of local chapters or conviviums that organize events and activities in practicing the Slow Food philosophy in their respected communities. Slow Food Tourism networks would be an active strategy for the promotion of Sant'Elian Ciociarian cuisine through the communal organization of wine and olive oil tastings or convivial activities such as group meals, beginner wine courses, and educational lectures. However, no convivia exist in Sant'Elia Fiumerapido nor are there any food fairs or collaborations between local restaurant chefs and food growers. Entrepreneurial marketing has to be done individually and without any governmental support. Perhaps the greatest challenge and obstacle to Slow Food Tourism in Sant'Elia Fiurmerapido and for most of the Ciociarian region is the absence of vertical and horizontal integration from local, provincial, and regional tourism boards indicating the lack of ground support to "would-be" Slow Food entrepreneurs. Liza Salvatore of *TerraBella Travel* has experienced the lack of support as she reached out to the Lazio Region *assessore* (minister) of tourism for assistance in promoting Slow Tourism in Sant'Elia Fiurmerapido but was confronted with the reply "…but why do you need to reinvent the wheel? Why go to Sant'Elia and have to create interest in something new when Rome has so much history, and great restaurants to offer tourists. My home town of Arezzo has beautiful mosaic art. I can be a great help there [Arezzo]" meaning that Sant'Elia had nothing to offer to tourists in the realm of experiencing Italian culture.

Due to the lack of local and regional governmental assistance, Sant'Elian Ciociarian cuisine Slow Food tourism would benefit greatly from joining Slow Food Tourism networks or establishing a convivio in Sant'Elia Fiurmerapido. For example, the Bra Gourmet Association in Italy is also part of the Barolo & Friends network that aims at exploiting wine culture and specific territorial wines through special events. In just three years, membership grew from 3,000 members to 8,000 as their mission was to promote tourism and to distribute wines and other products. As a result, a local restaurant in Bra, *Osteria del Boccondivino* was opened and with *Slow Food's* publication of *Osterie D'Italia: A Guide to Traditional Places to Eat and Stay in Italy* (2007) has helped revolutionize restaurants by introducing concepts like "regional food, tradition, simplicity, hospitality, and reasonable prices." According to Van Der Meulen (2008), such actions resulted in the survival of hundreds of small, traditional restaurants and their suppliers. Founder of Slow Food Tourism Carlo Petrini states, "We want to defend the richness in agricultural food products against the deterioration of the environment, protect consumers, and high-quality products, stimulate research and promote gastronomic pleasure of eating together" (Petrini, 2001; Van Der Meulen, 2008). Therefore, it is imperative for Sant'Elians to reach out and make these connections by joining various networks in order for Ciociarian Slow Food Tourism to work.

Although, Slow Food Tourism could offer an opportunity to arrest Sant'Elia's decline and even offer a rebirth of its traditions and culture but Slow Food convivia are too few in the area. In addition, the Sant'Elian mentality is skeptical from that of adherents of the Slow Food philosophy which many accuse as being too elitist (Van Der Meulen, 2008). Critics say the Slow Food movement demonstrates its elitism by stating that it wants to protect itself by being available to only a select group of tourists rather than the masses (pp. 234-235). Whereas, many local Sant'Elians may claim that "Slow Food" will add to the burden of the average Sant'Elian because unlike Slow Food tourists who are more affluent and have the time and money for developing 'taste', 'knowledge' and 'discernment', the average Sant'Elian is just struggling to survive in order fulfill basic daily needs. Therefore, Sant'Elian Ciociarian cuisine Slow Food tourism maybe viewed as a pipe dream rather than a tangible asset to support entrepreneurship and as a significant strategy for community empowerment to alleviate economic poverty, preserve regional Sant'Elian Ciociarian cultural heritage and promote the local products of Sant'Elia.

4. Conclusion:

Tourists are now seeking alternative forms of experiencing cultural authenticity by forgoing urban settings and redirecting the tourist experience at a slower pace especially in rural communities. Slow food tourism aims at the "unhurried experience" by providing an opportunity for tourists to gain knowledge and experience the local culture at a slower pace from a "bottoms up" mind frame of experiencing food of a community. However, slow food tourism is a significant strategy and serves in other capacities especially for local empowerment to encourage, reify and preserve regional cultural identity. In addition, slow food tourism supports the commodification of local products that would otherwise not be brought to the global forefront for tourists to experience and enjoy. This inquiry examines Ciociarian cuisine as practiced by the peoples of Sant'Elia, Fiumerapido, in the province of Frosinone, Italy. Ciociaria is derived from the Italian word *ciocie* meaning "primitive lace up boot" that the local sheepherders once wore indicate this cuisine is framed in humbleness and simplicity by honoring the products of the region through simple preparation and presentation. This paper addressed how Sant'Elian's have an empowering incentive to communicate regional identity while preserving Ciociarian cuisine through slow food tourism objectives of economic sustainability and collective empowerment through tourist entrepreneurship, creation of employment, and establish business networks to draw in tourists to Sant'Elia and other Ciociarian cuisine regions. In addition, Sant'Elian Ciociarian Slow Food Tourism can also showcase and distinguish local commodities, revive community pride as Sant'Elians; and inscribe as well as safeguard the preservation of Sant'Elian Ciociarian cuisine as an both a tangible and intangible cultural heritage.

References:

[1] Create the Good Life. (2014). Retrieved from http://www.create-the-good-life.com/2014.

[2] *Journal of Heritage Tourism.* 8:2-3, 158-171. London, UK. Routledge: Taylor & Francis. Abel Duarte Alonso and Krasjic Vlad (2013) Food heritage down under: olive growers as Mediterranean food. DOI: 10.1080/1743873X.2013.767807.

[3] Bhabha, Homi.*The Location of Culture*. London: Routledge.1994. ISBN-13**:** 978-0415336390

[4] *Journal of Heritage Tourism.* 8:2-3, 99-104. London, UK. Routledge: Taylor & Francis. Dallen J. Timothy and Amos S. Ron (2013). Understanding heritage cuisines and tourism: identity, image, authenticity, and change. DOI:10.1080/1743873X.2013.767818.

[5] *Food and Travel Magazine.* 1-8.London, UK. Green Pea Publications (2013).

[6] Petrini, Carlo. Slow Food. (1986). Retrieved from http://www.slowfood.com/2014.

[7] *Journal of Heritage Tourism.* 8:2-3, 182-192. London, UK. Routledge: Taylor & Francis. Angelo Presenza & Giacomo Del Chiappa (2013). Entrepreneurial strategies in leveraging food as a tourist resource: a cross-regional analysis in Italy. DOI: 10.1080/1743873X.2013.767810

[8] Rizza, Olivella Maria. Building social capital to foster local development: the experience opening a HUB in Siracusa. Siracusa, Italy. Lettera Ventidue Edizoni (2013). In *Recupero Valorizzazione Manutenzione nei Centri Storici: Un Tavolo di Confronto Interdisciplinare.*

[9] Salvatore, Liza (personal communication, November 6, 2013)

[10] Van Esterik, Penelope. From hunger foods to heritage foods: Challenges to food localization. Lanham, MD: AltaMira Press. (2006). In R. Wilk (Ed.), *Fast food/slow food: The cultural economy of the global food system* (pp. 83–96).

[11] Van der Meulen, Hielke S. The Emergence of Slow Food. Dortrecht: Springer (2008) In W. Pulsink and H. Dons (eds) *Pathways to High-tech Valleys and Research Triangles: Innovative Entrepreneurship, Knowledge Transfer and Cluster Formation in Europe and the United States* (pp. 245-247).

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Gathering Treasures and Distributing the Spoils

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Abstract:
The attribution of cultural heritage is one thing, but the management of it is quite another. Governments around the world are attempting either surreptitiously or in broad daylight to extricate themselves from the burden of heritage management. Cultural built heritage management is regarded as costly involving too much red and green tape. Private owners, politicians and developers take a dim view of the heritage profession and have come to regard it as both arcane and unpredictable. There is very little consistency in management style. Some local municipalities do it one way but the neighbouring municipality will do it completely differently. Managing cultural built heritage is expensive because it is highly detailed and draws upon professional skills to do it right. Against this backdrop, the paper that I will present will show how heritage management can become self-funding and beneficial to both owners and municipalities. Its attention is focused upon incentivising and reward mechanisms and greater participation and profitability for private owners.

Keywords: heritage incentives; tax credits; urban regeneration; conservation; preservation.

1. Introduction

This paper addresses the complexity of relationships that exist in heritage management today. Various actors and agencies at various levels of government, community and private enterprise come together to effect urban regeneration projects all over the world today. Successful urban regeneration projects are premised on a healthy mix of projects, professionals, bureaucrats, businesses, owners, developers and incentives. It is the last of these – 'incentives' that constitutes the focus of this paper. Against a backdrop of urban regeneration, three incentive schemes are discussed. These are the 'Belvedere Memorandum' in the Netherlands; the English Heritage Lottery Fund and; rehabilitation tax credit scheme in the USA. Each scheme is analysed in terms of mandate, operation and effect and then in the conclusion of the paper, a brief comparison follows.

2. The nature of urban regeneration projects

Common to most urban regeneration projects is the perception that the historic environment is one way of regaining a concentration of people and activity back in the city centre. Local authority expenditure imposed from central government promotes the conservation of the historic environment to boost locally generated income and thus taxes (Madgin, 2010). Different types of funding to lever private investment are used in combination with fast track planning. Single purpose agencies with a financial and administrative mandate are specifically formed to accelerate the pace of regeneration. Governments rely upon market forces by courting private sector investment. Public funding is used to invest in infrastructure and reduce the risk to the private developers. Hence partnerships, often called PPPs, are utilised as a project delivery vehicle.

However, the sensitive treatment of urban regeneration projects is crucial to the urban regeneration project because of the pressures it faces. Such projects contain a unique and irreplaceable heritage of physical fabric and evidence of earlier cultural histories. As the centres of sometimes substantial urban complexes, they are expected to continue to provide for the social, cultural and commercial requirements of present populations, which in turn places a tremendous strain on a fragile environmental structure (Mageean, 1999). The unique quality of their environments makes them attractive to tourists and other visitors. The combination of these roles has to be recognised and addressed in any effective conservation strategy.

The need to achieve continuity between the past and present is still a generally accepted starting point for such projects, but concepts of how this might be achieved on the ground are weak. The problem of defining a clear philosophical framework hinges on the fact that different things and places may be differently valued by different people. Within the context of managing the built heritage in urban regenertation projects, there must be adaptability to change. It remains a problem of balancing interests: social, political, commercial and environmental (Mageean, 1995).

The economic and social composition of cities in the developed world has been profoundly transformed in the past six decades by the processes of globalisation, deindustrialisation and tertiarisation. A key contemporary challenge for city governments and their partners arising from this transition, is balancing an aspiration for economic competitiveness, i.e. promoting a better mix of attributes for business and business success with an imperative to promote social inclusion (Barber & Hall, 2008).

Barber and Hall (2008) explain that a distinctive ‘entrepreneurial’ model of urban economic development has evolved in urban regeneration projects. They involve investment in service-sector physical infrastructure, promotion of ‘creative’ industries, ‘boosterist’ city marketing campaigns, development of up-market housing in the central business district (CBD), hosting internationally-important sporting and leisure-related events and ‘themed’ neighbourhood regeneration (Smyth 1994, Hall & Hubbard 1998). These interventions are designed to reinvigorate economically urban areas and, thus, contribute to economic competitiveness. They are commonly branded as examples of ‘urban renaissance’. Such entrepreneurial strategies are typically conceived, funded and implemented by coalitions of local government and business stakeholders and are characterised by exclusive, corporatist forms of political process (Davies 2001).

Contemporary relationships have developed between the policy spheres of conservation-planning, regeneration and economic development. In so doing, it is argued that conservation has largely repositioned itself successfully from being regarded as a barrier to development to being regarded as an active agent of change. In the process conservation-planning, whilst sharing ancestry and values with other spheres of conservation activity, has become something distinct and different (Pendlebury, 2013).

Pendlebury (2013) explains that today, conservation is seen as a force for continuity balanced against forces for change. It has been presented as an active agent of change in itself. The concept of change has been decoupled from physical change. It no longer tends to be associated with the erasure of existing physical environments and their replacement with new. Increasingly, the discourse embodies necessary change that can be achieved and enhanced by conserving and recycling historic buildings in ways compatible with conservation objectives.

Conservation-planning is considered to be an assemblage that helps us conceptualise the complexity of the social relationships in the sphere of heritage management. It helps draw out the horizontal and shifting power relationships that exist in contestations over the management of places, alongside the hegemonic vertical power relations that also exist (Pendlebury, 2013).

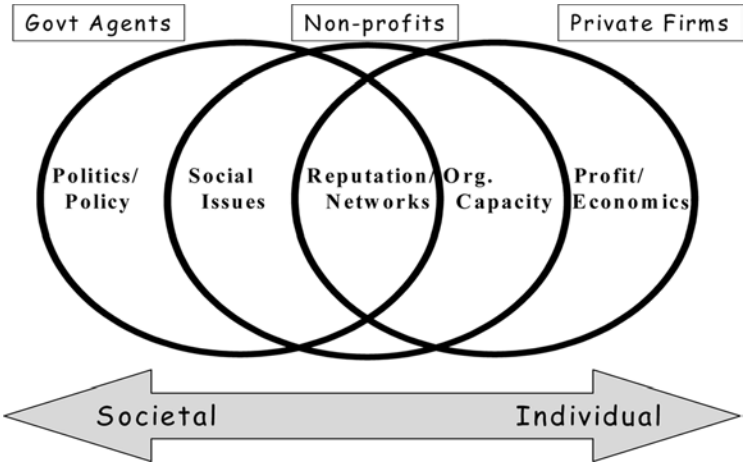

Fig. 1 - Decision Factors by Agent Type–Similarities and Differences in Rhodes, M & Murray J (2007) Collaborative Decision Making in Urban Regeneration: A Complex Adaptive Systems Perspective, International Public Management Journal, 10:1, 79-101

Hokerberg (2013) explains that the concept of heritage can be perceived as a process rather than a static phenomenon; it is constantly redefined in the predominant social and cultural context. It signifies an interpretation or a reconstruction of the past to fulfil the needs of the contemporary society and the institutionalisation of a collective memory. It is a practise that 'clarifies pasts so as to infuse them with present purposes. The social and cultural consequences of such a definition of heritage has democratic implications. It needs to respond to certain standards of legitimacy and representation. Heritage is a frequent issue on the political agenda. More people are becoming involved and aware in a much broader and a deeper array of heritage phenomena than ever before (Harvey 2001, p. 336).

Urban heritage is now recognised as an important contribution to the historical continuity and complexity of our cities. Today, there is a methodological urge to develop new parameters for the assessment of heritage including not only aesthetic and historical qualities but also social values and other aspects that contribute to the complexity of the concept of heritage (Hökerberg, 2013). The focus of heritage discourse has been gradually shifting from the extraordinary and unique to the typical, inspired by the reorientation in landscape heritage discourse where the ordinary landscape is subject to conservation interest. The everyday landscape is acknowledged as an important part of the quality of life as well as areas of 'outstanding beauty. It contributes to the formation of local cultures and it is considered an essential component of an area's natural and cultural heritage (European Landscape Convention, 2000).

Rautenber (2012) posits that the extended application of the category of heritage to new objects such as industrial vestiges or expressions of collective memory, has been among the most important cultural phenomenon of the last three decades of the twentieth century. It can be seen as one expression of the rise of a 'contemporary regime of historicity' (Koselleck, 1990) that has emerged. According to Koselleck, today there is a tension between our collective experience and expectations. Faith in progress is fading and the past takes a weaker place in our collective representation of time. Consequently, as Hartog (2005, p. 15) states, we would be entirely engaged in the present, an omnipresent that has no horizon other than itself. Heritage has become one way of experiencing ruptures with the past and reducing them for our own purposes. Heritage is called upon to preserve the diversity of culture, to promote local empowerment and sustainable development (Hartog, 2005).

Morisset (2009) defends the notion that 'the idea and object of patrimony are specific to the time and place to which they belong (Morisset 2010, p. 55). She argues that, unlike history, heritage or patrimony links our present not only to time but also to our material environment which objectifies our identification of feelings by putting them in physical places and in other people or social groups that form our territory. Heritage is supposed to tell us something about ourselves: who are we; where we come from. Each period of the past has built its own interpretation of authenticity and patrimonial objects which, like fossils, accumulate meanings that emerge from collective memories as archives of the past. Such aspects of authenticity originate in seeing the patrimonial object as a container or vehicle of patrimonial investiture according to a process of accumulation and fossilisation (Morisset

2010, p. 56). We must consider the patrimonial object as the expression of a balance between relationships with Time, Space and the Others (Morisset 2010, p. 56).

This paradigm of urban policy is linked to a more general evolution of a governance that embodies all the rules, networks, public institutions and collective practices, which facilitate the management of the cultural built environment. The framework of relationships between cities and states has changed. It no longer follows the top down approach whereby the centre dictates to the peripheries. The state is no longer the central entity because of the multiplicity of new social, economic and institutional actors. With free choice, contemporary society has adopted concommitant forms of individualism. With an increase in mobility, we are more autonomous than ever before and we appear to have fewer functional links to the territory in which we live. But, because we choose where we live, we are more interested in such places. The territory becomes a central element of our individual experience (Rautenberg, 2012).

3. The Belvedere Memorandum

The Belvedere Memorandum and its incentive programme (1999–2009) initiated by the the Dutch government actively encouraged the integration of heritage conservation with spatial planning. During its operation, the Belvedere Memorandum contributed to a reorientation of heritage conservation practises. After its closure, Dutch heritage conservation faces new challenges as a result of reduced involvement in conservation and spatial planning. It faces a socio-economic change in demographic and development (from growth to shrinkage) as a result of the post GFC European property market crisis.

In the 1990s, many European countries recognised that heritage planning had to move from control and command type approaches to those based on dynamic management of change (Fairclough & Rippon, 2002). Several governments developed public policies and national strategies for a renewed direction in the heritage conservation of the historic environment. In order to use heritage more proactively as a resource for urban development, it was generally recognised that there would need to be an integration of conservation policies within the planning framework (Janssen et al, 2014). Shifts in state-led heritage policies were initiated, connecting heritage more closely to tourism policy and regional development (Poirrier, 2003). In Germany, the so-called Denkmalpflegediskussion focused on the question of how state-led heritage policy could become more dynamic and decentralised, thus clearing the way for local actors, the public and private stakeholders to work together (Holtorf 2007). Essentially, denkmalpflegediskussion asks whether in a democratic society heritage management should be liberalised to the extent that it becomes the responsibility of local communities and individual citizens rather than the state. The discussion raised criticisms concerning existing practices of heritage management, some of which were said to alienate and patronise people despite the best intentions. In the course of the public exchange, it was suggested that more influence should be given to owners. The overriding criterion for listing should be a site's ability to move people, in other words its 'beauty' rather than some complex academic reasoning about historical significance. The Denkmalpflegediskussion had wide influence in the UK, The Netherlands (Belvedere) and Sweden (Agenda Kulturarv project – Putting People First, 2004). The polemic resonates with the work of Laurajane Smith on Authorised Heritage Discourse (Uses of Heritage, 2006).

A call for a more integrated and inclusive heritage planning began to influence the debate on heritage conservation and spatial planning in the Netherlands. In the Dutch heritage sector, the 'culture of loss' that had traditionally dominated heritage management turned into a 'culture of profit', entailing an approach to spatial, economic and ecological issues that had a broader social base and was more inclusivea (Kolen, 2007). This shift was accompanied by revival and revaluation of historical interest in Dutch society together with a growing interest in heritage. The paradigm shift was accelerated and intensified by the 'Belvedere Memorandum' (1999).

Jannsen et al (2014) explain that Belvedere was a programme in which the national government defined the outline for a reform of the relationship between heritage and spatial planning. It was a response to the prevailing fragmented and defensive heritage management practice in the Netherlands at the time.

Page 7 of the Memorandum (1999) sets out the philosophical peramaters of the scheme;

> In a dynamic and vital society such as ours, the loss of historic features is sometimes inevitable. After all, we cannot live in the past. We must build and design to meet and reflect the culture of our own age. Planning, designing and building result in a new cultural quality, but paradoxically that is the greatest threat of all to the past qualities. The tempo and scale at which our environment is being adapted to meet the demands of today have become so great that the effect can be destructive. If no deliberate policy aimed at preserving the cultural-historic heritage is adopted, the unique quality of our country which took so many centuries to develop will be obscured entirely by the new design. The result will be that areas in all parts of the Netherlands will start to look very much like each other. This blurring and erosion of the diversity in our surroundings should be a concern to everyone. We must seek strategies and solutions whereby development and conservation can go hand in hand wherever possible, whereby the links between past, present and future will be strengthened.

The Memorandum set out to include professionaqls within the scope of its purview. It introduced the idea that the future of heritage management lay in its relationship with spatial planning. The heritage sector would have to become future-oriented and more pragmatic in order to lock step with developments in society.

The Belvedere Memorandum was conceived to be a broad based national heritage incentive program. Over the course of 10 years, more than 400 projects of both national and local scale were initiated and developed. A project office was set up to put the Belvedere approach into practice with the help of grants for elligible projects. Meetings between heritage specialists, planners and designers and design workshops were held. The approach was focused on those areas in the Netherlands which were seen as most valuable in terms of heritage, the so-called Belvedere areas, but later, the focus widened to the Netherlands as a whole (Jannsen et al, 2014). The intention of the programme was to provide incentives, policy guidance, seed funding and expertise in support of local projects devised and executed by local public and non-statutory agencies and private firms. The scheme united the heritage sector and found new, more productive links between heritage, management, property development and leisure. Monuments, historic buildings and historic landscapes that were seen as symbolic to the identity of the country were given new leases of life and designers, users, investors and administrators were actively encouraged into the prgram. The scheme had the effect of fostering stronger collaboration between the hitherto fragmented and siloed cluster of heritage disciplines, each with their own knowledge bases, rules, values and languages. The Belvedere innovation program produced a wide range of results. Four are listed below.

1. Broadening of the concept of heritage to encompass archaeological, built heritage (including urban planning), historic landscape heritage, physical objects and the non-material (intangible) dimension of heritage.
2. Rejuvenation of the concept of heritage especially among professionals
3. Public participation especially from non-experts and local communities
4. Greater interest in and input from designers to find better and more appropriate development. Solutions involving fragile and rare heritage fabric

The Belvedere programme ceased in 2009. However, it constituted a programme that called into question the closed system of professional assessment and material fixation. It provided a new strategy for the preservation of historic buildings and sites. It was a strategy designed not to turn built heritage into museum pieces but to keep them in social, functional and economic circulation (Jannsen et al, 2014). The traditional heritage management system involving experts was challenged and the public was allowed more input and participation.

4. The Heritage Lottery Fund (HLF), UK

HLF was established in the UK as a result of the National Lottery Act, 1993, which identified National Heritage Memorial Fund (NHMF) as the body to distribute funds raised by the National Lottery to the heritage sector throughout the UK. NHMF was itself established as a funding body for the heritage by the National Heritage Act, 1980. At that satge, the operational definition of heritage was essentially a culturally conservative approach focussed on material evidence of past hegemonies, such as great houses and works of art. Since the advent of HLF, the heritage approach constitutes a broadened definition involving more socially inclusive practices that, in addition to material objects, involve less tangible matters such as language and customs. This broadening has become a guiding principle

during the HLF's tenure and has led to a significant redefinition of the concept of heritage (Demos, 2004).

Clark and Maeer (2008) explain that from its inception in 1994 to the end of 2006/07, the Heritage Lottery Fund had awarded £3.97billion to 26,000 heritage projects of all shapes and sizes - from tiny community events to multi-million pound capital projects. Over the years HLF refined its procedures and its approach, partly in response to greater public and government scrutiny, but also due to an internal management desire to understand how well the Fund was working. As the number of applications for grants increased across larger geographical areas but under fixed budgets, data collection became an essential tool for cost efficiencies in order to deal with the full range of heritage, social, economic, environmental and organisational challenges. In response to this, the Fund worked with think-tank Demos in 2004 to develop an evaluation framework to help articulate those challenges. The framework was based around the idea of public or cultural value and set out to identify the different kinds of value that the organisation might generate for the public (Hewison & Holden, 2006, 2006; Clark, 2006).

At the time of reporting (Demos, 2004), the Fund was operating its second strategic plan (2002–08),which had three aims:

- to encourage more people to be involved in and make decisions about their heritage;
- to conserve and enhance the UK's diverse heritage; and
- to ensure that everyone can learn about, have access to, and enjoy their heritage. (Heritage Lottery Fund, 2002, p. 5)

Clark and Maeer (2008) explain that the Heritage Lottery Fund distributes funding from the National Lottery to heritage projects across the whole of the UK. Over 200 staff is located in central, regional and country offices. Government-set policy and financial directions provide HLF with the operational guidelines for funding and how they are to be allocated. There is a board of Trustees (appointed by government) and committees in each region/country of the UK. Funding decisions are made by Trustees, committees or staff (depending upon the amount) using criteria based on the organisation's aims and policy directions. HLF views heritage as anything that has been inherited; is of value and needs to be passed on to the future. This includes cultural heritage such as museums, historic buildings and archaeological sites, natural heritage such as landscapes and biodiversity and intangible heritage; language, fashion, custom etc.

The types of projects that the Fund awards vary from large capital projects that help to conserve or restore historic buildings, landscapes or museum collections to activity projects based around heritage, such as surveying wildlife, learning about a building or recording oral histories. The Fund's 2002 operatiomal guidelines emphasise;

- the needs of the national heritage;
- the need to ensure that all parts of the UK have access to funding;
- the scope for reducing economic and social deprivation but creating heritage benefits;
- the need to promote access to heritage, for people from all sections of society;
- the need to promote knowledge of and interest in the heritage by children and young people;
- the need to further the objectives of sustainable development.
  (Heritage Lottery Fund, 2002, pp. 43–44)

According to its website, the Fund maintains that over the past 17 years, it has given over £1.5 billion to projects that have conserved more than 14,000 historic buildings and other structures including 2,750 listed at Grade I/A and Grade II/B. The funding is used to repair and transform a wide variety of buildings that people want to keep and hand on to future generations. The website asserts that the transformation of prominent historic buildings can be a catalyst for urban regeneration, the promotion of heritage and the creation of jobs. The Fund's 2002 and 2005 income and operational costs are reported in the table below
.

Table 1 – Heritage Lottery Fund Income and Operatings Costs for 2002 and 2005

	2005/06	2002/03
Income from Lottery proceeds	£230.4 m	£296.2 m
Value of commitments made during the year	£322.8 m	£356.3 m
Operational costs	£23.0 m	£21.5 m
Operational costs as % of income	10.0%	7.3%
Operational costs as % of commitments	7.1%	6.0%

Source: Hewison and Holden (2007, p. 43).

As the millennium approached, the UK Government conducted a major review of policies covering one part of HLF's remit; the historic environment. The first stage of this was was the publication of the seminal report 'Power of Place' in December 2000 by English Heritage, which had been identified as a major policy document in England for the sector.This was followed in December 2001 with the publication by the DCMS (Dept. For Culture, Media & Sport – UK Government) of 'The Historic Environment: A Force For Our Future'.This second report presented the Government's vision for the historic environment as;

- **Providing Leadership**: to respond to public interest in the historic environment with firm leadership, effective partnerships and a sound knowledge base from which to develop policies.
- **Realising Educational Potential**: to realise the full potential of the historic environment as a learning resource.
- **Including and Involving People**: to make the historic environment accessible to everyone and ensure that it is seen as something with which the whole of society can identify and engage.
- **Protecting and Sustaining**: to protect and sustain the historic environment for the benefit of our own and future generations.
- **Optimising Economic Potential**: to ensure that the historic environment's importance as an economic asset is skilfully harnessed.

The above five areas appear to underpin the Government's policy objectives for the historic environment, although a further policy document; 'People and Places: Social Inclusion Policy for the Built and Historic Environment' was published by DCMS in June 2002. This document reinforced the Government's commitment to social inclusion, warning that "engaging with a social inclusion agenda may require substantial cultural change from heritage organisations" (Demos, 2008:18)

5. The Federal Tax Reform Act of 1976, USA

Up to the enactment of the Great Society legislation that created a host of social and cultural programs, support for historic preservation as with other social and cultural activities in the United States, had been largely episodic and undertaken through private initiative (Swaim, 2003). Today, a shared cultural heritage is considered to be a public good commensurate with public subsidy. The growth of legislation and federal cultural agencies in all the US states has engaged the interest of various publics. In conservation (preservation), these publics comprise real estate developers, bankers, preservationists, legislators, and bureaucrats. Their interest in preservation results in government policies, programs and support that leverage private efforts (Swaim, 2003).

Until the 1970s, the federal tax code made it more financially beneficial to demolish and build new. Congress ameliorated this situation in 1976 with the adoption of federal tax incentives for historic preservation. Two years later, Congress established an investment tax credit for rehabilitation and by 1986 the current structure of the historic tax credit had been established: a 20 percent credit for qualified rehabilitation expenditures on historic structures and a 10 percent credit for non-historic buildings built before 1936. Rehabilitation tax credits (RTCs) have now contributed to the preservation of more than 38,000 historic buildings—many of which exist in urban neighbourhoods and downtowns throughout the nation (Ryberg-Webster & Kinahan, 2013). By the reckoning of Rutgers University Centre for Urban Policy Research, federal tax incentives for historic rehabilitation since their inception have generated 2.2 million jobs and leveraged nearly $100 billion in private investment to rehabilitate 38,000 historic properties. The program has paid for itself, generating $24.4 billion in federal taxes to

more than offset the $19.5 billion credits allocated by the National Park Service (Preservation Leadership Forum, 2012).

To further incentivise preservation, thirty-one states now offer a state-level tax credit, which can typically be partnered with the federal credit (Schwartz, 2013). Developers can pair the rehabilitation credit with other federal programs including Low-Income Housing Tax Credits, New Markets Tax Credits and Community Development Block Grants (Listokin, Lahr, and Heydt 2012) and many cities and/or states offer property tax relief and low-interest loan programs for historic preservation projects.

Federal RTCs catapulted preservation and the adaptive reuse of industrial and commercial buildings to the forefront of urban revitalisation. Some of the most recognized historic preservation projects which have made use of the tax credit are former industrial districts or buildings that have undergone wholesale transformation such as New York City's SoHo, Richmond's Tobacco Row and Shockoe Bottom, Cleveland's Warehouse District, St. Louis' former garment district, and Seattle's Pioneer Square (Ford 1974; Zukin 1982; Birch and Roby 1984; Silver 1984; Wonjo 1991; Listokin, Listokin, and Lahr 1998; Stanziola 1998).

Private-sector developers had begun to envision the possibilities (and profits) of adaptively reusing vacant and outmoded urban buildings as early as the 1960s. The 1964 conversion of San Francisco's Ghirardelli Square to a retail and entertainment destination is generally considered the first major adaptive reuse project (Wonjo, 1991). Also indicative of early adaptive reuse was James Rouse's 1976 transformation of Boston's Quincy Market and Faneuil Hall into a ''festival marketplace'' (Sagalyn, 1989).

The primary economic incentive offered by federal policy is the historic preservation tax credit which allows a credit of up to 20 percent of the cost of renovating a property of historical significance. According to the National Park Service (NPS), the tax incentive program is one of the most successful revitalisation programs ever created (Swaim, 2003).The National Park Service administers the program with the Internal Revenue Service in partnership with State Historic Preservation Offices. The tax incentives promote the rehabilitation of historic structures of every period, size, style and type. They are instrumental in preserving the historic places that give cities, towns and rural areas their special character. The tax incentives for preservation attract private investment to the historic cores of cities and towns. They also generate jobs, enhance property values and augment revenues for State and local governments through increased property, business and income taxes. The Preservation Tax Incentives also help create moderate and low-income housing in historic buildings. Through this program, abandoned or underused schools, warehouses, factories, churches, retail stores, apartments, hotels, houses, and offices throughout the country have been restored to life in a manner that maintains their historic character (NPS, 2012).

However, current proposals to overhaul the federal tax code pose a direct threat to the credit, spurring the National Trust to issue a policy alert stating that ''deficit reduction measures are currently being debated on Capitol Hill, and the federal historic tax credit program is at risk'' (NTHP, 2013). The recent Commissioner of the Internal Revenue v. Historic Boardwalk Hall decision has caused widespread panic, calling into question the typical investment structure for historic tax credit projects. It has generated uncertainty about how to structure tax credit deals in the future (Preservation Leadership Forum, 2012).

Those critical of historic preservation emphasise equity issues and draw on long-standing perceptions of the field as an expensive, elitist practice. They argue that preservation standards require large expenditures that the poor cannot bear and that, property value increases will drive out low-income homeowners and renters (Listokin, Listokin & Lahr, 1998). The legacy of the perception is a burden on the profession, particularly when working in low-income communities (Listokin, Listokin, and Lahr 1998, 465). Some studies that empirically question the relationship between preservation and gentrification reveal that the connection is tenuous causing minimal neighbourhood change and/or a more complex relationship (Ryberg-Webster & Kinahan, 2013).

Inequitable outcomes from federal tax scheme raise questions about who benefits from preservation and how resources for preservation are distributed. Domer (2009, 97) argues that preservationists do not know how to ''balance the integrity of the past with the utilitarian and aesthetic needs of the present and future'' and that preservation standards result in the construction of a ''preferred past''

that ‘‘fits the values, aspirations, and desired associations of white upper- and middle-class men and women who own and invest in those projects and who are strongly motivated by capitalistic goals’’ (Domer 2009, 99). Swaim (2003) analyses distributive issues related to the federal rehabilitation tax credits concluding that they are a powerful, but understudied subsidy that confers benefits to wealthy investors and developers who possess the necessary financial and political savvy to undertake often complex, risky, and expensive projects. In other words, he finds that the credits are ‘‘a classic example of good politics but bad policy: easily enacted, largely hidden from view, seldom cut back, transferring billions of dollars to powerful but undeserving constituencies’’ (Swaim 2003, 38).

6. Conclusion

The three heritage incentive schemes discussed above include a fund (Heritage Lottery Fund) a Memorandum (Belvedere Memorandum) and a rehabilitation tax credit scheme (RTC). Although each is conceived differently, all three constitute national schemes that disseminate their largesse to the the states and municipalities without apparent boundaries or geographic preference.The Dutch and the UK schemes comprise not only grant money dispensed to applicants but active heritage promotion as a public good in society. They seek to prosletyse, socialise and edify the nations' business, development, professional and bueaucratic communities along with the citizenry about the good causes of cultural built heritage. While the USA scheme is merely a tax credit arrangement, it can be argued that it has had a similar effect i.e. the rehabilitaed buildings speak for themselves. They constitute the prompotional aspects of heritage through the encouragement of ordinary tax payers to make use of the system possibly with less pre-qualification and elligibility than the other two schemes. Further, it may be argued that even in the absence of a manifesto for cultural built heritage, the US tax credit scheme for heritage is larger, bolder, longer-lasting and further reaching than either the Dutch or the UK schemes.

In comparing the three schemes, the question is whether the goals of revitalisation (regeneration) and preservation (conservation) are best achieved through tax incentives, unassisted market mechanisms or direct government spending. There are questions of fairness and equity. First, should the tax system allow a relatively small sector of society to reap gains from rehabilitation projects? Second, is there a better way to ensure that important cultural resources like historic buildings are preserved? If the fundamental goal is to maximise the number of rehabilitation projects, then the credit is probably the most feasible way of accomplishing that goal (Law & Contemporary Problems,1985: 258).The tax credit will maximise the number of projects because the credit is limited only by the supply of properties available and not by factors such as grant budgets.

Arguments in favour of investment tax incentives include; tax incentives clearly enhance returns on investment; they may be justified by positive externalities stemming from investments; they are relatively easy to target and fine tune; they signal openness to private investment; they are useful in a world of capital mobility; they are necessary for responding to tax competition from other jurisdictions; they compensate for other deficiencies in the investment climate; they enhance revenue by stimulating investments that generate other taxable income via employment and linkage effects and; they offer political advantages over direct expenditure programs to stimulate investment (Bolnick, 2004).

In terms of heritage conservation,tax incentives generally have one of three objectives: (a) to reduce the cost of maintenance or restoration; (b) to reduce the ‘opportunity cost’ of retaining a building rather than demolishing and rebuilding; or (c) promoting the flow of resources to non-profit bodies in cash or property (Making it Happen, 2004). Granting a tax incentive implies that the listed heritage stock is considered too vulnerable to market failure and that either the tax system is the obstacle or other obstacles exist that can be compensated by the tax system (Klemm, 2009).

As long as there are investors and properties, the process can continue. However, if the concern for the greater good also factors in social spillover effects from rehabilitation, a direct spending program, or even refundable tax credits, might allow more investors access to this program. By giving grants for rehabilitation work, the government would remove a bias against those who possess rehabilitation expertise but lack experience in tax matters. Refundability would allow investment by those for whom the non-refundable tax credit does not add enough of an incentive (i.e., those whose tax burden is not reduced significantly). In addition, a direct spending program could be regulated much more closely before projects begin, whereas a tax credit is approved only after the money has been spent and the

project completed (Law & Contemporary Problems,1985: 258). Choosing between rehabilitation projects before they begin would allow other factors, such as location, type of building, and benefit to the community, to be considered.

This would probably minimise concentration of rehabilitation resources in expensive warehouse conversions or similar projects and may lead to the selection of a more beneficial mixture of projects. Although the cost and the size of the program budget can be limited prospectively in contrast to a tax expenditure which is only limited retrospectively, a labour-intensive grant approval process such as the HLF and the Belevedere Memorandum,has the tendency to delay projects and cause money otherwise spent on rehabilitation to be spent on administrative costs. Direct spending programs are also susceptible to politicisation, resulting in projects chosen not on merit, but on the basis of legislative compromises (Law & Contemporary Problems,1985: 259).

7. References

Barber, A & Hall, S (2008) Birmingham: whose urban renaissance? Regeneration as a response to economic restructuring, Policy Studies, 29:3, 281-292

Bolnick, B (2004) Effectiveness and Economic Impact of Tax Incentives in the SADC Region, Nathan Associates Inc. SADC Tax Subcommittee, SADC Trade, Industry, Finance and Investment Directorate

Clark, K & Maeer, G (2008) The cultural value of heritage: evidence from the Heritage Lottery Fund, Cultural Trends, 17:1, 23-56

Davies, J (2001) Partnerships and regimes: the politics of urban regeneration in the UK. Ashgate: Aldershot.

Domer, D (2009), Old But Not Good Old History: Prospects and Problems of Freezing Time in Old Buildings, Journal of Architectural and Planning Research, 26 (2): 95–110

European Landscape Convention (2010) Florence, Italy - Council of Europe

Fairclough, G & Rippon, S (2002) Europe's landscape: archaeologists and the management of change. Brussels: EAC (EAC, Occasional Paper 2).

Hall, T & Hubbard, P eds (1998) The Entrepreneurial City: Geographies of Politics, Regime and Representation, Wiley Architecture:Chichester

Hartog, F (2005) Time and heritage, Museum International, 227:7–18

Harvey, D (200) Heritage pasts and heritage presents: temporality, meaning and the scope of heritage studies. International Journal of Heritage Studies, 7 (4), 319–338.

Heritage Lottery Fund (2004) New Opportunities Fund: Policy Directions For the financial year ended 31 March 2004: HC1091SE/2004/236 London: The Stationery Office.

Hewison, R & Holden, J (2004) Challenge and Change: HLF and Cultural Value, Demos, Heritage Lottery Fund (HLF)

Hewison, R., & Holden, J. (2006). Public value as a framework for analysing the value of heritage: The ideas. In K. Clark (Ed.), Capturing the public value of heritage: Proceedings of the London conference (pp. 14–18). London: English Heritage

Hökerberg, H (2013) Contextualising the periphery. New conceptions of urban heritage in Rome, International Journal of Heritage Studies, 19:3, 243-258

Holtorf, C (2007) What does not move any hearts – why should it be saved? The Denkmalpflegediskussion in Germany. International Journal of Cultural Property, 14 (1), 33–55

Janssen, J, Luiten, E, Renes, H & Rouwendal, J (2014) Heritage planning and spatial development in the Netherlands: changing policies and perspectives, International Journal of Heritage Studies, 20:1:1-21

Koselleck, R (1990) The past future: Translation in Editions de l'Ecole des Hautes Etudes en Sciences Sociales, Paris, France

Listokin, D, Lahr, M, Heydt,C & Stanek, D (2011) Second Annual Report on the Economic Impact of the Federal Historic Tax Credit, Washington, DC: The Historic Tax Credit Coalition

Listokin, D, Listokin, B & Lahr, M (1998). The Contributions of Historic Preservation to Housing and Economic Development, Housing Policy Debate, 9 (3): 431–78

Madgin, R (2010), Reconceptualising the historic urban environment: conservation and regeneration in Castlefield, Manchester, 1960–2009, Planning Perspectives, 25:1: 29-48

Mageean, A (1999) Assessing the impact of urban conservation policy and practice: the Chester experience 1955-96, Planning Perspectives, 14:1: 69-97

Making Heritage Happen - Incentive and Policy Tools for Conserving Our Historic Heritage (2004), National Incentives Taskforce for the Environment Protection & Heritage Council

Morisset, L (2010), Patrimony, the concept, the object, the memory and the palimpsest. A view from the History of Architecture, JSEAC, 35:53–62

NPS - National Park Service (2012), Federal Tax Incentives for Rehabilitating Historic Buildings: 35th Anniversary, Washington, DC:US Department of the Interior, National Park Service, Technical Preservation Services

NTHP - National Trust for Historic Preservation (2013), Protect Historic Tax Credit and CAPP Act, Accessed 22 March, 2014, http://www.preservationnation.org/take-action/advocacy-center/protect-historic-tax-credit-capp.html

Pendlebury, J (2013) Conservation values, the authorised heritage discourse and the conservation-planning assemblage, International Journal of Heritage Studies, 19:7,709-727

Poirrier, P (2010) Cultural Politics & Practice (Translated in La Documentation Française, Paris, France)

Preservation Leadership Forum (2012) Blog - 5 September accessed 24 March 2014, http://blog.preservationleadershipforum.org/

Putting People First *(2004) Agenda* Kulturarv: Swedish National Heritage Board

Rautenberg, M (2012) Industrial heritage, regeneration of cities and public policies in the 1990s: elements of a French/British comparison, International Journal of Heritage Studies, 18:5, 513-525

Rhodes, M & Murray J (2007) Collaborative Decision Making in Urban Regeneration: A Complex Adaptive Systems Perspective, International Public Management Journal, 10:1, 79-101

Ryberg-Webster, S & Kinahan, K (2013) Historic Preservation and Urban Revitalization in the Twenty-first Century *Journal of Planning Literature XX(X) 1-21*

Sagalyn, L (1989), Measuring Financial Returns when the City Acts as an Investor: Boston and Faneuil Hall Marketplace, Real Estate Issues, 14 (2): 7–15

Smith, L (2006) Uses of Heritage,Routledge, Oxford

Smyth, H (1994) Marketing the city: the role of flagship developments in urban regeneration. London: Spon.

Swaim, R (2003) Politics and Policymaking: Tax Credits and Historic Preservation, The Journal of Arts Management, Law, and Society, 33:1, 32-39

The Belvedere Memorandum (1999) - A policy document examining the relationship between cultural history and spatial planning (pg. 7), http://www.belvedere.nu/download/belvedere_memorandum.pdf

The Impact of ERTA and TEFRA on Tax Credits For Historic Preservation, Law and Contemporary Problems,48:4 (1985)

Wojno, C (1991), Historic Preservation and Economic Development, Journal of Planning Literature, 5 (3): 296–306

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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On the safeguarding of sites and historic cities: a study on the evolution of French legal system

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Abstract
France has classically been tied to the idea of protection of cultural heritage, so much so that the birth of the concept of European cultural heritage can be traced back to its 19th-century vision of *patrimoine*. In addition, it has developed, over time, a regulatory apparatus of the most complete, especially in relation to protected areas. From the law of 1913 on historic monuments to that on natural sites of 1930, from the extension of protection to the surroundings of monuments introduced in 1943 to the creation in 1962 of *secteurs sauvegardés* and then of the *zones de protection du patrimoine architectural urbain et paysager* (today AVAP), France has been able to organize a legal system of proven effectiveness. In a spirit of a necessary conceptual and operational maturation, with the new *Loi Patrimoine*, France intends today to reorganize the field, according to a comprehensive and integrated approach, founded on the knowledge, communication and shared decision making, really aimed at the transmission of heritage to future generations. The primary objective is to meet the new demands posed by a sustainable development of the territory while responding to essential questions: why do we need to safeguard? How to reconcile conservation and innovation? Which are the economic, social and cultural benefits that may result from a conscious and conscientious exploitation of cultural heritage?

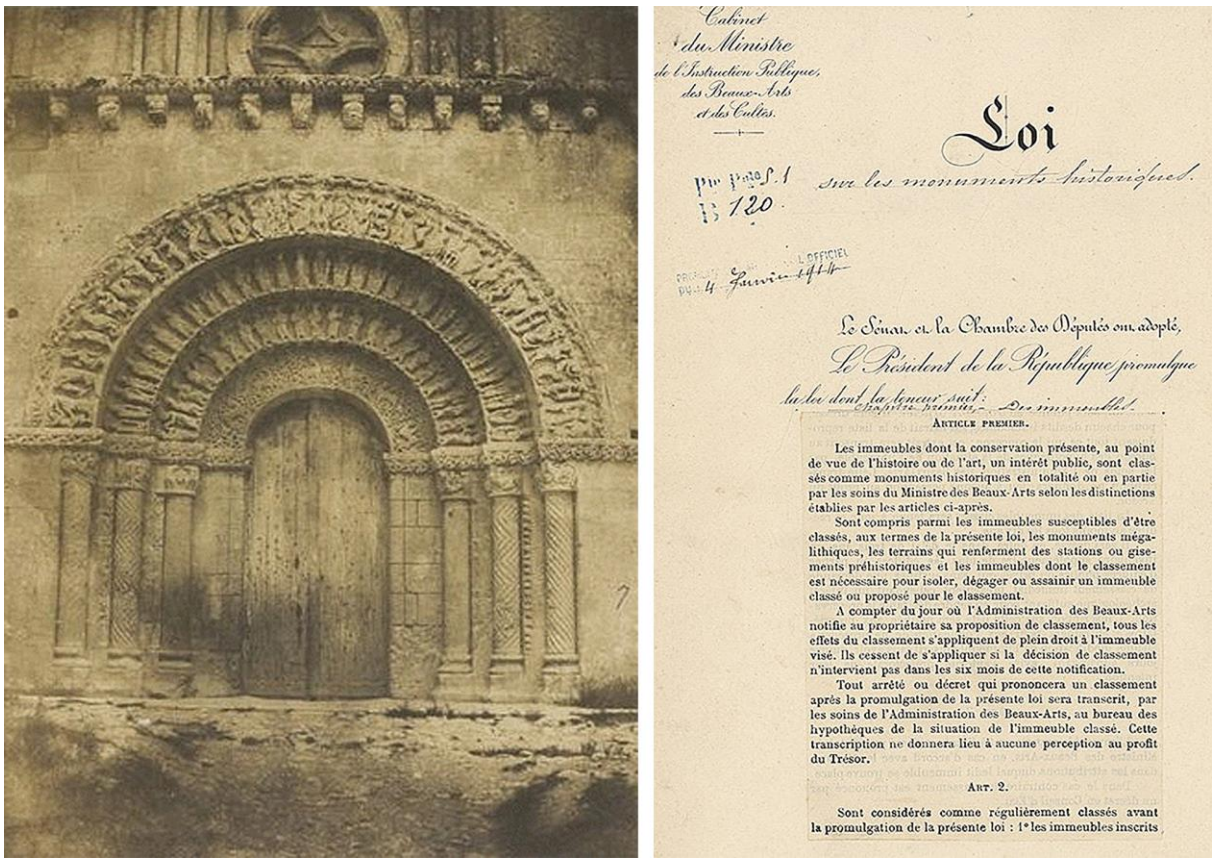
Keywords: historic monuments, cultural heritage safeguarding, conservation areas, France

1. From the advent of the heritage's concept to the first laws
The current concept of heritage is certainly to be considered as the outcome of numerous factors. It results both from the "physical reality" of the elements composing it, and from the aesthetic, documentary, descriptive and even sentimental values that the common knowledge gives them, as well as from the legislative apparatus that has been produced over time in order to know, study, protect and make it accessible to as many people as possible.
Its origins can be traced - according to an "*étrange paradoxe*" [1] - in the French Revolution: the period in which this notion mostly evolves, changing from "sacred well" to "collective public good" [2, 3, 4]. As the bearer of a tremendous memory's value, heritage is considered as an element that can substantially contribute to the formation of national identity that is reflected in it.
During the revolutionary period, in response to the many acts of devastation that accompanied the popular uprisings, France developed legal and administrative instruments devoted to the understanding and protection of its historic and aesthetic heritage. The safeguarding of monuments, of these "*pierres durables*" that far from being just ornamental elements were, however, one of the key element of the Nation was, beyond the important destruction made in the early years, an explicit goal of the revolutionaries. "*The transmission to posterity will be henceforth the result of reasoned actions, specifically oriented in this direction*" [5]: in this context, cultural goods would be considered as a resource to reorganize, not more to the benefit of the elites but of the entire national community.

A season marked by a genuine patrimonial vocation will be, therefore, that of the July Monarchy. A time during when - through the creation of specific figures/bodies (the *Inspector général des monuments historiques* in 1830 and the *Commission des Monuments historiques* in 1837 endowed with a specific budget for the restoration and conservation), a census on historical monuments in need of safeguard (1840) and the establishment of specific protection modalities (the law of 3 May 1841 on expropriation for public utility) - the public engagement in the field of cultural heritage developed.
In 1887, after the excitement caused by the destruction of the monuments that took place between the summer of 1870 and the spring of 1871 (the war against Prussia and then the Commune), the first organic law on historical monuments will be approved (*loi du 30 mars sur la conservation des monuments et objets d'art ayant un intérêt historique et artistique*). This tool clarified in a systematic way the modalities of protection and the role of the State in the processus: the criterion of so-called "national interest" will be taken as the legal basis of the French politics of memory. In addition, the law will introduce, the legal concept of "*classification*" for the monuments of public property and the exclusivity of the intervention on national protected assets, laying the foundations for the national heritage politics.
In the next years, the French heritage consciousness will reach a big leap ahead. The popular feeling against the *patrimoine* will become more extensive and directed even to goods, which, while not havng an exceptional character, would be considered worthy of protection. The administration in charge of historic buildings safeguarding will continue to evolve around three axes: development, professionalization and nationalization [6]. This will inevitably be accompanied by a regulatory fervour.
The approval of the 1905 French law on the Separation of the Churches and State (*loi du 9 décembre 1905 concernant la séparation des Églises et de l'État*) will play a significant role in the debate about heritage. Religious buildings will become public; in particular, churches will be placed in the ownership of local administrations (communes) while cathedrals and other religious buildings will be taken over by the Central government. This led to the need of redefining what should or could be protected since “religious”’ was not necessarily the same that “national’, as well as to the necessity of rethinking the 1887 law that will result in the organization of a new protection system [7]. On 21 April 1906, the law on the protection of natural sites and monuments of artistic character will be voted; the law of 18 July 1909 will introduce the classification of objects of private property and the law of 20 April 1910 will prevent the billposting on the historic monuments.
Despite this, the legislative body still seemed insufficient. Various proposals were developed for the purpose of re-formation of the 1887 Act. From their synthesis finally born the law of 31 December 1913 that will complement and enhance the provisions taken in the previous tool (fig. 1). The law will introduce a dual organization of protection based on the one hand, on the *classement* and on the other on the inscription on the supplementary list (*inventaire supplémentaire des monuments historiques*). The first will be by now applied to any type of good - movable and immovable - including those of private property, without necessarily obtaining the consent of the owner. The second will provide for the possibility of entry of the goods worthy of protection: a sort of waiting list for the classification in order to make up for the slowness of the procedure. This instrument for inventory will be later transformed by the Act of 23 July 1927 in a real protection tool: less complex than *classement* and thus easier to implement.
The 1913 Act marked the end of the 19th century evolution of the concept of heritage and its preservation. It subordinated the right of ownership to the imperatives of heritage protection. This right, a consequence of the Revolution, now also assumed a "social function": that of preserving - not only for themselves but also for the community - the monumental assets, so reflecting the 1832’s vision of Victor Hugo: "*There are two aspects to a monument: usage and beauty. Its usage belongs to the owner; its beauty belongs to the world, to you, to me, to all of us. So destroy it is beyond our right. (...) we must account of the past to the future*" [8].
From then on, with the acceptance of wider definitions, more subjective criteria for listing would be applied, so allowing, in spite of the continuing centralism of the system, the increasing preservation of buildings of “local” rather than “national” interest. In addition, this would gradually reduce the apparent conflict between categories of heritage: “*the one national and ‘major’, the other local and ‘minor’*” [9].

2. The extension of the concept of heritage to sites and protected areas

In parallel with the elaboration of the first instruments of urban planning, but independently, specific provisions were then issued and directed to "territories" recognized as exceptional and/or significant from the cultural and aesthetic point of views. With this in mind, the law of 2 May 1930 related to the protection of natural monuments and sites of artistic, historic, scientific, legendary or picturesque interest was enacted. Its title III defined a new category of "protected zones" guaranteeing the safeguarding for natural sites as well as for the areas around the monuments, such as, for example, the cathedral of Rouen (1938), the neighbourhoods of the cathedral and of the town hall of Aix-en-Provence (1942), or even Carcassonne, Villeneuve-Les -Avignon, Concarneau, Provins, etc.



Cabinet
du Ministre
de l'Instruction Publique,
des Beaux-Arts
et des Cultes.

Loi
sur les monuments historiques.

Le Sénat et la Chambre des Députés ont adopté,
Le Président de la République promulgue
la loi dont la teneur suit :

ARTICLE PREMIER.

Les immeubles dont la conservation présente, au point de vue de l'histoire ou de l'art, un intérêt public, sont classés comme monuments historiques en totalité ou en partie par les soins du Ministre des Beaux-Arts selon les distinctions établies par les articles ci-après.

Sont compris parmi les immeubles susceptibles d'être classés, aux termes de la présente loi, les monuments mégalithiques, les terrains qui renferment des stations ou gisements préhistoriques et les immeubles dont le classement est nécessaire pour isoler, dégager ou assainir un immeuble classé ou proposé pour le classement.

A compter du jour où l'Administration des Beaux-Arts notifie au propriétaire sa proposition de classement, tous les effets du classement s'appliquent de plein droit à l'immeuble visé. Ils cessent de s'appliquer si la décision de classement n'intervient pas dans les six mois de cette notification.

Tout arrêté ou décret qui prononcera un classement après la promulgation de la présente loi sera transcrit, par les soins de l'Administration des Beaux-Arts, au bureau des hypothèques de la situation de l'immeuble classé. Cette transcription ne donnera lieu à aucune perception au profit du Trésor.

ART. 2.

Sont considérés comme régulièrement classés avant la promulgation de la présente loi : 1° les immeubles inscrits

Fig. 1: One of the first monuments *classes,* the Saint-Pierre Church in Aulnay (left) and the 1913 Act (right)

This legislation marked the beginning of the extension of the concept of heritage. However, based on a very complex procedure and largely focused on the "buildings' exterior", it proved unsuitable for larger urban sites [10]. Unfortunately, the idea that the monument could find the ideal setting for its development only through an appropriate "isolation" was still too rooted in the mentality of that time to promote a broader vision of protection at the urban scale.

The years immediately after, however, will be full of reflections on the subject, conducted by technicians and intellectuals who will compete on the controversial issue of the safeguard of the *quartiers historiques*. Between the two World Wars, a kind of real militancy towards the protection of archiectural heritage developed and took force. This, especially thanks to the work of the many organizations that flourished in France at the time, such as the *Ligue urbaine et rurale pour l'aménagement du cadre de la vie française* re-founded in May 1943 by Jean Giraudoux in order to fight "*all attacks on beauty, health and dignity of the country*" [11].

From the beginning, the L.U.R. focused its activity on two separate but complementary objectives: the defense of French natural and monumental heritage and the promotion in the field of urban planning and reconstruction, of the advent of a new French humanism.

In the spirit of Jean Giraudoux and his friends, "*some modern architecture*" had given too much importance - although legitimate - to biological needs (air, sunshine, greenery, space), without taking sufficient into consideration the "*psychological and moral reactions*" of people. Actually, they intended to highlight how the attachment to the past did not preclude in any way seeking bold solutions. In a period in which both parties fiercely opposed - the "defenders of traditional architecture" and the "champions of utilitarian architecture", the L.U.R. proposed a compromise solution rich in realism and tradition. Reconstructions should play, in fact, the role of weld between old elements to achieve wealthy and rationally designed cities but as far as possible, respectful of the past. It was, indeed, a very modern thinking, which sought to reconcile protection and development purposes.

In August 1941, a report prepared by the Secretariat of State for Education and Youth highlighted numerous threats made to some of the most beautiful sites in France. In Marseille, Avignon, Valence, massive constructions were undertaken or planned, that may destroy or seriously impair, unique landscapes. The administration of *Beaux Arts* would be able to oppose the continuation and achievement of these constructions only by allocating higher compensation to owners and builders: *ad hoc* legislative measures were therefore necessary with greatest urgency.

The real turning point will be the promulgation of the Law of 25 February 1943. In addition to "isolate, clear and cleanse" the listed buildings, the article 1 stated that classification may intervene to

"valorize" them: "*the spirit of the law was no longer based on the conflict between a monument and its environment, but rather on finding a necessary complementarity, the reciprocal effects between the monuments and its surroundings*" [12].
At the heart of the act, there was the institution of a "radiant" protection thus added to the "punctual" one. This new procedure submitted to the authorization of the *Service des Monuments historiques* each construction project located in the "field of view" of a building classified or proposed for classification" and concerned indeed, "*any other building visible from the first or visible at the same time that it and located in a radius not exceeding 500 meters*".
Because of a poor drafting of the text, the notion of field of view gave rise to many difficulties of interpretation. The article 1 defined "a priori" a protection zone corresponding to a square of 125 meters on each side, a circle with radius of 79.61 meters. Under these conditions, the range of such servitude seemed highly limited; its scope was indistinguishable from many of some protected areas established under the Act of 2 May 1930. In fact, the Administration has always taken a broad interpretation of the text, substituting to the concept of perimeter that of a radius (500 meters long) of the circle drawn around a monument. However, this definition apparently clear not only posed problems of interpretation but, in many cases, also proved inadequate and insufficient. This, because of the automatic nature of the law, primarily based on geometric criteria (later it will defined as "beasts and villain" round).
However many buildings near monuments were saved, even if only in an embellishment perspective, rather as accompanying elements, such as "*l'écrin qui met le bijou en évidence*" [13]. In fact, texts and interventions were taking into account the environment of the monuments (and only the major ones) only if they had artistic, legendary, historic and picturesque values. Once again, such an instrument was the result of a "*monumental idea of heritage*". Keeping the framework allowed a better valorization of the monument.
Later, it was the projects for Paris first and then everywhere in France, which created a new awareness. Medical investigations, relayed by the hygienist movement, had highlighted many unhealthy islands at the center of *Vieux Paris.* An important part of the Marais was slated for demolition.
The Minister of Culture André Malraux alerted by an opinion more sensitive to its surroundings and aware of the need to preserve the evidences of a past more and more weakened by the imperatives of modernity - in collaboration with the minister of Construction Pierre Sudreau - decided to take action. They did pass the law of 4 August 1962 knows as *loi Malraux* that introduced the concept of *secteur sauvegardé* [14].
The 1962 Act radically changed the approach regarding the *patrimoin*e. This text did much for the development of the concept of heritage, determining the expansion to areas before excluded. The sectors definitively dragged the question of the protection of the monument to the space now taken into account for themselves, as forming a whole, beyond reference to any element composing them. The decree to implement the law, which later was incorporated into the *Code de l'Urbanisme*, therefore officially linking the two kinds of legislation, heritage protection and planning, was published in 1963. It created the *Commission Nationale des Secteurs Sauvegardés* within the Minister of Culture, gave the power of veto over planning applications in the sectors to the *Architecte des Bâtiments de France* (ABF). It also introduced the *Plan de Sauvegarde et de Mise en Valeur (PSMV)* : a kind of detailed master plan, preceding the *Plan d'Occupation des Sols* (POS) which was not introduced until 1967 (*Loi n° 67-1253 du 30 décembre 1967 d'Orientation Foncière*).
Conservatives and passionate enemies of vandalism, who saw in this tool - innovative and strongly different from the previous protective measures - the answer to their prayers, greeted this revolutionary law enthusiastically. Its main purpose will be to extend the concepts of conservation and valorization to the historic districts, taking into account every aspect - social, economic and financial - connected to them, and involving residents in restoration operations to relieve them from otherwise unaffordable expenses.
Despite good intentions, however, the plans later called "of first generation" extremely ambitious and seductive, often proved to be unenforceable due to a series of difficulties related to their implementation: such as, for example, the hostility of the Municipalities that, almost never really involved in decisions and forced to undergo a number of charges, often slowed down the process. As to the timing of plans' approvals, initially estimated at 18-24 months, they were in many cases even increased tenfold. The negative impacts that these rhythms have led to the overall quality of interventions are evident; they are often restricted by regulations made longer appropriate given the evolution of times, urban and social needs and attitudes. In addition, these plans were generally characterized by extreme choices that have marked the historic fabric: a number of demolitions, the widening of road sections and the realignment of the fronts built to allow, according to the conceptions of the time, an automotive circulation *à grande vitesse* (fig. 2).
Entrusted to the *Architectes en Chef des Monuments historiques* not possessing the necessary skills for the development of real projects of urban renewal, the plans of the first decade of experimentation,

in full contradiction with the premises made by the legislator, were designed in order to be "exemplary". Globally, they translated an idea of protection too selective, more careful to the quality of architectural objects that of the urban landscape in its entirety. Later, following the change of mentalities, to the numerous "exercises in style" and/or interventions geared to the *façadisme*, followed recovery actions less invasive but more forced; clutches of the new in the ancient not always carefully screened in their figurative forms.

In the early '70s, the French policy of protection of historic centers has been radically called into question. The first plans were reviewed in the light of new guidelines based on an overall view and on interventions less aggressive, driven by a greater respect of minor architecture and public space. The evolution of the doctrine, legislation and planning policies has enabled to produce a new generation of plans, more alive to the historical and urban dimensions. The Ministry of Public Works abandoned the classical system of the *îlots opérationnels* (until then used to quickly start with operations but with very bad results), financing less individual restoration operations and increasing urban recovery actions.

Following the law of 31 December 1976 (*Loi n° 76-1285 du 31 décembre 1976 portant réforme de l'urbanisme*), also the *loi Malraux* has undergone a substantial redefinition, finally becoming a planning tool in its own right. The presentation of the PSMV (now private by the adjective "permanent") has become comparable - in terms of content and procedure - to that of the local urban plan (*plan local d'urbanisme*, PLU) introduced by the Law n° 2000-1208 of 13 December 2000 on solidarity and urban renewal (*loi relative à la solidarité et au renouvellement urbains*). The PSMV replaces the PLU in the defined perimeters while being different in some features, such as an increased graphics precision and the high level of in-depth analysis on architectural heritage and on the morphological characteristics and historical evolution of the urban fabric.

In the early '80s, the process of decentralization has allowed to reconsider the division of powers between the different administrations. The State has maintained the responsibility of the national policy for the protection of cultural heritage - of which it is still guarantor - despite the growing involvement guaranteed to Municipalities, Departments and Regions.

In the same spirit of sharing powers between the Central Administration and local authorities for the safeguarding and valorization of their local heritage, French heritage policy has thus been enriched with new tools. In particular, the Act of 7 January 1983 on Architectural, Urban and Landscape Heritage Protection Zones has provided for the possibility of establishing the *zones de protection du patrimoine architectural et urbain*, in the vicinity of historical monuments and more generally in all the quarters and sites meriting to be protected and valorized for aesthetic or historical reasons. "*It is important to remember that the ZPPAUP instrument was based on an original pact between State and Municipalities* emphasized the former Minister of Culture and Communication, Frédéric Mitterrand, during the installation of the Committee of reflection, consultation and proposal for ZPPAUP in September 2009.

This mechanism has benefited from a growing interest of people towards heritage preservation and at the same time from relatively flexible regulations allowing "innovation" by adapting to very different situations. It has been motivated by the opportunity of taking into account a variety of different places (built or natural, large or small, communal or intercommunal), provided they were equipped with an heritage "asset" as affirmed by the circular n° 85-45 of 1 July 1985 on ZPPAU: "*Heritage is itself a concept that evolves over time and concerns, for example, the personality of a region. A regional policy can allow this perception: here history and archaeology predominate, then the industrial 19th century, elsewhere rural architecture of vineyards or mountain pastures, sometimes mines and mills of the 20th century founding the collective consciousness*".

However, such a freedom of action has at times makes fail some. Actually, several delimitation engaged in the '80s for the establishment of ZPPAUP have been unsuccessful due to lack of knowledge and understanding of the method. A number of documents of this period seem reluctant to assert specific characteristics of ZPPAUP that remain, in the operative approach, still poorly defined. For the establishment of some dossier, the *chargés d'études* have actually chosen as source of inspiration other planning documents – the *plan d'occupation des sols* or the *secteurs sauvegardés* - widely experienced but having different objectives. In addition, most municipalities did not benefit before any inventory or any protection regulation.

The heritage prescription were often limited to the opinion of the Architects of France's Buildings (ABF) on the monuments surroundings (*abords*) or historical sites. Everything had to be invented: based on a from a historical and cultural study of the territory, ZPPAUP should be designed for a shared management taking into account both the value of *patrimoine* and the necessary adjustments to their revitalization.

Even if some early results may seem disappointing and objectionable, the ZPPAUP has gradually become an instrument very much appreciated by Municipalities and supported by heritage associations (such as the *Association Nationale des Villes et Pays d'art et d'histoire et des Villes à secteurs sauvegardés et protégés*). The number of created ZPPAUP (about 620 and approximately 400 study in mid-July 2010) can give an idea of the success of the tool.

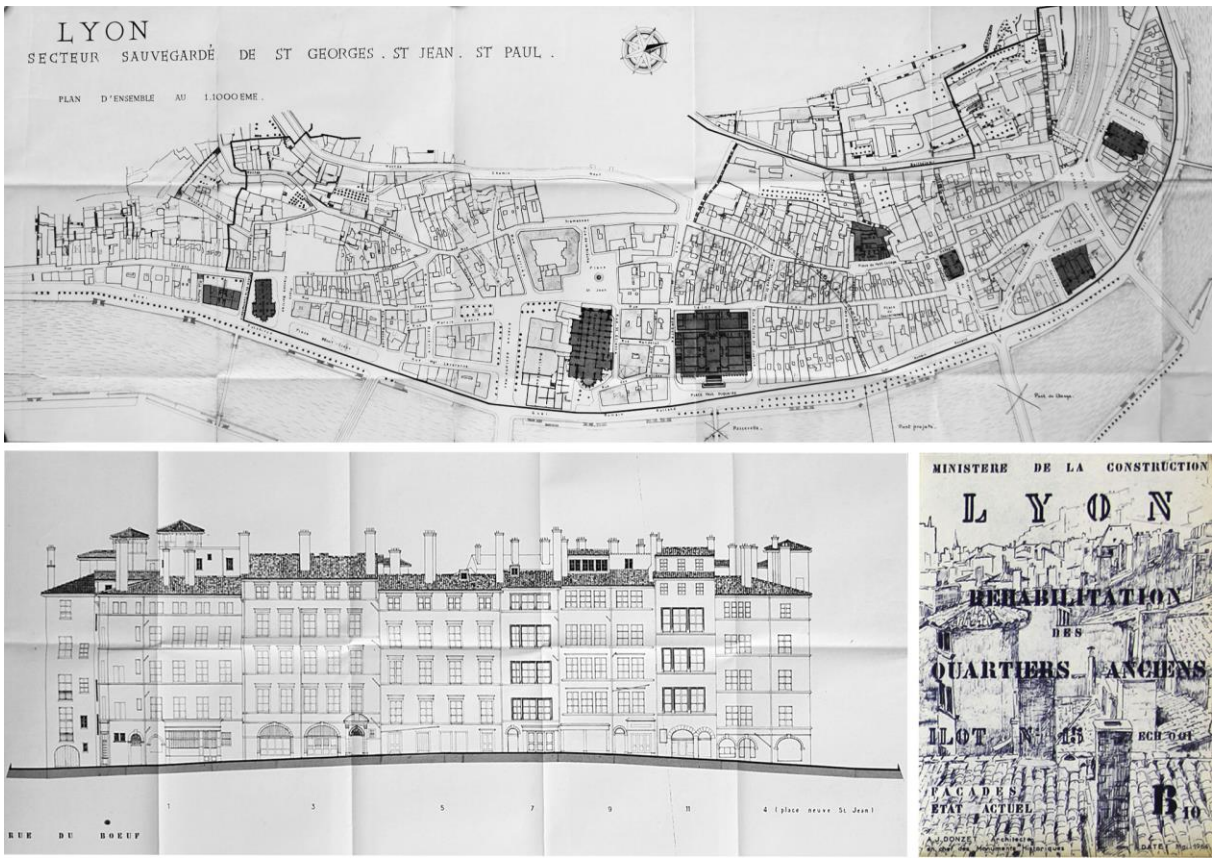


Fig. 2: The plan de sauvegarde et de mise en valeur (PSMV) of Lyon by André Donzet (1964)

The law of 8 January 1993 has then extended this instrument to natural landscapes' protection by defining the *zones de protection du patrimoine architectural, urbain et paysager* (ZPPAUP). The simplifications has made more "attractive" these instruments, especially in rural areas. The order n° 2005-864 du 28 July 2005 related to *secteurs sauvegardés* and its implementing decree of 2007, have further cut down the procedures for the preparation and adoption of the safeguard plan, clarifying its relationship with the local level of planning (fig. 3).
More recently the article 28 of the on National Commitment for the Environment - also referred to as the Grenelle II Law (*Loi n° 2010-788 du 12 juillet 2010 portant engagement national pour l'environnement*) - has created new conservation perimeters, called *aires de mise en valeur de l'architecture et du patrimoine* (AVAP), which will replace the ZPPAUP within five years (i.e. by 13 July 2015). One of the reason for the change in the name is that of giving greater priority to sustainable development, although many consider that these new areas offer less in terms of control and financial support than the ZPPAUP.
If the new instrument has no significant break with the old - as "*the greening of heritage law was not accompanied by a disruption of the legal mechanisms. Clearly, the legislature favored continuity to achieve its purposes*" [15] - the passage from ZPPAUP to AVAP is for all people concerned an immense challenge. While many municipalities are engaged in this transition, some will have neither the legal and financial means nor the time to transform their zones in AVAP before deadline. Several municipalities will have no choice but to subscribe their heritage policy: the regime about historical monuments and sites registered under the Environmental Code will be restored. To avoid the risk that in 2015 some areas lose their protected status, the Minister of Culture Aurélie Filippetti decided to proceed with the establishment of a new law with the intent of make a new simplification of procedures in order to better protect. A component of this *projet de loi* will concern the urban development areas: "*50 years after the Malraux law, protection zones should not suffer from lack of funds*" [16].

3. The 2013 French vision for protected areas: simplify to better protect

As foretold by the Minister, 100 years after the promulgation of the 1913 Act on historic monuments, a *projet de loi sur les patrimoines* has been presented to the Council of Ministers at the end of 2013. Heir to a long normative stratification that has given it some complexity, the legislation in the field of heritage needs to be simplified and modernized, without compromising its fundamental principles. Exceeding the strict powers of Ministry of Culture and Communication, it prior requires a close cooperation with other ministries, representatives of local authorities and associations.



Fig. 3: Some examples of ZPPAUP showing the huge application field of the instrument: the Belsunce quarter in Marseille, the towers of Villeurbanne, the reconstructed town of Havre, the *Marché aux Puces* in Saint Ouen

The revision of heritage code will update the existing law in the field, in response to recent developments (particularly in terms of planning). It would facilitate the public access to different forms of heritage, raising the risk of weakening the legal protection of heritage (additional delay in transforming ZPPAUP in AVAP, which posed a threat of loss of protection of these areas). The primary objective is to meet the new demands posed by a sustainable development of the territory while responding to essential questions: why do we need to safeguard? How to reconcile conservation and innovation? Which are the economic, social and cultural benefits that may result from a conscious and conscientious exploitation of cultural heritage?

The main changes will concern five priority topics: protected areas and historical monuments, museums, archives, architecture and preventive archaeology. In particular, with regard to protected areas and historical monuments, the Ministry of Culture intends to integrate heritage issues in the planning documents. Today, if these heritage issues can be dealt with under Article L123 -5/ 7 of the Town Planning Code and in the *plans de sauvegarde et de mise en valeur* (PSMV), the *zones de protection du patrimoine architectural, urbain et paysage*r (ZPPAUP) and the *aires de mise en valeur de l'architecture et du patrimoine* (AVAP), they remain related to the PLU without being integrated. Following the new provisions, the number of categories of protected areas should decrease from 10 to 3. It would thus exist the "historical sites", the "classified sites" and the "*abords*".

All these areas would be brought under a single statute, appointed by the still provisional title of "old city". Unless these areas already have a PSMV, they will need to develop a "heritage PLU ", which will replace the current one. In case the PLU become intercommunal (law n° 2014-366 of 24 Mars 2014 *pour l'accès au logement et un urbanisme rénové*), it is possible to consider a switch from "heritage PLU" to "heritage PLUI" without major impact on the content of the document.

The Ministry of Culture said that these changes do not amount to a withdrawal of the State that will continue to support the communities involved in the preparation of these documents, whether heritage PLU or PSMV. The documents will be forwarded to a national commission, after regional review. Other discussions are also underway on the listed sites, which if they have not changed since the early 20th century could be reclassified. Regarding the "*abords*", whose perimeter is currently 500 meters, the ABF propose to transform them into "intelligent" perimeters – i.e. variable depending on the characteristics and requirements of the site - which would be subject to public inquiry.

This project has created some concern in heritage associations, in particular with regard to the establishment of "heritage PLU". Indeed, the choice left to the local communities for future "historical cities" (which will bring together *secteurs sauvegardés* and ZPPAUP/AVAP) between "heritage PLU" and PSMV could lead them to move towards a less powerful tool: less protective but more tempting because less expensive. It would therefore necessary to create a "real" heritage PLU having goals and a development process based on that of protected sectors or AVAP. A reform of the Town Planning Code shall be conducted at the same time. It is important to consolidate existing and make it a springboard for more ambitious protections. The establishment of the planning document should be made with the endorsement of the State and not only through a formal legal control. The "heritage PLU" also raises the question of the capacity of the territories to be professionals. Support, expertise and training should be offered to local communities.

On the other hand, as the ancient centres concentrate hundreds of thousands of vacant housing, it is very important to develop specific fiscal advantages aimed at their revitalization and at recovering their

social image, as already experimented by the Urban Renewal Programme (*Projet de Rénovation Urbaine*, PRU) established by the law n° 2014-173 of 21 February 2014 *de programmation pour la ville et la cohésion urbaine* or by the National Program for Sustainable redevelopment of Old Areas (*Programme National de Requalification des Quartiers Anciens Dégradés*, PNRQAD) created by the law n° 2009-323 of 25 Mars 2009 *de mobilisation pour le logement et la lutte contre l'exclusion* (fig. 4). Ultimately, the future "historical cities" need to be outfitted with tools promoting and helping the public awareness, such as the label "*Villes et Pays d'Art et d'Histoire*".
It would not be the first time that an attempt to simplify the legislation and avoid overlapping generate an administrative chaos and stop ongoing procedures. We hope that this is not the case (fig. 5).



Fig. 4: The *Programme National de Requalification des Quartiers Anciens Dégradés* (PNRQAD) of Notre Dame–Vernier–Thiers in Nice (left) and the presentation of the PNRQAD of Bordeaux (right)



Fig. 5: A political cartoon about the *Loi Patrimoine (http://patrimoine-environnement.fr/compte-rendu-des-journees-juridiques-du-patrimoine-2-decembre-2013/)*

4. Conclusions

The French experience in the field of architectural and urban heritage preservation, held by its reputation in the cultural and social domains represents a legitimately recognized reference in Europe and in the world [17]. In the course of time, France has developed a legislative apparatus of the most comprehensive and articulated, especially in relation to protected areas

The idea of "heritage safeguarding" strictly combined with that of "quality of life" is now at the center of its cultural concerns: in a globalized world, every society clings to its reference points, even if they are called to evolve. This approach indicates how the inclusion of heritage should not be built up exclusively through the protection, but by integrating the heritage issue in procedures for development. Titian affirmed in his *Allegory of Prudence* (1565) that "*From experience of the past the present acts prudently lest it despoil future action*" but be prudent does not mean being timid, but to assume its own status as an intermediary between the world passed away and another that installs, without breaking the thread of life of the town which exists only because it is a living space, not a decoration [18].

This is the key point of French politics. Its ambition is to build a perennial great project for heritage through the implementation of stable, innovative and dynamic policies, able to reconcile protection, citizenship and evolution of functions and uses, at an enlarged urban scale.

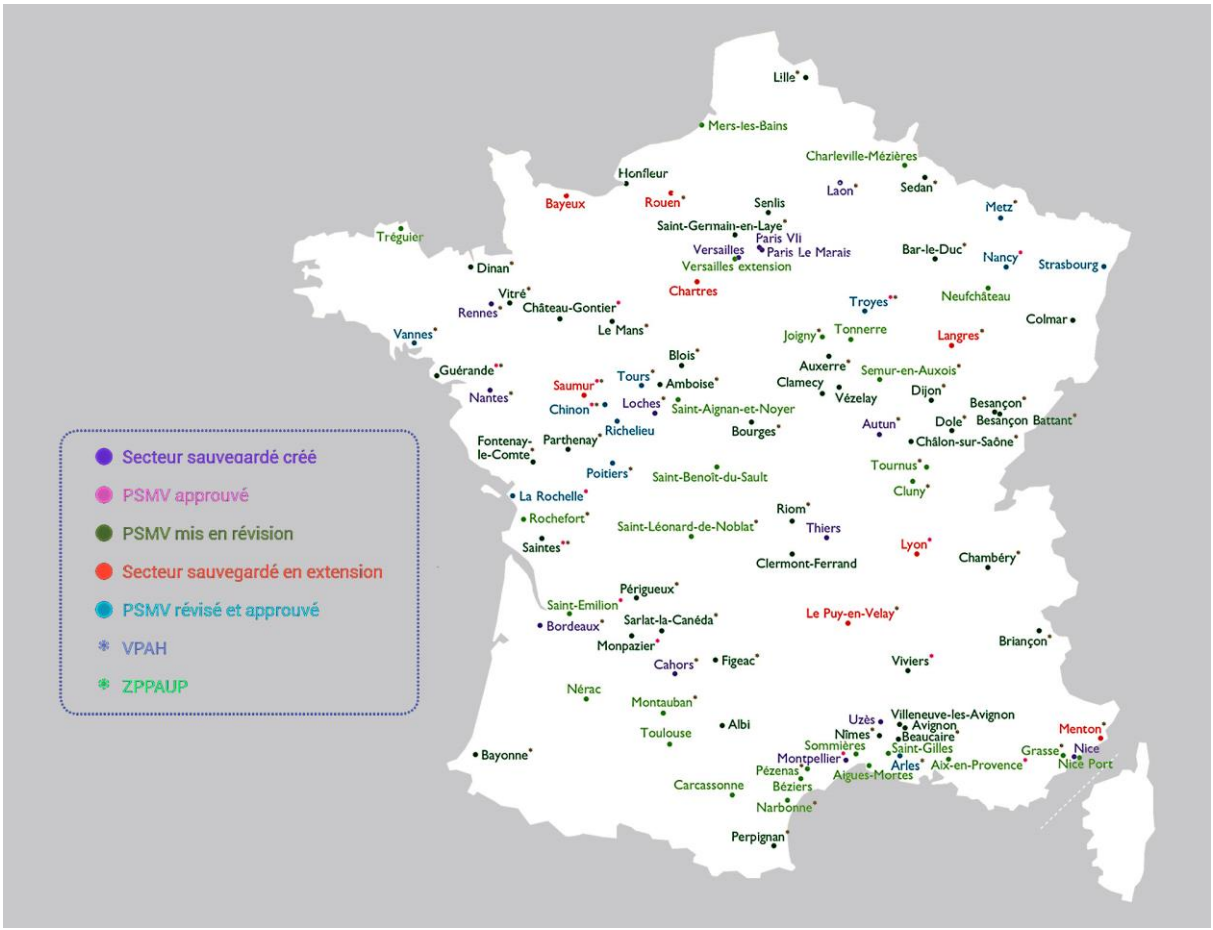


Fig. 6: Map of conservation areas in France

Bibliographical References

[1] LÉON, Paul. Les principes de la conservation des monuments historiques. Évolution des doctrines. In AA.VV. *Actes du Congrès archéologique de France, 97e session tenue à Paris en 1934.* Paris: A. Picard Librairie, 1935, p. 17-52.

[2] RÜCKER, Frédéric. *Les Origines de la conservation des monuments historiques en France (1790-1830)*. Paris: Édition Jouve et Cie, 1913, 234 p. (Thèse pour le doctorat d'Université en Lettres).

[3] CHOAY, Françoise. *L'allégorie du patrimoine*. Paris: Éditions du Seuil, 1992, 272 p.

[4] SIRE, Marie-Anne. *La France du patrimoine: les choix de la mémoire*. Paris: Gallimard-Caisse nationale des Monuments Historiques et des Sites, 1996, 144 p.

[5] POULOT, Dominique. *La nascita dell'idea di patrimoine in Francia tra Rivoluzione, Impero e Restaurazione*. In CATONI, Maria Luisa (ed.). Il patrimonio culturale in Francia. Milano: Mondadori Electa, 2007. p. 23-66.

[6] POIRRIER, Philippe, VADELORGE Loïc, (ed.). *Pour une histoire des politiques du patrimoine*. Paris: La Documentation française, 2003, 615 p.

[7] BRICHET, Robert. *Le régime des monuments historiques en France*. Paris: Librairies techniques, 1952, 238 p.

[8] HUGO, Victor. Guerre aux démolisseurs. In *Revue des deux mondes : recueil de la politique, de l'administration et des moeurs*, 1 fasc., janvier - mars 1832, p. 607-622.

[9] LOEW, Sebastian. *Modern architecture in historic cities. Policy, planning and building in contemporary France.* London-New York, Taylor & Francis e-Library, 2005, 257 p.

[10] FRIER, Pierre-Laurent. *La mise en valeur du patrimoine architectural. Les monuments historiques et leurs abords. Aspects réglementaires et jurisprudence*. Parigi: Editions du Moniteur, 1979.

[11] RAVAL, Marcel. Origine et position de la L.U.R. In *Bulletin d'information de la Ligue Urbaine et Rurale*, n° 1, n.d.

[12] BACKOUCHE, Isabelle. *Aménager la ville. Les centres urbains français entre conservation et rénovation (de 1943 à nos jours).* Paris: Armand Colin, 2013, 448 p.

[13] FRIER, Pierre-Laurent, *Droit du patrimoine culturel.* Paris: Presses Universitaires de France, 1997, 526 p.

[13] BERRY, Maurice. *La valeur actuelle du cadre ancien.* In *Urbanisme*, n° 39-40, Paris, 1955, p. 155-157.

[14] VERSACI, Antonella. *L'origine des secteurs sauvegardés. Intentions et difficultés sans la mise en place des premières opérations*. Tesi di dottorato in Architettura. Parigi: Université Paris 8 – Vincennes Saint-Denis, 2005; Lille: ANRT, 2012, 858 p.

[15] PLANCHET, Pascal. "La réforme de la loi Grenelle II: des ZPPAUP aux AVAP". In LAJARTRE, Arnaud (ed.). *Une nouvelle gouvernance pour la gestion du patrimoine architectural et paysager français: des ZPPAUP aux AVAP du Grenelle* II, Université d'Angers - Faculté de Droit (Centre Jean Bodin) - 10 et 11 février 2011.

[16] AA. VV. "Actes des rencontres de Bordeaux. Les secteurs sauvegardés. Cinquante ans d'une politique au service des centres anciens et de leurs habitants". In *Présence d'André Malraux*. Numéro hors-série N° V, 2013.

[17] MARINOS, Alain. *Zones de protection du patrimoine architectural urbain et paysager (1983-2010). Note d'évaluation pour une capitalisation des acquis dans la perspective des aires de mise en valeur de l'architecture et du patrimoine*, 2001- Web: http://www.www.alainmarinos.net.

[18] ANVPAH & VSSP. *Paroles d'élus. Les secteurs sauvegardés.* Bayonne: FlashCompo, 2012, 46 p.

XII International Forum Le Vie dei Mercanti

BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII

Aversa / Capri, 12,13,14 June 2014

Architecture for Archeology: Identifying new modular and flexible types of shelter adaptable to the diverse needs of archaeological sites

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Abstract

With the construction of three coverings in the Valle dei Templi of Agrigento, the management of the Park Agency is carrying out an experimental action which can produce innovation in the context of archaeology. The “Architecture X Acheology” workshop explored the state of the art in terms of works protecting archaeological landmarks, with the goal of identifying new modular and flexible types which are adaptable to the diverse needs of archaeological sites.
The Park, which covers 1,300 hectares, preserves an extraordinary monumental and landscape patrimony. Though visited by millions of tourists, the archaeological sites are not appropriately equipped for tourist use. To better use this enormous cultural resource and to make it an active agent of the regional economy, it is of strategic importance to equip it with new facilities which are appropriate for today. For this purpose, the workshop has seen professors and students of Politecnico di Milano, Palermo University, and of Tokyo University involved in the construction of experimental prototypes for the protection of archaeological finds and excavation sites. The shelters produced during the workshop —other than having a functional and aesthetic value— form the first nucleus of a park of modern architecture within an archaeological park. The work shows the willingness to systematize the great potential value which the interdisciplinary prospect of integration between architecture and archaeology offer to both disciplines in terms of research and analysis.

Keywords: Archeology, Architecture, Innovation, Digital Fabrication, Shelter

1.INTRODUCTION

“Architecture x Archeology” is a co-joint workshop held at the Parco Archeologico Valle dei Templi di Agrigento, together with Tokyo University, Politecnico di Milano, and University of Palermo, with the aim to design and build three pavilions for covering and safeguarding archeological excavations, and for protecting archeologists from atmospherical agents such as sun and rain.
The workshop offered an up to date study about shelter structures for archeological sites. It aimed at producing modular and flexible structure adjustable to different scenarios and needs. The workshop was divided in to two parts: the first preliminary part -45 days- took place at each respective university of the players involved. The second phase -7 days- took place on site.

The first preliminary part introduced issues relating to the complexity of designing within archeological sites, applications of computational design, structural stability, and practical solutions for quick physical materialization within limited time and budget. The second part explored culture and nature of Akragas (old name for Agrigento) which served as a pretext for further exploring design for archeological sites.
Three teams, each comprised of 6 to 10 members, ultimately produced three full-scale shelters to test out their ideas, methodologies, proposals, and materials. Despite differences in use of software (Rhinoceros, Grasshopper, BIM, Autocad), principal material (wood, bamboo, stones, micro-perforated polycarbonate), fabrication method (CNC routing, manual sawing), and budget (from 1,000 EUR to 6,000 EUR, including all costs) it was possible to make comparisons and analysis during the process and later in three distinct outcomes.

1.2 Functional Program: Shelters

Due to the complexity of the touristic fruition of Agrigento's archeological site the workshop focused only on shelter for covering and safeguarding archeological excavations.
This theme represents an unsolved issue of many open air archeological sites in Italy. In fact, archeological excavations needs a particular protection against atmospherical events that may bring back the excavations to their original conditions.
Moreover, the shelter theme represents a complex theme because induces a substantial modification of the site aspect. In case of construction -besides technical problems such as anchoring the structure to the ground- the site will be inescapably changed by the addition of a new volume on the site. In this sense, the team were asked to see their respective project as a shape that merges and connects to the landscape, and not as an opposing element. The three teams tested different technical and material solutions, all respectful of the historical heritage.
The experimented solutions were of three types:
1) Shelter with a light structure easy to move and disassemble.
2) Shelter with a medium-light structure easy to move and disassemble.
3) Shelter with a medium-light structure fixed to the ground.

2. Archeology and Architecture

According to architect-archeologist Sebastiano Tusa, the relationship between archeology and architecture has always been characterized by several, interlinking factors including historical perspectives, technological aspects, issues relating to restoration and the link with the local territory. No matter how tight this relationship has been, it has not always been linear and calm, both of which are necessary qualities for advancing the state of the art in this area. Differences due to background, epistemological divergences, academic contradictions and reciprocal individualism have produced a fracture between architecture and archeology - not only concerning research and analysis, but also the design of new facilities, restoration, and the transformation of the asset into a more fruitful experience: it seems logical to say that is time for architecture and archeology to start talking to and understanding each other.

2.1 Sicilian Context

Architect Giuseppe Guerrera – former director of a master course on architecture and archeology offered at the University of Palermo – reckons that Sicily is not rich of primary resources, it does not have an industrial reality big enough to sustain the Sicilian economy and, finally, the tertiary sector is not in very good shape, in spite of its strategic position in the middle of the Mediterranean Sea. Thus, maybe the real resource for a concrete economic and social development is not mass tourism, but cultural tourism, a sector on which regions like Tuscany and Umbria have prospered. If Sicily is to become a region capable of supporting a successful tourism industry, it is necessary to design and build adequate structures that are currently lacking: it is mandatory to update our heritage and natural sites for a better fruition.

2.2 Architecture for Archeology

Archeological sites could be one of the most important touristic resources of Sicily. However, archeological sites, even though they are visited by millions of visitors every year, are lacking adequate and up-to-date infrastructures. In addition, this present lack of infrastructure creates obstacles to archeologists and researchers in further excavations. In order to effectively exploit Sicily's cultural and historical heritage, new facilities that respect the historical context yet remain open to the future need to be built. As the first in a series of workshops, the projects designed will form the basis of a catalogue for actual construction, and will contribute to strengthening the collaboration between the academic world and the Archeological Park of Agrigento.

3. The Site and its needs

Covering an area of nearly 1300 hectares, the park preserves an extraordinary monumental and natural heritage that includes the ruins of ancient greek city of Akragas and its surrounding landscape. Listed in 1997 as a Unesco World Heritage, the Valley of Temples is home of one of the largest

archeological complex of Mediterranean area, immersed in a outstanding rural landscape punctuated by centuries old olive and almond trees. Agrigento is a major tourist centre due to its extraordinarily rich archaeological legacy.
Though visited by millions of tourists, the archaeological sites are not appropriately equipped for tourist use. To better use this enormous cultural resource and to make it an active agent of the regional economy, it is of strategic importance to equip it with new facilities which are appropriate for today. It is necessary to plan and build adequate structures which are now missing, and to adjust the cultural and environmental assets for better use.

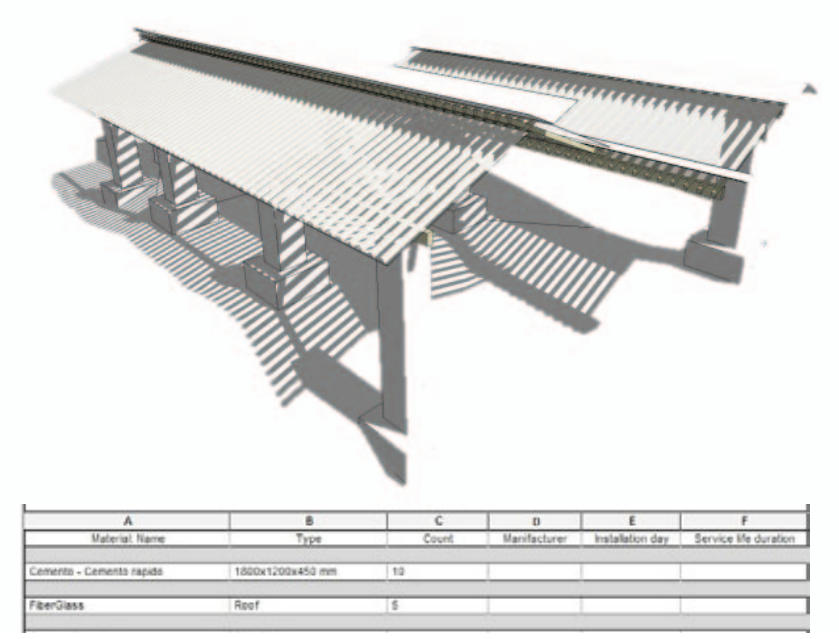
The construction of the shelters—in addition to posing technical problems related to anchoring to uneven ground, and to the dispersion and/or collection of rain water— transforms the site in that it inevitably adds a new element to the archaeological landscape. The projects have been interpreted as a shape to be managed in continuity with the landscape, something which does not conflict with it but rather merges with it. The projects have in part attempted a dialogue with the context—they listened to and answered it—and in part—in the most extreme manner—attempt to merge and cancel themselves in it in order to disappear.

4. Shelters case studies

Three case studies are described in the following sections. Due to the complexity of the site and the limited timescale, the workshop primarily focused on the design of shelters for covering and safeguarding archeological excavations. This particularly composite theme is at the center of many harsh debates in Italy and beyond. This is due to the substantial aesthetic change that they can bring to a site as well as the technical problems.
The workshop witnessed a true debate between the various participating schools, both in the design and in the construction. BIM, parametric software and digital fabrication techniques alternated with handmade sketches and craftsmanship skills pushed to the extreme. The three shelters went from the search for a dematerialized and wooden architecture–in contrast with the solidity of the Greek temples —to the use of materials found within the Valley, from the stripping of river reeds to the collection of rocks used as an integral part of the shelter structure.
The work shows the willingness to systematize the great potential value which the interdisciplinary prospect of integration between architecture and archaeology offer to both disciplines, both in terms of research and analysis and also in terms of how the planning pertains to the execution of avant-garde interventions.
It is on the basis of these considerations, that this complex, fascinating, and contemporary issue, regarding archeological areas and parks, was explored during the workshop. This signaled the beginning of a fruitful collaboration between Parco Paesaggistico e Archeologico della Valle dei Templi, Polytechnic of Milan, Tokyo University, and Università di Palermo. The collaboration consisted of both taught sessions throughout the academic year and collaborative work before and during the workshop. Functionaries of the archeological park provided students from Japan and Italy with reference books, technical drawings, aerial photos, and cadastral maps of the site. The preliminary research and design activity conducted co-jointly by professors, tutors, and students was used to achieve a mature design during the workshop. Students were asked to focus on a reciprocal and beneficial dialogue between architectural and archeological issues.

4.1 AkragaShelter, Milan Politecnico

The Polytechnic of Milan has realised a project named AkragaShelter, that sits by a temple built to honour the sacred spring dedicated to Demeter, wife of Zeus. A special and holy place, where architecture and nature combine and unite themselves in an empathetic way.
The small pavilion, about 20 sq.m., was built to protect some portions of the temple, now dismantled and aligned on the ground, waiting to be reassembled. However, this system could serve the Valley of the Temples Park also for other needs. Due to the sacredness of the place and the impressive archaeological site, the team opted for a simple design solution which makes use of materials including wood, corrugated fibre glass and rocks collected on site.
As the design work was shared with the Kengo Kuma Lab, which also developed its own pavilion, the team referred to some aspects of Japanese culture, Zen mysticism, as well as the historical context, Greek classicism.
The reference to the Greek temples of Agrigento is expressed in the project through the use of massive columns realised in galvanised steel gabions filled with local stones which serve for anchoring the shelter to the ground. This reference is highlighted by the slope of the roof, with an angle of 22.5°, identical to that of Temple of Concordia. Moreover, the wooden roof evokes the typical gable roof of the Greek temples. Concerning the reference to Japanese culture, the shelter gets inspiration from the Ise Shrine, the most important Japanese shrine, made of Inoki wood (cypress). In particular, it looks at the temporality and reversibility of Ise –which is disassembled and reassembled every 20 years– and at the shape of the roof summit, surmounted by a V-shaped ventilation duct for water collection.



A	B	C	D	E	F
Material: Name	Type	Count	Manifacturer	Installation day	Service life duration
Cemento - Cemento rapido	1800x1200x450 mm	10			
FiberGlass	Roof	5			

Fig.1: Digital model of the module, and database associated to it.

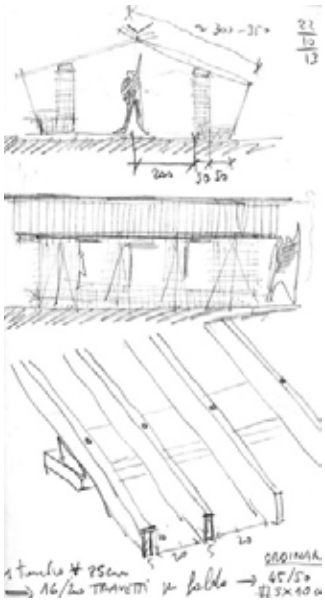


Fig.2 Sketches of the structure

The roof structure is covered by a white corrugated fibre glass which gives a soft atmosphere to the shelter when lit up at night. An effect similar to a Japanese lamp made of rice paper.
AkragaShelter was designed with a parametric and associative model. The shelter – which is modular and flexible – was conceived as a module that can be built in different areas of the park. Four variables have been taken into consideration for making the model: 1) the variety of sites with ruins in the park, 2) the different orientations of the sites, 3) the different size of the ruins to be covered by the shelter, 4) the uneven level of the ground.
Each variable was considered as a parameter in the digital model. The digital model designed can adapt its global geometry and that of its components to different variables. The height of every pillar is adjusted to ground conditions. The ground was modelled as a cloud of points built by importing data through a laser scanner survey. Length and width of the roof came as a result of the dimensions of the ruins. Every component of the shelter is hierarchically associated to the geometry of other components in a tree of associative relationships.
Once the shelter is digitally modelled, it is possible to simulate the real condition of the site and associate its geometry to a database from which it is consequently possible to extract: amount, dimension and specifications of construction elements. Finally, the team built a small architecture, simple and respectful of the surroundings yet functional and elegant, perfectly integrated in the natural environment of the Valley of the Temples.
This experiment shows the possibility in the use of this modelling strategy in a very simple geometry. Here the advantage is in the adaptability of the parametric shelter to different environmental situations.



Fig.3. Length and width of the roof came as a result of the dimensions of the ruins.



Fig.4: The shelter sits by a temple dedicated to Demeter, wife of Zeus.

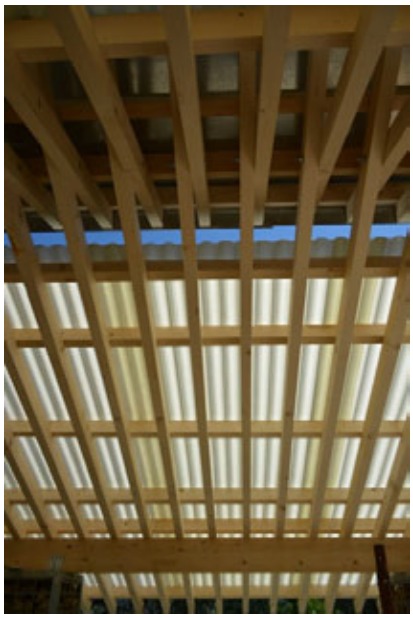


Fig.5 Detail of the roof.





Fig.6: White corrugated fiberglass covers the shelter giving it a soft atmosphere. **Fig.7** Construction phase

4.2 Molecular Shelter, Tokyo University

While respecting the local context, the molecular shelter design reinterprets a concept borrowed from Japanese traditional culture. In fact, the shelter takes inspiration from the bracket system found in traditional Japanese temples where the roof plays a prominent role.

The eaves, which extend far beyond the walls and cover verandas, have a practical function because they protect the building by carrying the rain as far as possible from its perimeter. The roof's weight is supported by complex bracket systems called “tokyō”. The shelter meets the requests of the Park Agency that asked for a shelter with a roof as large as possible, designed to carry as far as possible the rain from the excavations, and to minimize the surface area of column base. The columns size was checked by professor engineer Jun Sato through structural analysis software to optimize them to the thinnest possible size.

The traditional bracketing system was reinterpreted in the design by keeping it extremely essential both structurally and esthetically. Moreover, this system presents an intrinsic elasticity, which lessens the impact of lateral forces by acting as a shock absorber. The partial inclination of the roof is reminiscent of the “Tempio dei Dioscuri”, so to have a direct reference to existing forms in the landscape.

The shelter – being made of multiple units – is light, easy to fabricate and assemble in a reasonably short time, movable, adaptive to the site, and modular. The structure serves also for hanging archeologists’ working tools.



Fig. 8: The Park Agency asked for a shelter with a large roof, designed to carry as far as possible the rain from the excavations, and to minimise the surface area of column base.

The whole structure of the shelter is made by a joint system of four small struts bind along the x-y direction beams with M6 screws. The screws add on resistance against rotational movements due to horizontal external forces. Being modular, the system can extend. If requested by a particular site condition, columns can be positioned at different point of the grid. The structure weighs around 100kg, and can be easily moved by few people. The shelter is anchored to the ground by four concrete blocks of 20 x 20 cm.

The shelter is made of local pine trees, that were cut and assembled with M6 size screw * 5000. It took five days to assemble, and the final cost of the pavilion amounted to 1600 euro.

Concerning computational aspects, programming was developed with Rhino, Grasshopper, Python. This enabled the exchange of information between Tokyo and Agrigento and optimized the calculation which enables parametrical changes. In particular, the use of parametric software proved to be essential for testing different size and arrays of the grid structure, structure thickness and weight, material length and number of the elements used. As for the fabrication, hand-made easy fabrication system was used which demanded only simple holes by drilling and screwing instead of sophisticated CNC machines hard to find on site. Moreover the Tokyo team preferred to realize its project just by taking advantage of the local craftsmanship.





Fig. 9: The whole structure of the shelter is made by a joint system of 4 small struts bind by x-y direction beams with M6 screws. The screws add on resistance against rotational movements due to horizontal external forces.

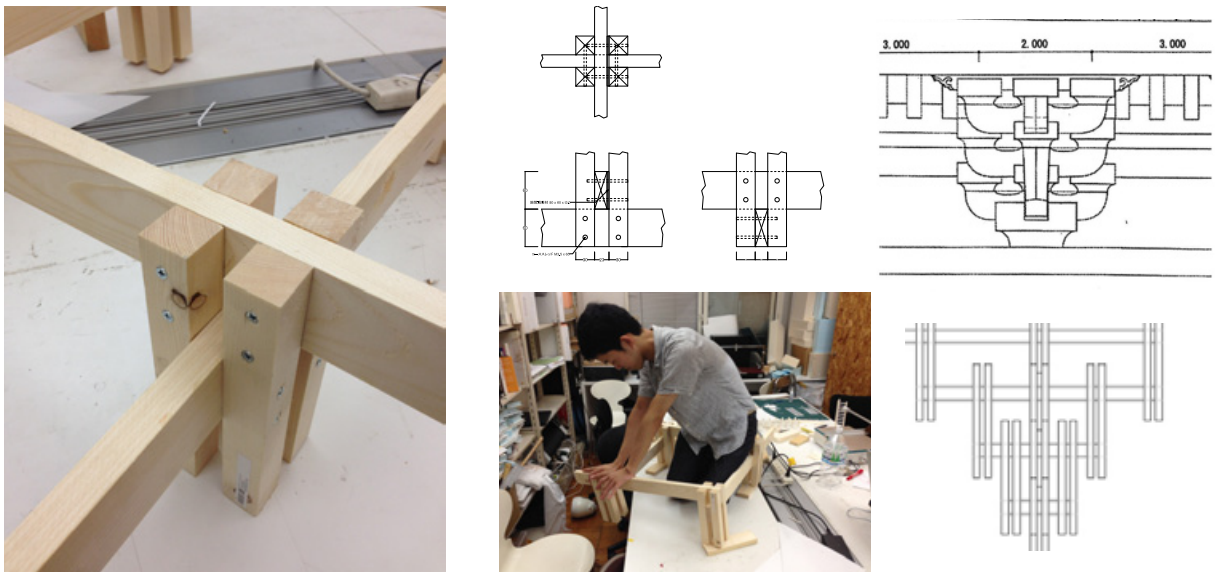


Fig.10: Left: Joint detail. Center: 1:1 mock-up. Right: Traditional Japanese bracket system and its reinterpretation.

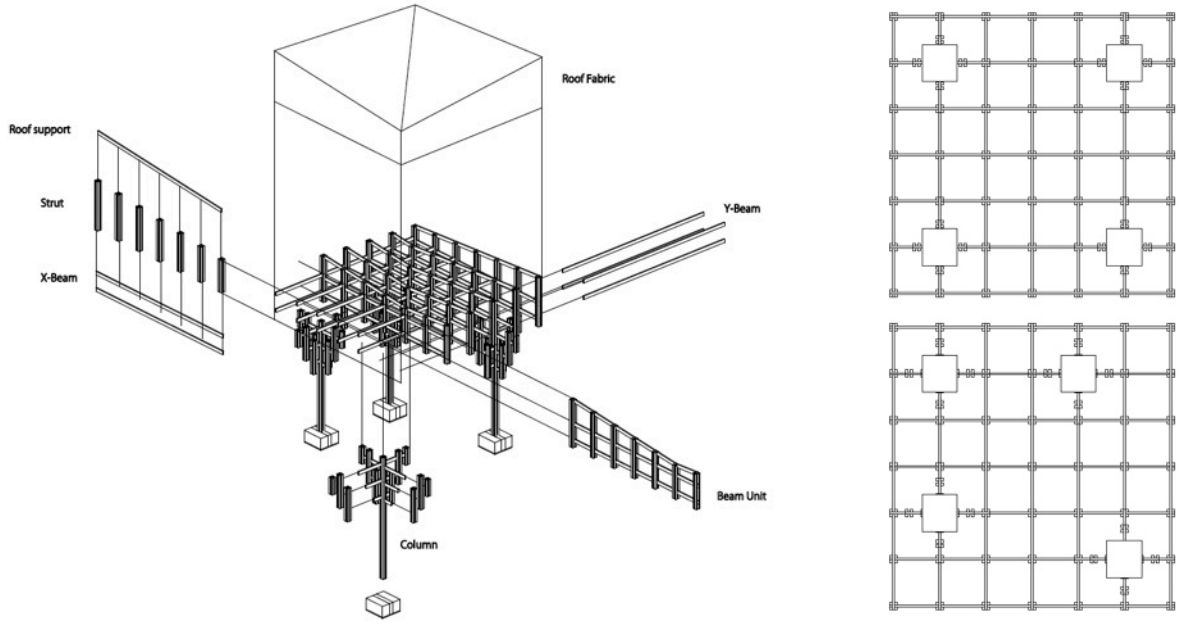


Fig. 11 Left: Exploded Axonometric. Right: the grid structure allows for flexibility

4.3 River Reed Shelter, Palermo University

River Reed shelter reflects on the idea that the millenarian culture of Greek temples is strictly related to the immensity of its surrounding landscape. It is thanks to this relationship with the landscape if the ancient culture can transmit its values to future generations despite the fact that the maintenance of current archeological park, it is not a shared value promoted by local politics. While the two previous shelters were designed during the preliminary phase, the Giardini in Campo follows in the category of readymade experimentation since it was designed and built during the workshop construction week.

The shelter responds to the following issues: it protects from heavy rain, hail, rain-off and erosion; it provides shade during excavations and to the general public. Thanks to use of local materials, it offers a high degree of integration with the landscape, moreover it is reversible and economical.

The shelter takes inspiration from archetypical shape of the two pitch rural houses in Sicily: the roof height and inclination can be adjusted to different needs.

The project aims at a bare essentiality. Nevertheless, it solves decisive issues such as the immediate possibility to adjust to uneven ground conditions. Moreover, the team decided to use a camouflage technique thanks to which the shelter almost melts into the landscape. This was partly possible thanks to the use of river reed collected in the Valley itself.

The river reed (Arundo donax) is a constructive element that characterizes the local construction culture. The reed is inextricably linked to the river Akragas which gave its name to the Greek colony. The reed has been used for centuries for fencing rural plots, as material for simple roofing, and as constructive material in sandwich walls. Very common in this area, the river reed is flexible and can be found at nearly zero costs. In the past 50 years river reed was replaced as a building material by



Fig.12 The team decided to use a camouflage technique thanks to which the shelter melts into the landscape.

synthetic materials which has resulted in an overpopulation of reed in the majority of Sicilian rivers and it has caused damage to the ecosystem. In order to optimize the structural performances and to minimize the size of the structure, the shelter is made of a 5x5 cm width profile in Corten steel.
The structure has been designed to be packed in flat boxes which are easy to move and it weighs just 103kg for a module of 9 s.qm. The reeds are prepared in advance and are assembled with the Corten structure in a easy way. The structure could be easily disassembled by archeologists themselves.

5. Conclusions

Conceived and finished in a very condensed period of less than 45 days, both computational design and digital fabrication enabled the speed and the challenges undertaken in each of the shelter.

The Japanese and Italian students interacted profitably, both with the local authorities and with the park functionaries and architects. The architectural design meeting took advantage of the scientific supervision of Kengo Kuma and Jun Sato as well as the contributions of subject matter experts like Giuseppe Guerrera, former director of a master course about Archeology held at the University of Palermo. The union of these synergies—university, public functionaries and craftsmanship—represents a unique moment of exchange and growth which opens new paths to explore.

The three shelters produced during “Architecture X Archeology” —other than having a functional and aesthetic value and were built only for temporary use— form the first nucleus of that which Director Parello imagines to be a park of modern architecture within an archaeological park.



Fig. 13 In order to optimize the structural performances and to minimize the size of the structure, the shelter is made of a 5x5 cm width profile in Corten steel.

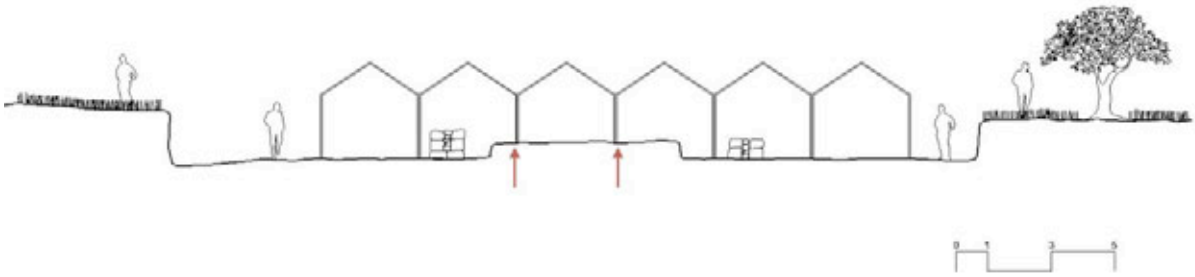


Fig. 14 Elevation. Aggregation of several units.

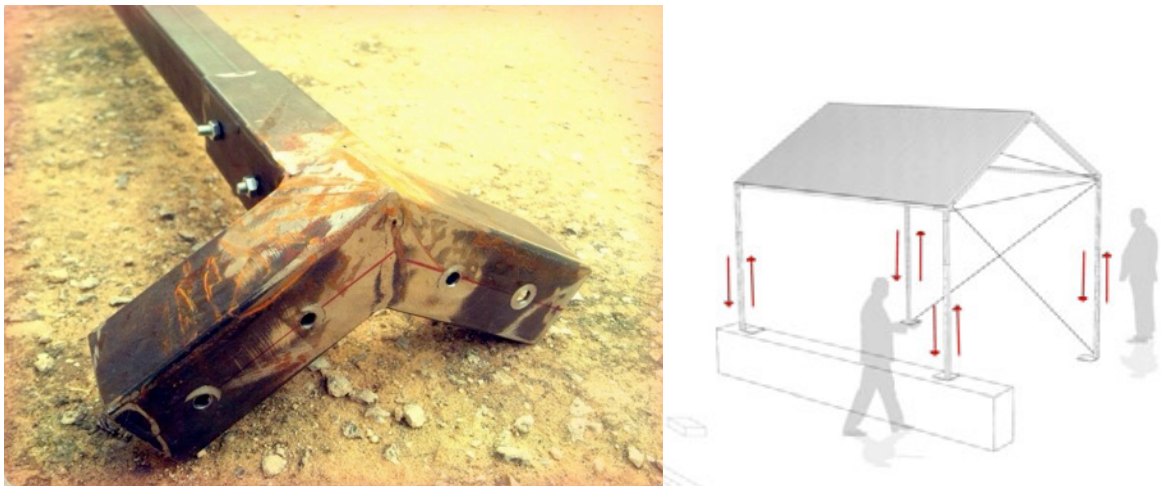


Fig. 15 Left: Joint detail Right: Columns height is adjustable to uneven ground.

Bibliographical references

[1] IMPERADORI, Marco, SENATORE Alfonso. *Schematic Design: tecniche ed esempi di comunicazione del progetto.* Collana I libri di Arketipo, Milano: Gruppo 24 Ore, 2011, ISBN 13: 978-88-324-7921-8

[2] *International Journal of Architectural Computing (IJAC),* KO, Kaon, LIOTTA, Salvator-John. Decoding Culture Parametrically: Digital Tea House Case Studies, issue 04, volume 9, Dec. 2011. United Kingdom, Mutli-science, 2003–2014.

[3] KO, Kaon, LIOTTA, Salvator-John. *Digital Tea House: Japanese Tea House as a pretext for exploring parametric design and digital fabrication in architectural education*, in AA.VV. CAADRIA 2011: Circuit bending, breakingand mending, Proceedings of the 16th International Conference on Computer Aided Architectural Design Research in Asia, CAADRIA, New Castle 27-29 Apr. 2011, p. 71-80.

[4] TUSA, Sebastiano, *Aree archeologiche e compatibilità produttiva*, AA.VV. in Atti del convegno di studi "Il paesaggio della Valle dei Templi", Agrigento, 1996, p. 15-26.

[5] http://www.unipa.it/dispa/eventi/castelvetrano_24febbr.htm

[6] http://www.unipa.it/dispa/pubblicazioni/guerrera_castelvetrano.htm

[7] http://www.archxarch.it/

[8] http://www.archxarch.it/terone/terone.html

[9] http://www.domusweb.it/it/architettura/2014/01/09/architecture_x_archaeology.html

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Design Process for a Led Based Luminaire in Exterior Lighting Application

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Abstract
Light Emitting Diode (LED) or Solid State Lighting (SSL) represents a promising technology for future lighting application; compared with other light sources, the LED lights allow efficiency comparable with those sources actually best performing, longer life and increased flexibility as it can be regarded as an effective "point source". On the other hand, the design of a LED based luminaire has to take into account many specific aspects of this technology such as photometric characteristics variation with the junction temperature, current vs. input voltage forward variation, environmental conditions (ambient temperature, humidity, and wind), and other aspects related to the heat dissipation (heat sink design and integration), control (current driving and power supply) and lighting fixture design for which is of a crucial importance the integration of different parts of a LED luminaire considering existing standard requirements.
In order to achieve the final target of developing a LED based luminaire in exterior lighting application, it has been firstly analysed and revised a set of up-to-date and trendy LED-based luminaires today commercially available and their principal characteristics have been listed; the behaviour of the main components of a LED system has been analyzed and their relationships have been taken into account. The first results of design process have been reported and the proposal of some prototypes fully described.

Keywords: LED, Hybrid Design Methodology, LED based luminaires design, LED system components design, Energy saving.

1. Design case studies, market analysis and trend

In the first phase of the design project some case studies were chosen to examine the different categories of LED outdoor lighting systems existing on the market. The case studied were classified in different categories of application:

1) Lighting for residential areas, parks, gardens and urban streets;
2) Lighting for parking lots and city large streets;
3) Lighting for extra-urban streets.

To this study were added: a specific study of some LED headlamps available on the market with different powers, a repertoire of retrofit devices and an analysis of some devices based on traditional

light sources competing with LEDs because still widely used. A comparison with these devices was carried out in order to define design strategies to overcome the LEDs weakness and to enhance their benefits.
The analysis was conducted on two different levels. A first level of systematization was carried out cataloguing and indexing the devices in relation to some identifying features, some of those useful to compare their potentiality in terms of market competition.
The features were:

- name;
- producer;
- site of production;
- type of source;
- degree of protection;
- orientation;
- electrical power;
- light efficiency;
- technical specifications;
- photometric simulation files;
- catalogues.

A further and more detailed analysis, was carried out on a limited selection of products, considered more interesting in relation to the specific business context and market related to the company that funded the research project. In this second step a detailed report of data and graphs was carried out.
The analysed features were defined in relation to the needs of the business market, in order to be able to build a strategy database, covering several sectors. The analysis could be continuously updated in order to drive the company's innovation strategy and the new products development, both from the technical and design points of view. The repertory obtained is easily implementable and linked to instructions for updating to obtain a durable strategic instrument for the future of the company beyond the end of the project. As result of the survey performed, all the gathered informations have been organized, for each luminaire, as reported in figure 1.

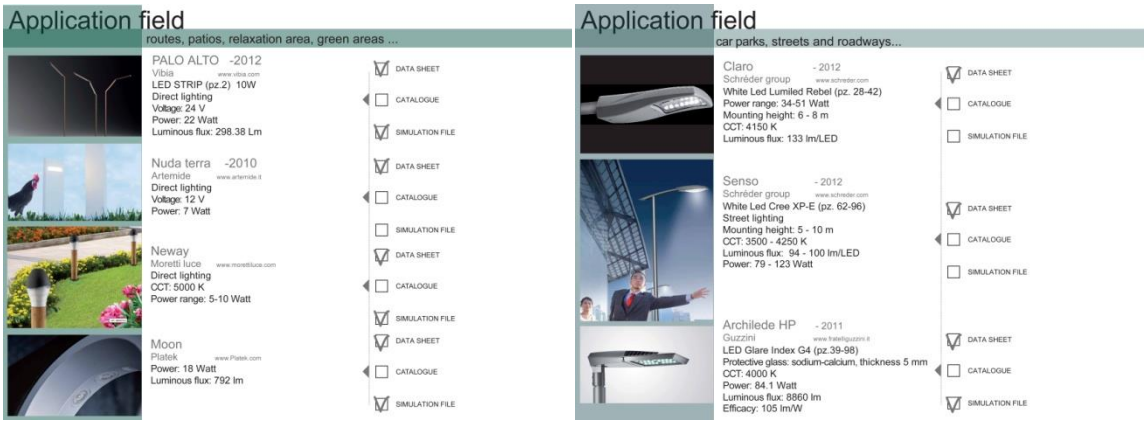


Fig. 1: Example of luminaire record.

After the activities of selection, cataloguing and characterization, a trend scenario was carried out. Besides the products on the market, some design concepts developed by designers or by design students were considered at an international scale. This study allowed for foreseeing the advanced functional and aesthetic trends useful to define the evolution paths of technological opportunities, users needs and design ideas.
The result of the analysis on a specific target of devices with a power of 250 W shows a prevailing aesthetic uniformity in terms of design and of the LEDs geometrical organization in the projector.
In contrast, the analysis of the more advanced concepts associated to lower power devices, smaller, lighter and more free from technical limitations, has provided some clues to the evolutionary trends that could be transferred and implemented on devices with high power. Inspired by these design trends, though the necessary technical and technological considerations, our research aimed for giving new design solutions to develop new products oriented to emergence on the mainly uniform market.

2. Design evolutionary framework and corporate identity strategy

The innovative formal and technical solutions emerged from the evolutionary framework were:

- modularity of the projectors starting on a basic module composed with various geometries in order to be flexible and adaptable to different contexts with different lighting requirements;
- use of new LED assembly geometries, alternative to the conventional rectangle. There are various examples of compositions. One of the most interesting is a continuous bend organization in which LEDs are mounted on a continuous bended profile (see Mira 380 by Hei Solarlight, Pilled by KXdesigners, SoleCity by Philips, PALO ALTO by Vibia). This kind of "bendy" sign could be interpreted as a characteristic identity of LED technology, which specifically allows this type of geometric arrangement. An opportunity to propose a recognizable character to associate to the LED devices connecting this new language with the values of innovation and sustainability, which should strengthen the image of these products on the market;
- in parallel with the previous bendy tendency oriented to harmonic continuous morphologies without interruptions, in other examples, emerges also the exaltation of a polilinear segmented geometry, with the contrast between the net vertical and horizontal lines (see Plan by Schréder group , Archilede and UFO by Guzzini);
- optimization of the structural supports and reduction of matter, oriented to reducing both the economical and environmental impact. The essential and minimal shape, resulting from structural optimization, seems to facilitate the integration of devices in different context, new or ancient. Geometries are clean and coherent with the contemporary in contrast with the approach of many companies of imitating morphologies and details of old lampposts for the historic contests. At the international level this approach is now considered as "historical fake";
- use of systems of reflection, refraction and diffusion to increase the LEDs efficiency and to overcome the spot effect that characterizes them, providing more homogeneous and continuous lighting conditions;
- tendency to integrate LED lighting systems with renewable energy sources, like PV systems and microwind, connecting the LEDs energy saving potential with other solutions for environmental sustainability;
- tendency to transfer morphologies from biology to propose new morphologies different from the conventional ones as well more compatible with nature and able to communicate the value of sustainability included in LED technology (such as the Philips's concept evoking a flower that opens and closes).

From this evolutionary framework the requirements of the various project proposals were developed, reaching to the definition of 4/5 devices corresponding to different target of market and fields of application e.g. parks and green areas, main streets and urban minor streets.
The analysis developed shows the need to impress the design of new devices on real users needs, deepening the differences, in terms of visibility and quality of light between traditional light sources and LED sources, in order to design systems that enhance the potential of new technologies exceeding their limits: many of the LEDs barriers to diffusion could be overtook by a good design.
Some fundamental restrains, that constitute a barriers to market, can be recognized in the high initial costs and the reduction of the useful life due to design errors in terms of dissipation (higher junction temperature), assembly and power. The benefits to highlight are, however, a better visibility of objects and walking people, durability, low maintenance costs, reduced energy consumption, possibility of dimming, colour rendering and greater visibility of road signs.
Among the several proposals developed, the research project has been closely related to various types of roads with specific lighting requirements (ie. road lighting class).
From the survey on the state of the art, it can derived that the LED lighting market, particularly for outdoor use, suffers from a general morphological and linguistic uniformity that interprets, in an automatic way, a source that is often perceived as cold and artificial: as if the appearance was sacrificed by the virtue of energy saving and technological innovation.
The study of design emerging trends leads, moreover, to identify two parallel and often conflicting approaches: a first one that continues the path of minimalism and "smoothness" of the forms that become "universal" because seem abstracted from all contexts, and a second one inclined to "naturally complex" forms that find in the "parametric design trend" the ultimate expression of affinity between mathematics and nature under a new digital aesthetics.
In the design phase of the research it was decided to combine these two approaches through a "bio-inspired" approach which refers to the "intelligence of biological systems" to define a new line of products more efficient in terms of optimization, adaptability and flexibility: an identity strategy, based on the integration between the concept of sustainable innovation with a nature-inspired approach, was defined.
A "new generation" of devices was conceived, by intersecting high LED technology with innovative complex morphologies, bio-inspired textures and organizations as well as structures taken by nature, with the aim to approximate the artificial dimension to the biological one.

The ultimate goal was to shift the perception of these systems from a "cold" and "technological" image toward a more natural one, more compatible and similar to man and to his biological nature.
The design concepts developed for the research project described below outline a new scenario of possible development paths characterized by a perspective of design for sustainability that intersects technological innovation and scientific evolution. In these "design concepts" nature was interpreted as a conceptual reference for designing systems that are more compatible with nature, but also as a communicative potential to sensitize the stakeholder on the environmental issues facilitating the assimilation of ethical messages. The nature is conceived, so, even as conceptual and communication tool to demonstrate an interest in issues of sustainability.
In this project, a bio-inspired design approach was applied though the adoption of a specific bio-inspired methodology particular called Hybrid Design Methodology [1] developed within the Hybrid Design Lab [2], a design lab dedicated to bio-mimetic design born in the Second University of Naples in 2006. In the Hybrid Design Lab the complex qualities drawn from biological world are transferred to the design of innovative products and services as a kind of "new genetic code". A code that can be extended from a single product to composite systems, defining new forms of relationships between production systems and user system.

3. Methodology and outcomes

The bio-inspired design methodology used in the project is an evolution of the "hybrid design methodology" geared to the specific characteristics of the LED lighting sector. The design process steps were:

1. analysis of the evolutionary scenario and trends;
2. definition the project brief as a list of "design problems" to compare with biological references. The issues identified were: modularity, light efficiency, reduction of environmental impact throughout the life cycle, energy efficiency, structural efficiency, lightness and reduction of materials, economic sustainability, adherence to the user requirements, adaptability to different contexts, aesthetic and formal quality;
3. check the solutions currently available, using the present scenario, the information coming from the state of the art but identifying the related limitations;
4. preparation of a list of biological systems in which it is possible to find answer to "life problems" similar to the "design problems";
5. interpretation of the nature model from a “design” point of view;
6. translation of the nature model into design concepts;
7. selection of the "hybrid concept “ more suitable to be developed;
8. development of the design and technical details.

The application of methodology allows to obtain a selection of strategies inspired by nature applicable in the field of LED streetlights. The strategies were:

- structural optimization;
- aggregation;
- modular;
- organization of space;
- organization of light;
- mimicry.

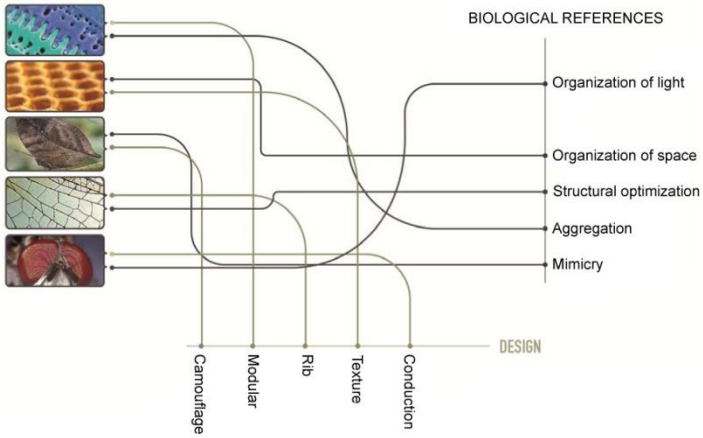


Fig. 2: References of the "Hybrid Design" approach specifically applied to the research.

Inside these strategies two families of design concepts were developed:
1. One's Parametric: this concept was based on the principle of modular organization in some biological structures like: the cobweb, the cells of a honeycomb structure of a leaf, the eye of an insect, the ribs that strengthen the wings of the dragonfly.
These all are the result of shapes repeated several times that creates a rhythmic composition and a modular organization that seems to be born to perform specific mechanical, physiological or optical needs. The texture present in many species of diatoms, for example, in the form of hierarchical holes on the shells is an interesting nature model as the structure of Amazonian Victoria leaf that seem to respond to the need of differentiation in terms of strength, flexibility and shape. This strategy was interpreted as an evolutionary response to the flow of specific forces on a surface.
2. One's Mehndi (Diatom top, Diatom01, Diatom0): these concepts are different versions of the same "type" inspired by the complex patterns of diatom shells. Diatoms are unicellular algae that have always been a great object of biological studies and research. Many species of diatoms exist in nature and the variety of shapes and ornamentations is very wide. These perforated patterns have in nature many motivations like filtering, structural optimization and lightness. In the design concepts this nature model was transferred to obtain heat dispersion, structural optimization and material reduction.

The founding principle of the project consists in a proposal of a minimal base model adapted to be inserted in both historical and contemporary contexts and in places with different "degrees of artificiality".
The new product collection includes some possible solutions inspired by textures of nature, which lighten the structure, in order to optimize the structure but also to dissipate the heat with a great advantage in terms of increasing the efficiency of the LEDs, thus of saving energy.
Textures can also be customized, according to the architectural character of the place of installation, to the trends changing and to the different aesthetic languages characterizing different cultures. For example, the propensity of Arab culture decorations to choose very complex patterns or Scandinavian preference for minimal morphologies.
The choice of materials and surface effects allow to choose different colours promoting the opportunities of integration in different contexts, according to a predetermined colour palette and the opportunity of customizing finishes and colour effects.



Fig. 3: Hybrid Design: One's Parametric luminaire concept developed for street light application.

4. Light source and optic

From the technological point of view, the growing efficiency of the Light Emitting Diode (LED) technology involves the possibility to use LED based luminaires in wider application fields. If from one side LEDs allow a greater efficiency, flexibility and longer life than traditional light source, on the other side their application presents new problems to take into account to guarantee their correct operation.
Comparing a traditional source luminaire vs. LED based luminaire, it can be noted the presence of some parts that specifically characterize LED luminaire type. In particular, in a LED based luminaire, there are components such as a heat sink, secondary lens, Printed Circuit Board (PCB), driver, etc… that are not usually considered in the design process of a present luminaire or they are present with different form or function: just considering the light source itself, the traditional luminaire was often assembled with a single light source of considerable size whereas LED based luminaire is characterized by an array of light source that can be approximated as "point sources".
Within this perspective it raises the necessity to a suitable approach for defining the behaviour of every single component as well as for the whole assembly, to analyse not only reciprocal relationship, but also the influence of environmental condition or the operating condition of the application field.
The main parts of a LED luminaire system that is hence necessary to consider can be summarized as:

- **LED**, as the light point source;

- **secondary optic**, that provides for optimizing and redirecting the luminous flux emitted by the source in precise directions;
- **heat sink**, that has the function to dissipate the heat power produced by the LED source;
- **power supply** and control system, that provide for electricity supply, flux control and system regulation under several operation conditions.

The Light Emitting Diode represents the core of the system and at the same time the most fragile element of a LED system as it acts as "basic point" for the choice and the design of all other components.
A LED is a chip of semiconducting material impregnated, or doped, with impurities to form a junction positive-negative (PN); the main feature of these devices is to allow current flow in one direction, as a normal diode, to which is added the ability to emit light.
The main characteristics of a LED can be summarized as reduced size (usually 5 x 5 mm), longer life time (greater than 50000 hours), higher efficiency (up to 160 lm/W or more [3]) and a high Colour Rendering Index (CRI) (greater than 90 for white light LED [4] [5]); these features allow to use the LED not only in retrofitting operation but, above all, to develop new and innovative products.
Considering a scenario where can be detected a market situation made of an impressive and massive LED sources availability, it is fundamental to correctly select the LED that fits the design targets and requirements necessary for each lighting application such as defined during the "design process" previously considered. Above all, the main aspects to consider for the choice of a LED light source can be summarized as:

- type and its field of application;
- efficiency;
- commercial availability;
- life time;
- luminous flux emitted;
- unit cost.

In the following table, the LED considered during all the phases of the research project have been reported with their main parameters.

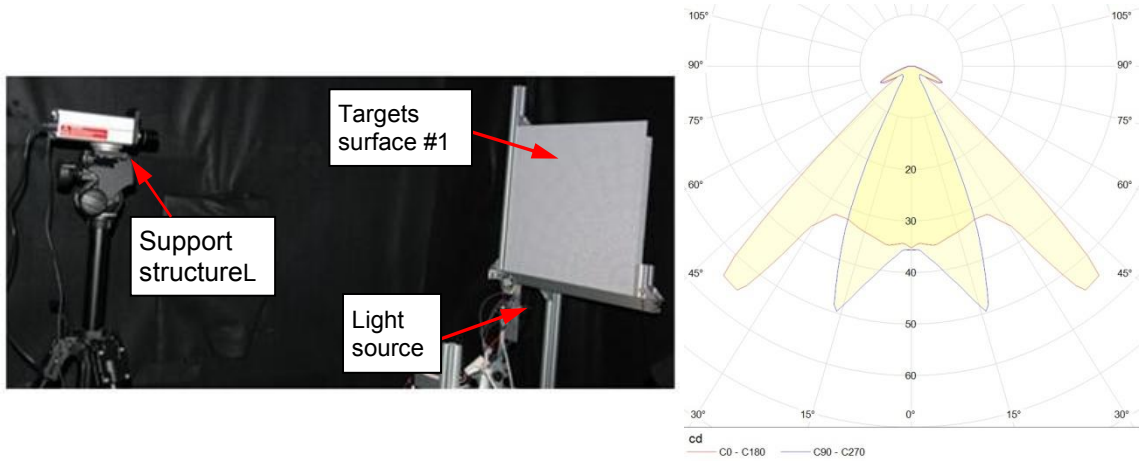
Manufacturer	Model	Color	CCT (K)			Flux (lm) @ 25 °C	Thermal resist. (°C/W)	Viewing angle (°)	LED junction temp. (°C)	Drive current typ. @25°C (mA)	Drive voltage typ. @25°C (V)
			Min	Typ.	Max						
Cree	XLamp XB-D	Warm white	2600		6200	114	6.5	115	150	350	3.2
Cree	XLamp XP-E	Warm white	2600		3700	87.4	9	115	150	350	3.05
Edixeon	KLC8 series	Warm white	2670		3800	45	10	140	125	350	3.2
Edixeon	K series	Cool white	5000		10000	140	8	120	125	700	3.5
Edixeon	ARC series	Warm white	2670		3800	60	13	130	125	350	3.5
Osram	Golden Dragon Plus	White				71÷150	11	170	125	350	3.2
Seoul Semicon.	Acriche	White		3000		180 (@ 110V)	7	130	125	20	220
Getian	High Power LED	Warm White	2700	3000	3300	1250		115		1400	16
Getian	High Power LED	Warm White	2700	3000	3300	3250		115		3200	16
Getian	High Power LED	Cold White	6000	6500	7000	6500		115		3200	33

Tab. 1: Main parameters characterizing selected LED.

Another aspect that has been evaluated during the development of the LED luminaire for the specific road lighting application, is the application of existing regulations and standards; in this field many technical standards claim for the enhancement of the vision quality and the reduction of light pollution. Thus, it rose up the need to integrate a lens system able to provide for the necessary photometry to optimize the luminaire and adapt it to the specific requirements.
This "secondary optic" is mainly divided into two types:

- **Total Internal Reflection** (TIR) lens; they are constituted by a full body, realized using polymer with a high transmission factor of the light, with a characteristic shape of a revolution paraboloid with central emptying. The area without material along the central axis has the function of directing the high intensity radiation of the central portion of the photometric solid. The area with material works by exploiting the phenomenon of total internal reflection to redirect the light; each reflection involves minimal absorption that must be adequately considered to reach a high luminous efficiency;
- **Reflector** lens; they are built using polycarbonate with a high thermal resistance and with an internal surface treated with burnished aluminium oxide in order to achieve the higher reflectance. At any reflection, a light absorption greater than the TIR lens occurs but, between two reflections the light runs through an empty space with negligible absorption; therefore only a little difference in efficiency is observed comparing TIR and Reflector lens. Nevertheless, the reflector lenses offer a lesser control of the radiation; a part of the light rays are emitted directly (without modification), causing an expansion of the beam.

For application where a carefull control of the luminous beam is required, such as road light application, a new type of secondary optics have been developed, called “free-form”. The free-form lens can be classified as a TIR lens, and its importance is related to the possibility to accurately design its internal and external shape for precisely controlling of the light beam of LED source.
In our design application, the use of free-form lens has been considered within the design of lighting fixtures to achieve the desired photometry as well to improve the optical efficiency; ie. it is important not only to consider the efficiency of the apparatus in terms of how much light is emitted from but also how much light effectively illuminate the task area.
Presently, on the market are available many lenses type for different application fields and LED source; each manufacturer makes available all necessary information for a correct selection of a lens for a specific application.
For our process, the design of the correct lens type for a specific application, has been made by a suitable selection among those commercially available; whereas the lens adopted has not been defined by a photometric point of view, a laboratory measurement where carried out by a simplified system set up at the Built Environment Control Lab of Department of Architecture and Industrial Design of Second University of Naples, for the photometric characterization of LED based sources. The facility is provided with photometric bench within a dark room, equipped with both traditional luminance meter and videoluminancemeter (LMK) that acquires luminance map of a suitable target upon which falls the luminous flux emitted by the LED and LED & lens system under consideration.



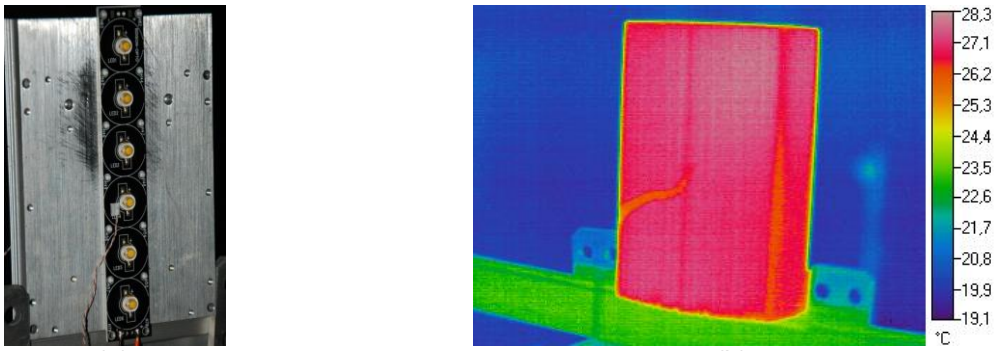
(a) (b)

Fig. 4: Facility layout (a) and candlepower distribution of LED Cree XP-E equipped with a free-form lens for street lighting (b).

5. Thermal management

Considering the working principles of a LED, it can be seen that about the 70% of the power supplied is converted into heat and that its life time and efficiency strongly depends from the operation temperature of the p-n junction; the major cause of failures in LED devices is due to improper thermal management. For this reason, the thermal management of a LED system assumes a critical aspect in the LED system design process and represents a topic ("heat sink" design) for many researches.

For the optimization of the system LED & Heat sink, a preliminary simulation tool able to identify the maximum thermal resistance value for the heat sink, with a predefined junction temperature, has been developed. The value of the maximum thermal resistance, so calculated, was used as input value into the catalogues of different manufacturers for the choice of the optimal heat exchanger, in terms of the total size, shape and characteristics of the fins.
To analyze the thermal behaviour of the LED & Heat sink considered, laboratory measurements were carried out using some T-type thermocouples, for different point acquisition, and an infrared thermal imager [6], for the characterization of the temperature distribution on the surface of the LED system. Various combinations (optimized and not optimized) of light sources and heat sinks have been considered and tested; for each combination the experimental junction temperature values have been compared with those simulated.
Before starting the thermal acquisition it has been checked that the system achieved electrical and thermal stabilization. Figure 5a shows an example of the LED system investigated and figure 5b shows a typical thermal acquisition.



(a) (b)

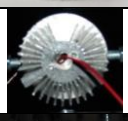
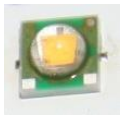
Fig. 5: Coupling of LED & Heat sink investigated (a) and its thermography (b).

For the present design project, the cheapest solution for a correct thermal management of a LED system for road application was considered: a fin aluminium heat sink that exploits natural convection heat transfer.
The choice of the heat exchanger type was made based on two considerations. The first consideration originates from a market research, the second one from the study of the datasheets and the catalogues of heat sinks manufacturers.
The market analysis was aimed to define some manufacturers of heat sinks and to analyse characteristics used in competitor devices for road applications.
The survey gave indication about the shape, material, fin type and surface finishing; the research results indicate, as the most used for road luminaires, the aluminium heat sink with straight fins and surface of anodised natural colour.
The study of the datasheets and the catalogues of heat sinks manufacturers gave information about the size, the shape, the thermal power dissipated and the efficiency of the products available on the market.
In the table 2 are listed some of the combinations investigated with indication of the type, thermal resistance and characteristics of the heat sink and the LED light source coupled; for each combination, the junction temperature has been evaluated and reported.

6. Field test

The last step of the design process is the photometrical characterization of the luminaire to know how the light is emitted: it represents a crucial aspect of the development of the luminaire. The luminous intensity distribution measurement is very important also to verify the data obtained through simulation during different design steps or to evaluate the effectiveness of a design choice.
The presence of a protection glass, the assembly process or other parts essential for mechanical or protection reasons can modify the original photometry of light source. Therefore, it is fundamental to measure the luminous intensity distribution of the whole luminaire; to this aim, a "test room" was prepared as showed in figure 6, where has been reported a picture of the experimental apparatus realised for the evaluation of the luminous distribution of luminaire.
Marks were placed on the room floor defining a "reference system" to use for measurements. The light source was placed at 3.5 m from the floor to respect the hypothesis of considering the light luminaire as a "point source" from all marks; a modular structure was used for supporting the luminaire and for aligning it to the reference system.

The luminous intensity distribution is simply calculated applying the "inverse square law" starting from the illuminance measurements in correspondence of the marks; the illuminance values have been gathered using a multi-heads luxmeter (Konica Minolta, Illuminance Meter T10).

LED system	Heat sink	R (° C/W)	WxLxh (mm)	Fin thickness (mm)	Pitch (mm)	LED source	T_J (°C)
System 1		1.4	150x95x40	B = 3 b = 2	variable		79.9
System 2		1.5	150x110x40	1.5	4		52.9
System 3		5.9	34x54(diam.)	a1 = 1 a2 = 5	3		55.6
System 4		2.0	170x40x35	2	7		58.4

Tab. 2: List of some combination LED & Heat sink analyzed.

During photometric measurements, also temperature values and electrical parameters have been acquired and stored to have a full knowledge of operation condition. A luminaire commercially available was used to calibrate the experimental apparatus, comparing experimental data with luminous intensity distribution provided by manufacturer.

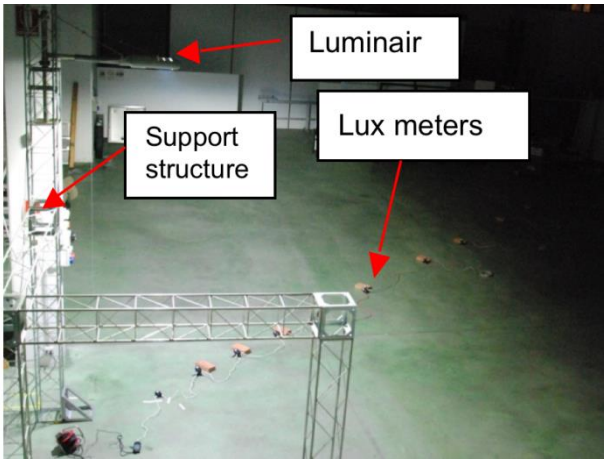


Fig. 6: Facility layout for photometrical characterization of luminaire.

Knowing the geometrical position of each mark respect to the light source and the illuminance value on them, the luminous intensity distribution and the luminous flux of the luminaire have been obtained; from experimental data, a EULUMDAT file can be created by a suitable software [7]. EULUMDAT file is a standardized file format utilized to provide information about photometric distribution and power supply of a light source and to exchange those information among simulation software.
The EULUMDAT files, obtained for the luminaires considered, has been then used in a lighting simulation software [8] to evaluate the respect of the performance requirements and to compare various lighting solution and different luminaires.

7. Conclusion

In the present paper, the issues related to the development of a LED based luminaire in exterior lighting application have been faced. In order to understand the behaviour of a LED system, the specific aspects of this technology have been analyzed and their relationships have been taken into account, while to the aim to increase the overall efficiency, the "design approach" has treated the LED system as an "unique" device with different parts and contributions interacting each other.

The analysis of the LED-based luminaires available on the market and some case studies has been developed showing a prevailing aesthetic uniformity in terms of design and LEDs geometrical organization.
In this research a "new generation" of devices was proposed, by intersecting high LED technology with innovative complex morphologies, bio-inspired textures and organizations and structures taken by nature, with the aim to approximate the artificial dimension to the biological one.
From technological point of view, the main components of a LED system have been identified and analyzed.
The LEDs as light source have been analyzed and their main characteristics, compared with traditional light sources, have been summarized as well as the main aspects to consider for the correct selection of a LED source for a specific application field, have been suggested and listed.
In order to achieve the desired photometry as well to improve the optical efficiency, the different type of secondary optics have been examined and a simplified system has been set up and used for the photometric characterization of LED based sources.
To understand the thermal behaviour of a LED system, a preliminary simulation tool has been developed and several experimental acquisitions have been performed to know the punctual temperature values and its distribution on the surface of various combinations LED & Heat sink. For the present work, a fin aluminium heat sink that exploits natural convection heat transfer as cheapest solution for a correct thermal management of a LED system for road application, has been considered.
Finally, an experimental facility has been used in order to measure the luminous intensity distribution of the luminaires developed. From the experimental data, the EULUMDAT files have been derived and a lighting simulation program has been used to evaluate the respect of the performance requirements and to compare various lighting solution and different luminaires.

Acknowledgement
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References

[1] LANGELLA, Carla. *Hybrid design. Progettare tra tecnologia e natura*. Milano: Francoangeli, 2007.

[2] Referring Web Pages Web: www.hybriddesignlab.unina2.it.

[3] Referring Web Pages Web: http://www.cree.com/LED-Components-and-Modules/Products/XLamp/Discrete-Directional/XLamp-XPG2.

[4] Referring Web Pages Web: http://www.cree.com/LED-Components-and-Modules/Products/XLamp/Discrete-Directional/XLamp-XPG.

[5] Referring Web Pages Web: http://www.osram-os.com/osram_os/en/products/product- catalog/leds-for-general-lighting/oslon-square/lcw-cqar.cc/index.jsp.

[6] NEC - Thermo Tracer TH7102WL.

[7] Acuity brands: Visual photometric tool.

[8] DIALux 4.12.

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Photometric Measurement for LED Based Sources

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Abstract
The utilization of SSL (Solid State Lighting), better known as LED, in internal and external application of lighting and displays is becoming nowadays more important. Their utilization is growing as an alternative to more traditional technologies due to their tangible features such as luminous efficacy comparable to the traditional compact fluorescent or HPS lamps, possibility to use CC forward current, wide opportunity to integrate renewable FV systems and operate in a way to ensure "smart" control and management operations to reduce energy consumption.
In this paper is presented a simplified system set up at the Built Environment Control Lab of Department of Architecture and Industrial Design of Seconda Università di Napoli, for the photometric characterization of LED based sources. The facility is provided with photometric bench within a dark room equipped with both traditional luminance meter and videoluminancemeter (LMK) that acquires luminance map of a suitable target upon which falls the luminous flux emitted by the LED and LED & lens system under consideration. Starting from luminance map (ie. luminance of each pixel of CCD matrix), target reflectance and considering the application of cosine square law for a point source, it can be easy derived the luminous intensity distribution of the source considered.
The methodology developed has been checked vs. a set of led and lens assembling system commercially available, giving useful information on the reliability and accuracy of results.

Keywords: LED, Videoluminancemeter, Luminous intensity evaluation, Luminous flux evaluation, Luminance map acquisition

1. Introduction

In the lighting field, the photometry of a light source represents the starting point for an accurate lighting system design. Without this information it is not possible to know how the light is emitted into the space, if a light source can be utilized in an application or compare two lighting design solution.
With this purpose, during years different instruments and apparatus have been developed and standardized to allow the quantification of the luminous intensity distribution and the luminous flux of light sources [1, 2, 3].
With the growing use of Solid State Lighting as light source, it becomes more and more important to characterize the whole system, light source and fixture, than the single source. This leads to a greater use of the goniophotometer respect to the photometer spheres but, the advantage in the use of goniophotometric measurements contrast with its maintenance and purchase costs.
To have the possibility to conduct photometric characterization of a LED based luminaire during all phases of its development, a simplified and less expensive system at the Built Environment Control Lab of Department of Architecture and Industrial Design of Seconda Università di Napoli has been developed and set up.

2. Aim of the work

The growing interest in energy saving and environmental pollution has affected all fields of technology. A lot of researchers, both in industrial and scientific fields are working to develop products more efficient or management strategies that permit to reduce the use of fossil fuel. In lighting field, the development of Solid State Lighting (SSL) has provided light sources more flexible than traditional, with higher efficiency and longer life. However, to maximize the performance and the efficiency of a Light Emitting Diode (LED) based luminaire, the knowledge of its luminous intensity distribution is fundamental.

To this aim, at Department of Architecture and Industrial Design "Luigi Vanvitelli", an experimental simplified apparatus for evaluating the photometry of LED or LED and lens systems has been set up. In this paper, the experimental facility and the methodology are described. The luminance values of some targets have been acquired, , using a videoluminancemeter and a traditional luminance meter and then the measurements have been compared. Taken into account the definition of luminance, it is possible notice that its value depends by direction between target and sensor and then by their relative position. In order to make independent the acquired luminance values from this parameter, the videoluminancemeter and the traditional luminance meter have been arranged in the same geometrical position respect to the targets. Finally, the experimental luminous intensity distribution and the experimental luminous flux have been compared with light source manufacturer data to estimate the reliability and the accuracy of the methodology.

3. Experimental set-up

A schematic view of the set-up is shown in Fig. 1. The system consist of a dark room, a supporting structure, a light source, a DC power supply, a Peltier cell, an heat sink, a data acquisition unit, a videoluminancemeter and two surfaces with targets.

The light source under consideration (a) is placed on and thermally connected to a Peltier cell (b) and all is fixed to a supporting plate (c) and an heat sink (d). Using the Peltier cell is possible make stable the junction temperature while the heat sink provides for heat dissipation. Through the supporting plate the light source is fixed to the supporting structure whereas the DC power supply (C) powers the LED and the Peltier cell.

The supporting structure (D) is a modular structure realized using aluminium profiles with which is possible to define easily the relative position of the light sources, the targets and the sensors; the structure is lean on a desk, it is used to keep the light source, the target surfaces, the instrumentations and all that is necessary for measurements.

The luminous flux emitted by light source falls upon the surfaces with targets (B) creating a luminance map; using a luminance meter (A) the luminance values are captured.

The targets have been realized upon the surface of a white cardboard. The C-γ reference system and a pitch of 10° for C planes and 5° for γ angles have been considered to identify the position of the targets on white cardboard; in correspondence of the targets, the luminance values have been measured. White cardboard permits to have appropriate and uniform photometrical characteristics for all measurement points.

In the present set-up two surfaces with targets have been used: targets surface #1 has been placed in vertical position in front of the light source at a distance of 0.50 m from the source and targets surface #2 (it also in vertical position) has been placed on the side of the light source, at a distance of 0.50 m from the source and orthogonal to targets surface #1.

The luminance meter (a traditional luminance meter or a videoluminancemeter) is placed on a professional photographic tripod equipped with a head that offer a precise movement in 3 directions; in this way, it is possible to vary the height and align the sensor to the cardboards.

In order to reduce as much as possible the external and the stray light and to control the environmental temperature value, all the facility described has been placed inside a dark room equipped with an air-conditioning system. The dark room has been realized inside a box 3.0 m x 3.0 m (plan) x 3.0 m (height) whose walls have been coated with black textile attached to a rigid trestle.

Finally, current and voltage supply of LED and Peltier cell and temperature values have been acquired and stored using a multi-meter FLUKE NetDAQ 2640A.

Thermocouples T-type (accuracy ±1 °C) have been used to measure temperature values in five different points of the systems: two (T1 and T2) have been placed on the surface of the PCB as close as possible the LED source, one (T3) on the surface of Peltier cell, PCB side, one (T4) on the other surface of Peltier cell and last one (T5), for environmental temperature, in proximity of light source.

The evaluation of the luminous intensity distribution, in direction α, is evaluated considering the light source as a point source and the surface of cardboard as Lambertian, by the equation:

$$I_\alpha = \frac{\pi \cdot L_\alpha \cdot d^2}{\rho \cdot \cos(\alpha)} \quad (1)$$

where I_α is the luminous intensity value, L_α is the luminance value of the measuring point (target in direction α), d is the distance between light source and measuring point, ρ is the reflectance value of the surfaces with targets and α is the angle between the normal to the measuring point surface and the direction of the incident light.

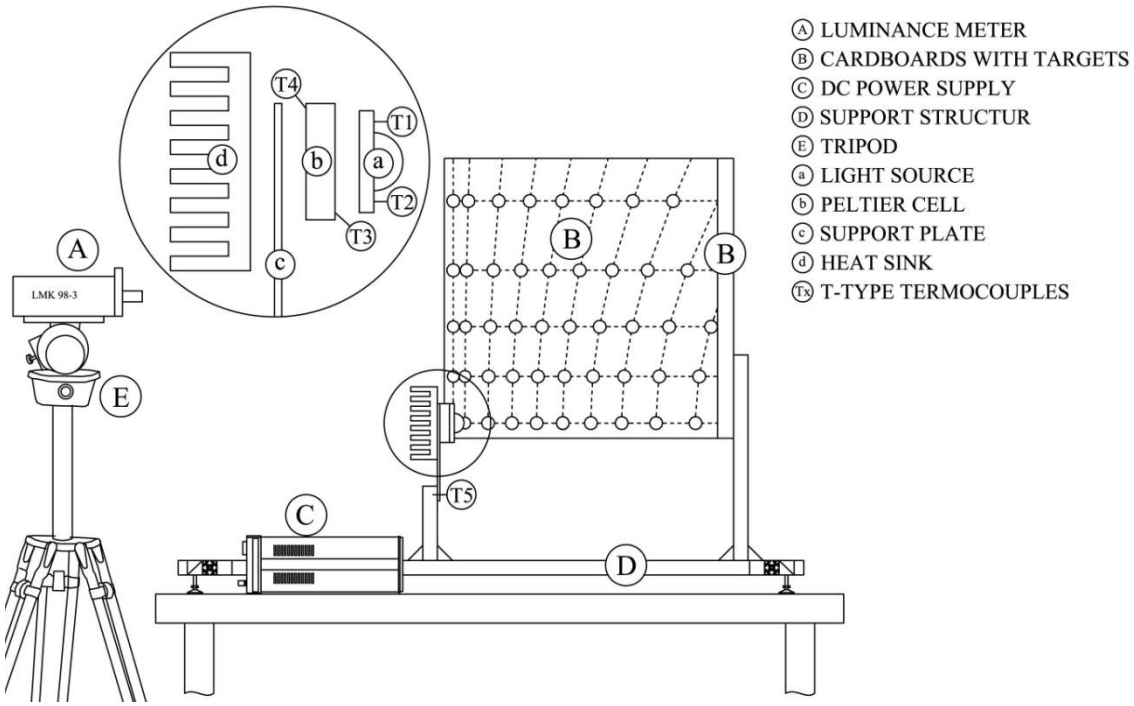


Fig. 1: Schematic view of the experimental set-up.

4. Metodology

The methodology developed is based on the so called “indirect measurement”. Indeed, differently from the direct measurement, the luminous intensity distribution is not calculated directly from the measurement of illuminance value at a definite distance and direction from the light source, but the illuminance values are derived from luminance values acquired on a diffusely reflective surface placed in the path of light. To can consider the light source as point source with a negligible error, the diffusely reflective surface has been positioned in the far field.
The methodology proposed starts from the photometrical characterization of the surface upon which the light emitted by light source analyzed falls, the geometrical definition of the relative position among the light source, the videoluminancemeter and the targets, and through the acquisition of the luminance values in correspondence of the targets, the luminous intensity distribution is calculated using equation (1).The photometric characteristics (reflectance) of the two cardboards, have been measured with a spectrophotometer Konica Minolta 2600d considering three survey points for each cardboard; the results of measurements are reported in Table 1.
The measurements allowed to evaluate the reflectance values considering different type of illuminant and the specular component included (SCI) or excluded (SCE).
As it can be seen from the table 1, a very small difference between reflectance values obtained considering or not the specular component, for different points and different illuminants has been observed. As previously said, in this paper the cardboards surface (and then targets surface) has been approximated to a Lambertian surface. As a consequence of this hypothesis, the reflectance can be considered constant in all direction and thereby the luminance value acquired on a target is the same regardless of viewing angle.

		Illuminant A		Illuminant D50		Illuminant D65	
	Measuring point	ρ (SCI)	ρ (SCE)	ρ (SCI)	ρ (SCE)	ρ (SCI)	ρ (SCE)
Target surface #1	1	72.17	71.94	71.99	71.78	72.17	71.95
	2	72.30	72.06	72.51	72.29	72.65	72.43
	3	72.35	72.11	72.56	72.33	72.52	72.32
Target surface #2	1	71.46	71.24	72.19	71.96	72.08	71.86
	2	72.28	72.05	72.32	72.11	72.58	72.37
	3	72.03	71.79	72.49	72.27	72.70	72.49
Mean reflectance		72.10	71.87	72.34	72.12	72.45	72.24
Overall mean reflectance		**72.19**					

Table 1: Reflectance values for cardboard used to realize the target surfaces.

This results permit to consider, for the use of equation (1), an overall mean reflectance value of 72.19 % for all targets.
Using a videoluminancemeter is possible to capture, at the same time, the luminance values for all points of the target surface; while, using a traditional luminance meter, it is possible to acquire only the luminance value of a point at a time.
The figure 2 show a typical luminance picture of the light source photometry upon white cardboard acquired with the videoluminancemeter [4]. Luminance data measured can be stored as a colours map, where different colours correspond to different luminance value, or in table form, where each pixel of picture is coupled with a luminance value; luminance value are expressed, for both colours map and table form, in cd/m^2.
The measurement points, employed to obtain the luminous intensity distribution, are marked with rings on the surface of cardboards. For each measurement point (target), the luminous value is deduced as the mean value of luminance values of the white cardboard surface enclosed inside the ring.

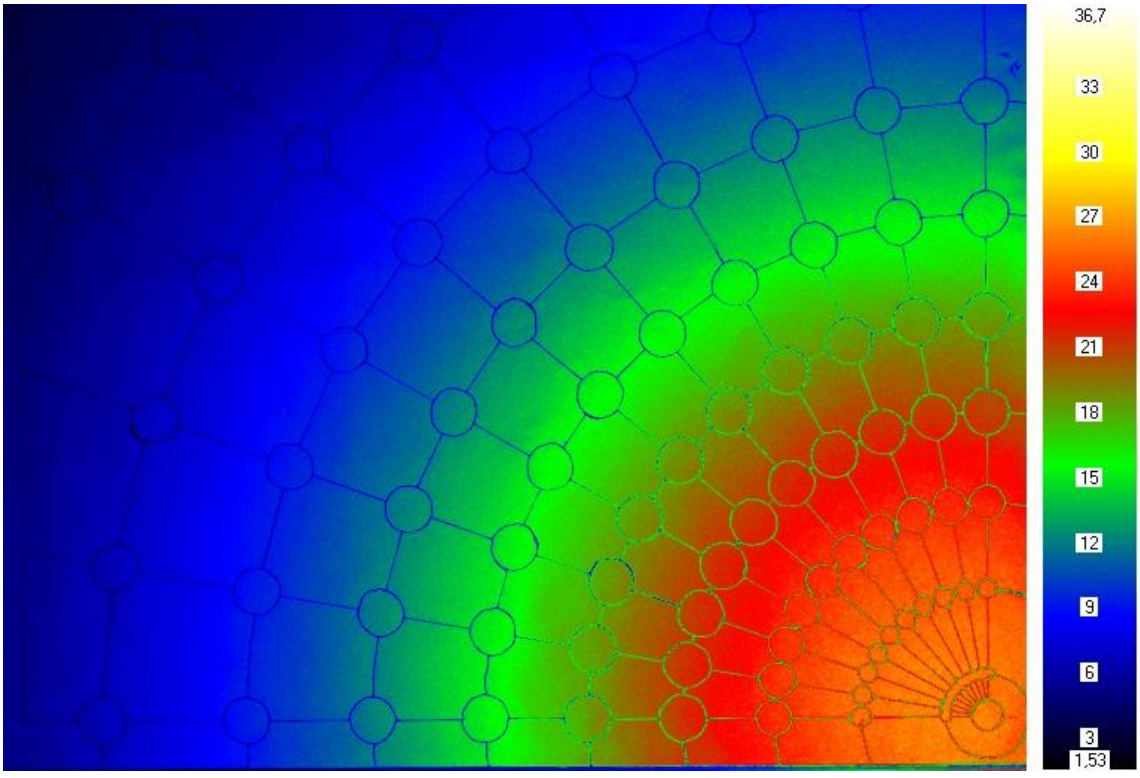


Fig. 2: Typical luminance colours map for targets surface #1 (in front of the light source).

4.1 Videoluminancemeter acquisition vs. traditional luminance meter acquisition

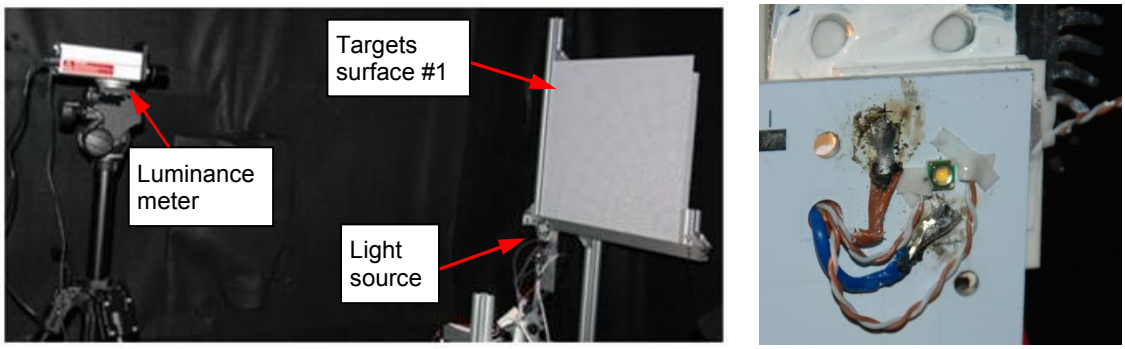
As described earlier, the measurement of the luminance value represents the critical aspect for the determination of the luminous intensity distribution of the light source analyzed.
In order to have a better information about luminance values, for some measurement points, the luminance has been detected with both the videoluminancemeter (LMK) [4], equipped with a TT25 lens (focal length: 25 mm, f_1' = 2.7%, accuracy = ±4.7%) and the traditional luminance meter (LS110) [5] (acceptance angle = 1/3°, accuracy = ±2%, ±1 digit of measured value); the luminance values on the targets have been acquired posing, one at a time, the two instruments in the same position and keeping constant the light source power supply conditions and the temperature inside the dark room.
The difference among the luminance values evaluated with the two instruments has been compared in terms of percentage differences and, in function of the C-planes and the γ–angles that identify the measurement points taken into account, the results are reported in table 2.
According to the data in table 2, it can be noticed that the percentage difference presented among the LMK and the LS110 values of luminance ranges from –1.65% to –5.71%; taking into account that the percentage differences reported in table 2 are negative, it can be stated that the LMK luminance are always lower than the LS110 luminance.
The maximum difference has beencalculated: on targets surface #1 for the measurement point C40-γ42.5 (LMK luminance value is 7.44 cd/m^2, LS110 luminance value is 7.76 cd/m^2 and a percentage difference of -4.16%) and on targets surface #2 for the measurement point C70-γ47.5 (LMK luminance value is 5.66 cd/m^2, LS110 luminance value is 6.00 cd/m^2 and a percentage difference of -5.71%).

Percentage difference of luminance values acquired								
Targets surface #1					Targets surface #2			
	C0	C40	C50	C80		C60	C70	C80
γ 0°	-3.69 %	-3.69 %	-3.69 %	-3.69 %	γ 47.5°		-5.71 %	-1.65 %
γ 17.5°	-3.75 %	-2.89 %	-2.99 %	-2.72 %	γ 52.5°	-1.95 %		
γ 27.5°	-3.59 %	-1.66 %	-3.50 %	-1.89 %	γ 62.5°		-2.48 %	-2.25 %
γ 42.5°	-2.79 %	-4.16 %	-3.44 %	-2.33 %	γ 67.5°	-2.43 %		
					γ 77.5°	-3.69 %	-4.08 %	-3.67 %

Table 2: Percentage difference of luminance value acquired with the videoluminancemeter (LMK) [4] and the traditional luminance meter (LS110) [5].

4.2 Methodology developed

In the first step of the methodology, all parts of the facility have been placed inside the dark room on their supporting systems, their relative position have been checked and their alignment has been verified.
The second step of the methodology covers the acquisition of the luminance values of all targets marked upon the surface of the two white cardboards by the videoluminancemeter (LMK) equipped with the TT25 lens. Before starting the acquisition it has been checked that the light source achieved electrical and thermal stabilization [6]. The luminance map acquired have been processed using the LMK management software to obtain the luminance mean value for each target.
In the third step, the photometrical values (luminous intensity and luminous flux) have been deduced. The luminance values deduced in the second step and the geometrical data about the position of each target have been used in the equation (eq. 1) to evaluate the luminous intensity in different directions.
According to its definition, the luminous flux in a direction can be calculated as the product of the luminous intensity and the solid angle centred in this direction; the total luminous flux will be obtained as the sum of all the luminous flux calculated for all direction. In this study, it was supposed that all light emitted by light source falls on a imaginary single half-sphere (where the source is located at the origin) and it was chosen to branch the half-sphere into 648 zones enclosed by the lines ΔC=10° and $\Delta\gamma$=5° from which the solid angle was derived; the luminous intensity values have been measured in the middle of such zones.
In figure 3a is showed the layout of the experimental facility with the relative position of the luminance meter, the targets surface #1 and the light source, while in figure 3b is showed a detail of the light source equipped with its PCB, the electric cables, the thermocouples, the Peltier cell and the supporting plate.



(a) (b)

Fig. 3: Facility layout (a) and a detail of the light source (b).

5. Results and discussion

To get information on the reliability and accuracy of the methodology, the experimental results have been compared with data made available by the manufacturer in terms of luminous intensity distribution and total luminous flux.

To calibrate the facility and the methodology a led X-Lamp XP-E [7] (luminous flux: 35.409 lm and input wattage: 0.3 W) made by Cree has been used as light source. The experimental results were obtained considering: a power supply of 0.3 W, a forward current of 105 mA, a junction temperature of 25 °C and a dark room temperature of 21 °C; all electrical and thermal parameters have been acquire and stored for all duration of the test.

In the figure 4 the experimental (continuous line) and manufacturer (dashed line) luminous intensity distributions are plotted for three C-planes, C0, C70 and C90; C70 represent the plan on which the maximum experimental value of the luminous intensity has been detected.

In particular figure 4 show :

- a different distribution for experimental and manufacturer luminous intensity highlighting that the manufacturer data display a distribution almost identical for the three C-planes considered, while the experimental data exhibit a distribution as a function of both the target position (γ-angle) and of the C-plane considered;
- a good agreement between experimental and manufacturer data for γ-angles between 0° and 30°, where the percentage difference ranges from 2.77% to -5.50% and for γ-angles between 60° and 80°, where the percentage difference ranges from 6.67% to -4.79%;
- for γ-angles between 30° and 60°, the experimental data are lower than manufacturer data with a percentage difference ranging from -4.56% to -18.52%;
- the experimental data are generally lower than that declared by manufacturer.

Comparing the value of the total flux of Φ=31.487 lm, derived from the experimental luminous intensity distribution, with the value declared by manufacturer Φ=35.409 lm, it can be derived a percentage difference of -11%.

6. Conclusion

In this paper a simplified methodology, developed and set-up at the Built Environment Control Lab of Department of Architecture and Industrial Design of Seconda Università di Napoli, has been described and information on the reliability and accuracy of its results have been obtained.

Information about the photometric characteristic of the targets surfaces have been evaluated using a spectrophotometer. The measurements show a very little difference in reflectance values; consequently, an overall mean reflectance value of 72.19 % was considered for all targets.

In order to have a better information about luminance values, the luminance values for some targets using two instruments, the videoluminancemeter [4] and the traditional luminance meter [5], have been investigated. It can be notice that percentage difference ranges from –1.65% to –5.71%; it is always negative underlining that values acquired with the videoluminancemeter [4] are lower than those acquired with the traditional luminance meter [5].

Information about reliability and accuracy of the methodology have been extracted using a single LED as light source and comparing experimental data with data made available by the manufacturer. Differences have been observed in terms of both shape and absolute values of the luminous intensity

distribution. Measurements highlight that the percentage difference vary at varying of the position of target; a maximum percentage difference of -18.52% was found.
Finally, for the total luminous flux calculated from experimental data and that declared from manufacturer, a percentage difference of -11% has been evaluated.

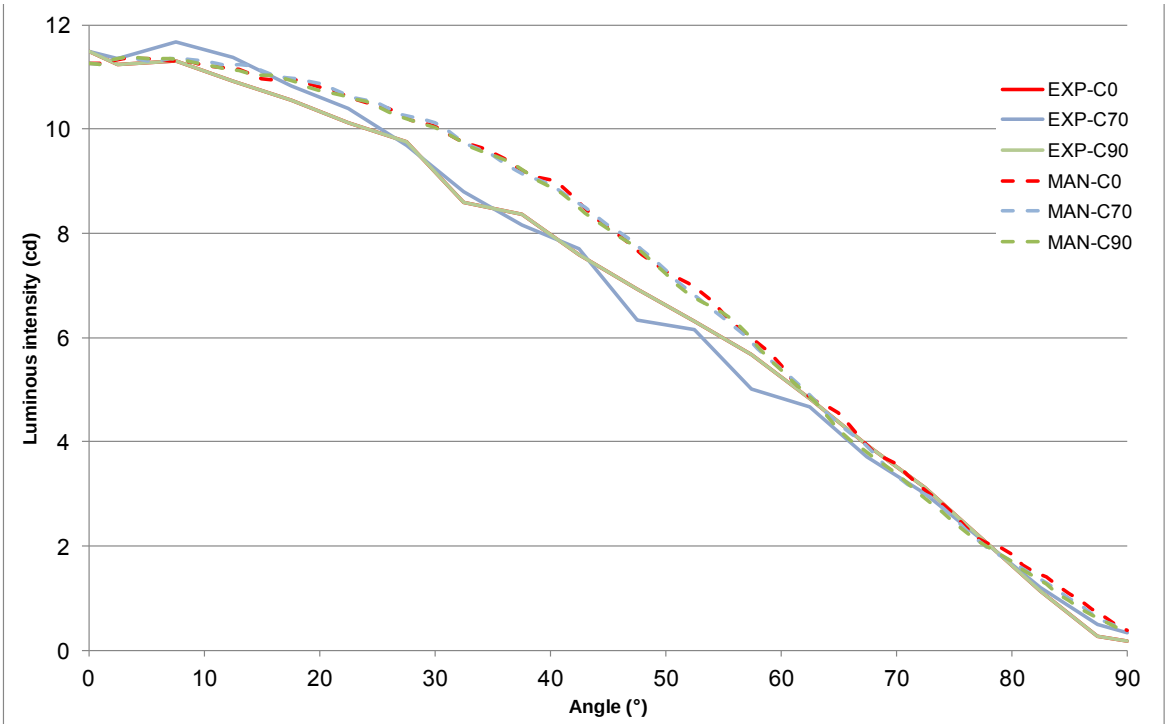


Fig. 4: Cartesian luminous intensity distribution for C0, C90 and for C70 (plane of I_{max}).

Bibliographical References

[1] CIE, Publication n.70: The measurement of absolute luminous intensity distribution, 1987.

[2] CIE, Publication n. 84: The measurement of luminous flux, 1989.

[3] CIE, CIE 121-1996: The photometry and goniophotometry of luminaires, 1996.

[4] Techno Team, Luminance and color measuring camera LMK 98-3 Color.

[5] Konica Minolta, Luminance Meter LS110.

[6] UNI 11356-2010: Protocol for the measurement of LED luminaires photometric data.

[7] Referring Web Pages Web: http://www.cree.com/LED-Components-and-Modules/Products/XLamp/Discrete-Directional/XLamp-XPE.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Applications of Augmented Reality to understand an archaeological site: problems and future development.

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Abstract

To understand heritage plays a key role in the experience of visitors and it becomes critical when sites are partially buried or in ruins. To understand an archaeological site we have to reduce the communication gap linked to archaeological finds, giving to visitors all additional information to decode the sign. One way is to merge the real and virtual word together using AR applications.
We present the results of our experimental research about mobile Augmented Reality (AR) applications for the ancient site of Cuma.
This paper resumes recent advances in AR and shows some of the problems linked to the right collimation between the real world and 3D models. We have analyzed some different merging techniques in particular we compared the techniques that are based on the use of markers (QR code) and more complex ones based on the recognition of the site's geometry, markerless.
We have tested AR technology using an *open source* software that allows us to mixed real word to digital word, we have activated our channel and we have created a link to MatchMed, the database that we have developed in our research. Scanning some different QR codes we can: link directly to MatchMed, active the channel and see the labels at geo-located Points Of Interest, POIs, that give us access to all the information contained in MatchMed or start up the 360° navigation in the rebuilt temple which overlay visible reality by the devices' webcam of tablet or smartphone.

Keywords: Augmented Reality, Virtual Archaeology, 3d Modeling, 3d Database, ICT.

1. AR Applications to understand an archaeological site

To understand heritage plays a key role in the experience of visitors and it becomes critical when sites are partially buried or in ruins. To understand an archaeological site we have to reduce the communication gap linked to archaeological finds, giving to visitors all additional information to decode the sign. One way is to merge the real and virtual word together through AR applications. The most applications can be placed in the field of so-called Mixed Reality (MR), in the scale that goes from the Real Environment (RE) through Augmented Reality (AR), Augmented Virtuality (AV) to a full Virtual Environment (VE) [1].
Recent advances in AR technology let us to overlay virtual content, such as labels, images or 3D models, directly onto the video feed with the correct position and perspective using the localization tools of smartphone or tablet such us the map or GPS or some others systems.
There are a lot of very interesting applications for art, history and in particular for archaeology.
ARCHEOGUIDE is the first Augmented Reality Guide for Archaeological Sites, it is an application that includes the use of portable devices capable of providing guided tours with audiovisual information and limited interaction. It can be considered the first experimentation that uses outdoor tracking, mobile computing, 3D visualization, and augmented reality techniques to enhance information, presentation, reconstruct ruined sites, and simulate ancient life [2].

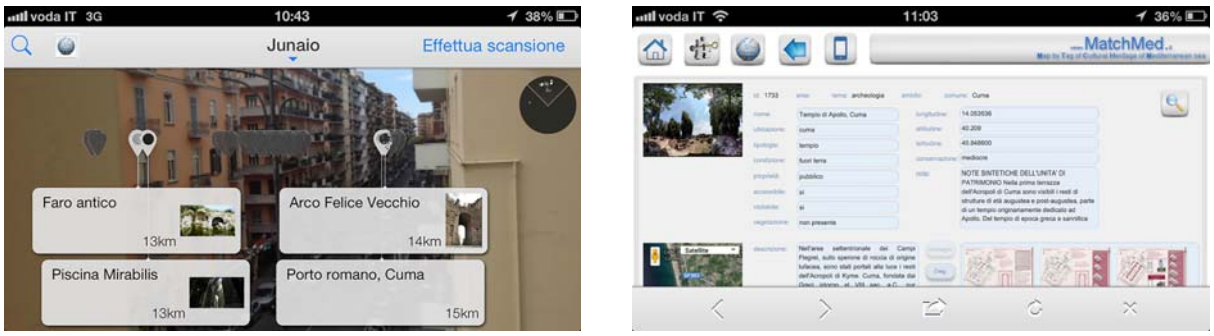

Fig. 1: AR application based on the use of POIs and the access to our database MatchMed. PRIN 2009, research group led by A. di Luggo, Napoli Federico II.

Actually, tanks to the advances in ICT and AR technology, we can choose between a lot of Augmented Reality systems that allow to give some additional information during the visit in archaeological site.
There are a lot of AR browsers that allow to unlock digital information from places, products and sights around the viewer, to visualize information in a completely new way. Now even non-developers can create their own Augmented Reality "channels", a drag-and-drop and easy-to-use content management system for AR. These systems combine GPS, image recognition, visual search and a robust cloud-based architecture to recognize and attach digital information to nearly any object or environment in real-time. In order to make possible the creation of augmented elements into the real world, devices can use one or more of the following technologies: optical sensors, accelerometers and gyroscopes, GPS, solid state compasses, RFID and wireless sensors.
There are some different AR applications that help to bridge the gap between recreation, education, and scientific research in archeology linking augmented components into the real world. The easiest application and the most common is based on the use of the augmented geolocated view. In a geolocated view, the augmented reality system uses the GPS, accelerometers, gyroscopes and compasses in order to place a lot of POIs, Point Of Interests, according to the user´s location and direction. Once all the data received from this hardware are analyzed, the output will be used to place some POIs on the screen. Using POIs we can design a specific communication project or access to a database where there are all information about an archaeological site. Using this system we can visualize text information, multimedia documents such as PDF and videos or simple images.
Another kind of augmented reality system is based on the use of the optical sensors to "catch" what is happening in the environment, analyzes the input information and overlays the augmented information over the real physic world. We can overlay images, texts or add interactive 3-D content to the real scene. We think that the most interesting application for the archaeology are all the applications that allow to visualize the reconstructive hypothesis overlapping on the existing findings during the real visit, thus our goal is to choose the best way to visualize 3D Model using the advanced of ICT.
We can use two different methods: overlay a 2D image on another or visualize in real-time a 3D object in an exact point of the real space. The first approach is based on the overlay of a virtual image on the real image from camera devices, in this case we have to determinate the right point of view in the real space from that we can see the image correctly overlapped on the real scene. Using this approach we have to localize this point of view in the site and we have to design the way to do that.

2. AR : different methods used to augment a view with 3D data

This paper resumes recent advances in AR and shows some of the problems linked to the right collimation between the real world and 3D data. We have analyzed some different merging techniques in particular we compared the techniques that are based on the use of markers (i.e. QR code, ...) and more complex ones based on the recognition of the site's geometry, so called markerless.
AR technology let us to mix reality with texts, Images, Movies and 3D objects.
Using high resolution cameras, internet access and positioning sensors of smartphone, it is possible to visualize these additional information in Points Of Interest (POI) in relation to the context in which the user is located. The information about the real world that surrounds the user can become interactive and digitally manipulable.
While smartphones are able to provide geo localization through GPS, the lack of accuracy does not allow for precise and robust alignment of the augmented 3D data with the camera image. There are some different approaches to solve the camera pose estimation problem [3]:

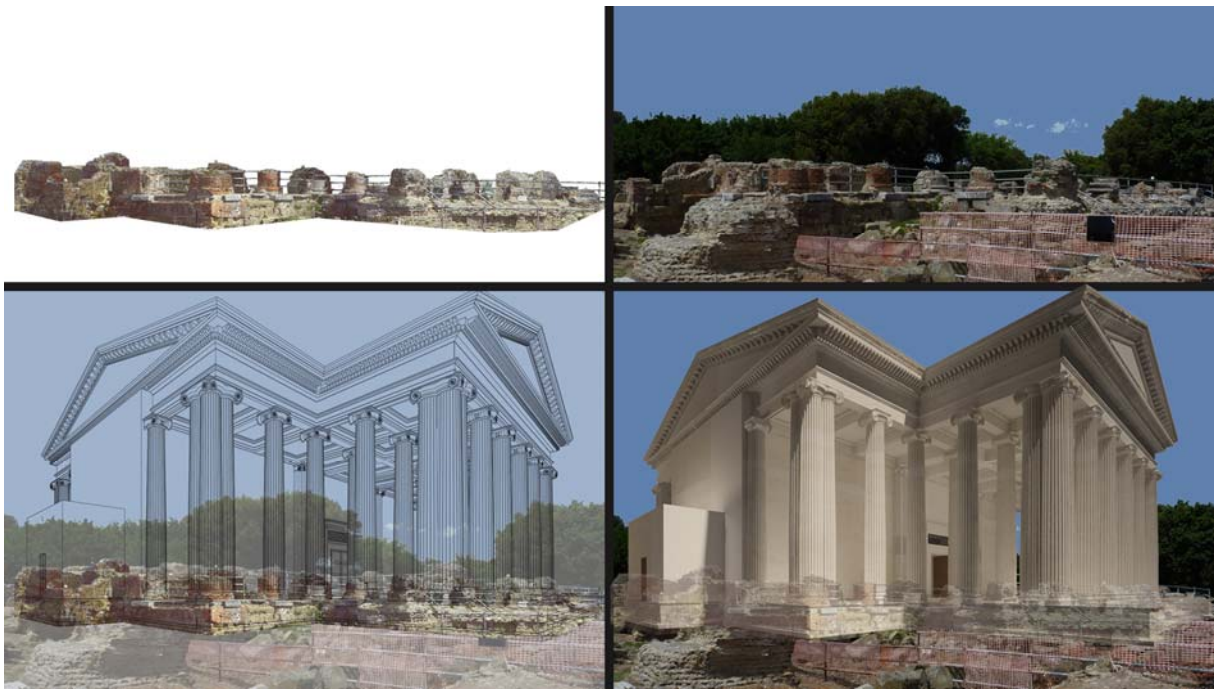

Fig. 2: Cuma, Temple of Apollo. Design of AR experimental applications based on the use images: the virtual image is overlapped on the real image from camera devices.

1. Using the localization tools of devices (accelerometers, GPS, and digital compasses) for obtaining the camera position and orientation;
2. Using the images to extract the camera pose from them ;
3. Using both the localization tools of devices and information from images.

The first approach allows to measure directly the orientation and camera position avoiding the high computational, but the overlay of 3D model to the real scene isn't very accuracy, so it is not very used when the accuracy is required, such as in 3D virtual archaeological reconstruction visualization.
The second system is based on photometric information from images of the scene to measure the pose of the camera. There are two kind of vision based approaches: marker based tracking and markerless tracking.
In the marker based tracking we have to pose fiducial markers in the scene to recovery 3D camera position, in this way the appearance of markers in images may be considered as a reference for image scaling, or may allow the image and physical object, or multiple independent images, to be correlated. By placing fiducial markers at known locations in a subject, the relative scale in the produced image may be determined by comparison of the locations of the markers in the image and subject. This application is based on principles of photogrammetry, the fiducial marks of a surveying camera may be set so that they define the principal point, in a process quite the same of conventional collimation.
There are some systems to do that, based on QR Code, ARTag, ARToolkit [4] or Visual Markers.
QR Code is a type of matrix barcode used by all AR browser to link to information system, images or 3D data. The browser supports URL redirection, which allows QR codes to send metadata to existing applications on the device.
ARToolkit is a computer tracking library for creation of 3D augmented reality applications that allows to overlay virtual images on the real world. To do this, it uses video tracking capabilities that calculate the real camera position and orientation relative to square physical markers in real time. Once the real camera position is known a virtual camera can be positioned at the same point and 3D computer graphics models drawn exactly overlaid on the real marker.
ARTag is a fiduciary marker system to support augmented reality. It can be used to make it easy to make virtual objects, games, and animations appear to enter the real world. Like the earlier ARToolKit system, it allows for video tracking capabilities that calculate the real camera position and orientation relative to square physical markers in real time. Once the real camera position is known a virtual camera can be positioned at the same point and 3D computer graphics models drawn exactly overlaid on the real marker. It thus addresses two of the key problems in Augmented Reality: viewpoint tracking and virtual object interaction [5].
For Visual Marker we intend the use of image as marker. There are two different AR Visual Markers Systems: the Image matching systems and Image tracking. The image matching systems are based on optical sensors that are able to recognize an image that appears in the scene and will trigger an

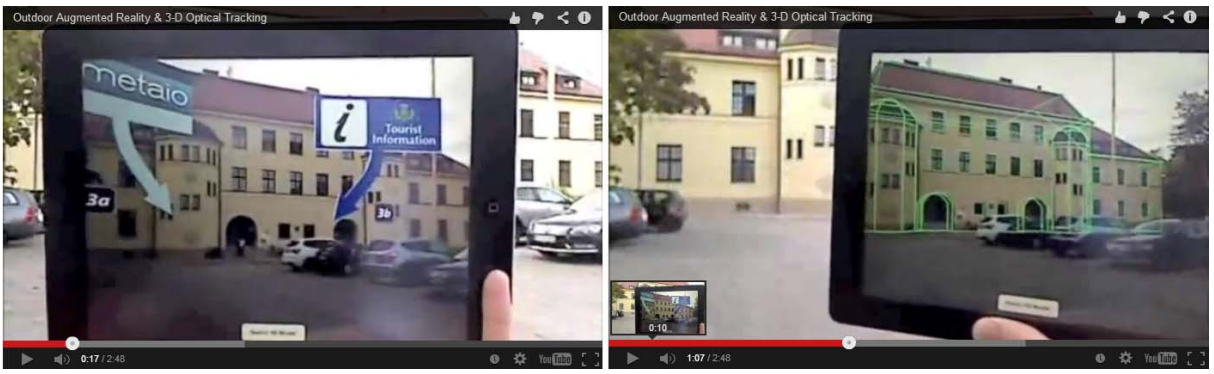

Fig. 3: Metaio experimental markless system based on geometry of the site.



Fig. 4: AR application using SLAM tracking (based on their own proprietary algorithms). A city model elaborated by Metaio to demonstrate how it is possible to map large physical spaces in real-time, with simple, non-stereo HD cameras and Smartphones.

event (i.e. an 2D image, a text ...) unlike the image tracking system is able to know the camera pose too. This camera pose estimation will allow the system to overlay a 3D object just where the target is, in the right perspective that we could visualize if it were a real object in the real physical world. In real-time applications, however, unpredictable motion makes sequential approaches uncertain and fragile introducing some errors in visualization of the resulting reconstruction models. The most important problems are caused by the difference between the viewing device's angle that could be slightly different from that assumed for the augmentation of the natural user's view.
These marker methods allow a good control of small 3D objects in a small environment but it doesn't allow us to get good results when the goal is to introduce a building in an urban context or to represent the reconstructive hypothesis in an archaeological site, in fact it is very difficult to use marker based technologies for outdoors applications.
Markerless methods are based on the geometric features of the place that allow us to reconstruct 3D model of the real scene without introducing any artificial elements.
Markerless outdoor augmented reality solutions are generally based on using of projective invariant. [6] or on Structure-from-Motion (SfM) [7] or on the related online approach of Visual Simultaneous Localization and Mapping (SLAM) that are able to estimate camera position and the 3D structure of the imaged scene together.
All the images are the 2D projection of a 3D scene, therefore the use of 3D information is fundamental in AR application for different tasks involving both planar surfaces and full 3D solid objects.
In the first case, the target is planar, its projection in the camera frame is planar too. This allows a complete modeling of the relationship between target object and its projection in the image in terms of a simple homography matrix. It will be easy extract 3D information from the homography, allowing a 3D pose estimation of the target in the space. Many interesting applications in creating augmented content are based on the use of the planar facade extraction technique to use as a 3D frame of reference for augmenting the scene [3].
The case of 3D solid is more complex because 3D objects appearance significantly change according their instant pose. If the camera moves around a cube the target projected image changes showing the different faces according the relative position between camera and object and the solution becomes more complex. Iterative methods are usually applied in order to estimate the correct pose of the target. The general idea is to find the pose matrix that minimize the so-called re-projection error,



Fig. 6: Streetmuseum is a new augmented reality iPhone app created by the Museum of London that allows you to browse historical photographs in various parts of the city. It is an outdoor georeferenced application where 2D historical image overlays to real image.

the difference between the projection of the 3D model of the target in a given pose and the image captured from the camera.
Using a SLAM Simultaneous localization and mapping, technique used by robots and autonomous vehicles to build up a map within an unknown environment, or to update a map within a known environment, there are some applications that exploit a set of images of the same scene captured from different point of view in order to rebuild the 3D structure of the scene and to make it easier to determine where the 3D content should be positioned and visualized in the 2D image of the scene.
There are a lot of experimental systems that allow to research the best solution for each problems, for this reason it is very important knowing the power of different browsers to choose what is the best for our needs. Our goal is to find a system that allows us a real time interaction with 3D model of reconstruction hypothesis of temple of Apollo visible in the right scale in the archeological site, this isn't a very simple outdoor application.
One of the most important problems that we have to solve are the 3D model size, the technology to use to visualize 3D model in perfect overlay on the archaeological finds and the possibility to visualize the reconstructive hypothesis in motion.
The extensive use of 3D models in Augmented Reality App is one of the most interesting news of recent years, to do that we need a 3D model that can be displayed in that virtual 3D world that exists over the real one that we can see through our device's camera.
Some mobile App lets us visualize 3D models in Augmented Reality, integrated in real time in their actual size and environment. Generally 3D models can be exported from any 3D software such us 3ds Max, Sketchup, Maya, SolidWorks, Cinema 4D etc...
The problems that we have to solve are linked to the size of 3D model that is defined from the total number of polygons in a 3D model. Usually this numbers unit is counted in triangles. A high-resolution model with a lot of polygons is called "high-poly-model" in comparison to a "low-poly-model" with a small polycount. Sometimes these categories are not clearly distinguished. They are dependant on the device and from the use of the models. In case of real-time applications mainly low-poly-models are being used. They render faster and increase the performance of an application. Thus, when we design a 3D model we have to use as few polygons as possible but many as necessary.
Another problem to solve is the correct use of the texture, in fact if we use many texture, especially large ones, the performance of mobile phone will also decrease and the texture sizes must not be larger than 2048x2048 pixels.

3. Augmented Reality (AR) applications for the ancient site of Cuma

We have tested AR technology using an open source software, Junaio, that allows us to mixed real word to digital one, we have activated our channel and we have created a link to MatchMed, Map by Tags of Cultural Heritage of Mediterranian sea, the database developed in PRIN 2009 by Federico II research group led by A. di Luggo.
Scanning some different QR codes we can: link directly to MatchMed, active the channel and see the labels at geo-located Points Of Interest that give us access to all information contained in MatchMed, or in a point of observation, appropriately marked in the site visualize the 3D model of reconstructive hypothesis or, activate the 360° navigation in the rebuilt temple which overlaps on the visible reality through the camera of the device, tablet or smartphone.



Fig. 7: AR experimentation: Archeological site of Cuma. We have used a free AR browser, Junaio. Scanning QR codes the visitor can access to MatchMed database, can access to geolocated view mode or visualize the 3D model. Download Junaio, it is possible to try from this image.



Fig. 8: AR experimentation on Archeological site of Cuma. Design of 360° navigation in the rebuilt temple which overlaps on the visible reality through the camera of the device, tablet or smartphone.

For placement of the QR codes in the archaeological site we designed Plexiglas panels that can be considered interfaces between analogical world and virtual one, where we are going to impress the image of reconstructive hypothesis and we are going to localise the QR codes.
Using the principles of Descriptive Geometry, and in particular of linear perspective, we have sized panel, built the image, defined the position of the observer and the localization of the panel in site so that the image of reconstructive hypothesis overlaps perfectly to reality.
The project for the installation of the panel has been developed based on principles of perspective projection, intersection of the visual pyramid with a plan, where mathematical observer is considered a single fix point unlike the human observer who has two eyes in continuous movement.
The perspective projection that represents the hypothetical reconstruction of the temple has been built using the digital model, simulating the process of image construction.
The size of the panel and the position of the observer relative to the panel have been defined considering a 50° visual cone and the possible positions of the panels relative to the model is been defined to obtain an image of the reconstructive hypothesis in vertical perspective projection.
After we have checked if POV, Points Of View, was in a right position related to the site and the image represented on the panel coincided with the image of the existing findings.

The project involves the installation of Point Of View, an element that signals the position to be taken by the visitor to align the real world to the virtual representation, and the plexiglass panel on which are printed the perspective image of the model and the QR codes to access digital content.
To create the conditions that *artificialis perspective* looks like *naturalis perspective* the observer will have to look with one eye and the gaze should be fixed as far as possible, to make easier this vision mode, a target will place on the panel in Vo, the orthogonal projection of the point of view on the panel.
In this way the panel with the image and QR codes becomes an interface between the analog world and the virtual world.

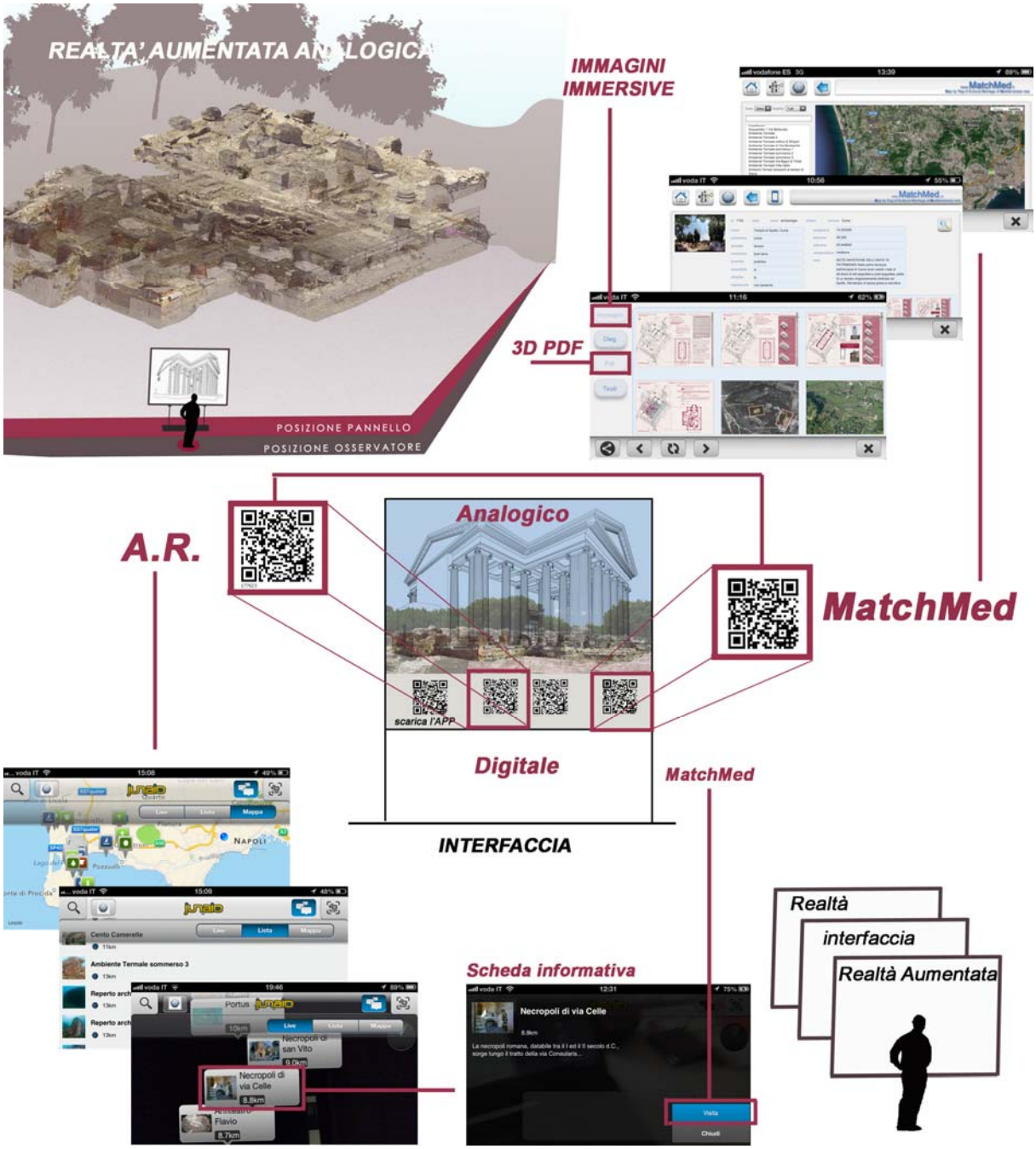

Fig. 9: AR experimentation on Archeological site of Cuma. Design of Point Of View, an element that signals the position to be taken by the visitor to align the real world to the virtual representation, and the plexiglass panel on which are printed the perspective image of the model and the QR codes to access digital content. It is possible to try from this image using Junaio and scanning QR Codes.

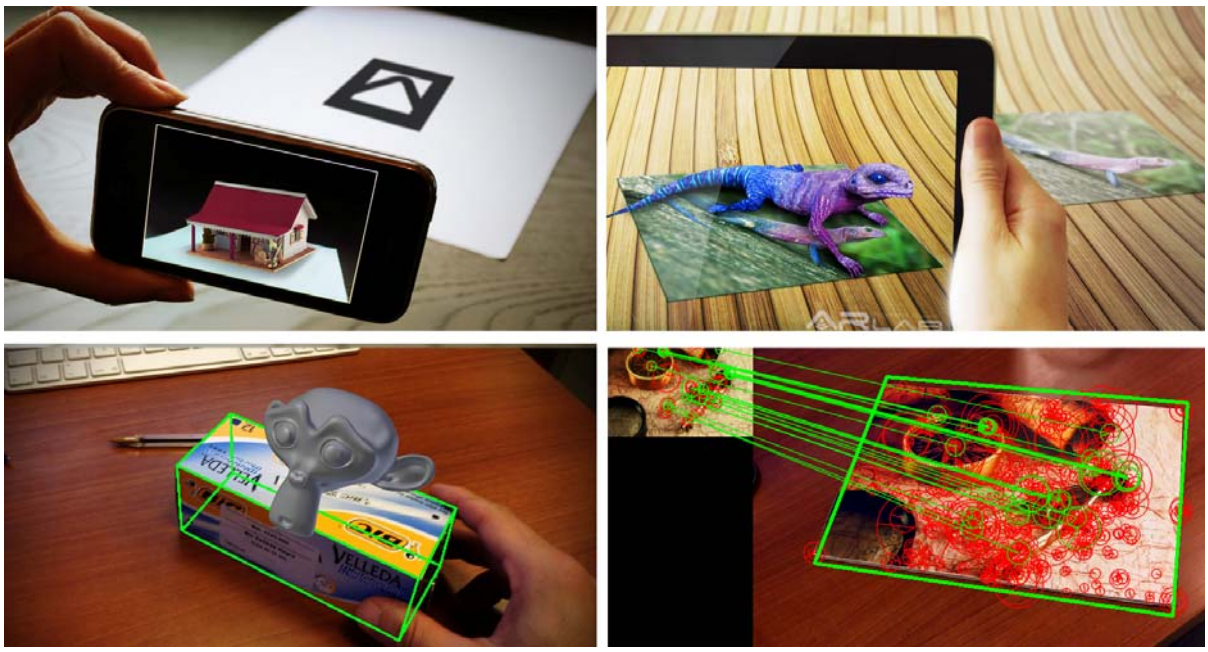

Fig. 11: Augmented Rality System based on Visual Markers and Markerless

4. Augmented Reality trends and future developments

The research has shown some technological problems that have stimulated to find solutions that can hybridize the analog world and the digital one, as the panel that has the function to communicate explicitly the presence of a digital platform and to promote the access to it.

The most important problem to solve is the determination of camera position, in fact if the pose of camera is correctly determined the virtual objects can be rendered onto the virtual camera in right location and perspective to provide the illusion to be present in the place. When the real camera is correctly located the system allows to locate the virtual camera in the same position and so 3D model can be visualized perfectly overlapped on the real world.

To find a solution in our case studio we have defined a new paths of research mainly oriented to develop systems where the alignment between real world and virtual world achieved through the recognition of three-dimensional geometries present on the site, so now we are working on the hybrid markerless systems.

In the near future we will probably be able to localize camera position using only the natural environment features but now we generally use systems based on markers, such us QR Codes, ARToolkit or ARTag.

A very interesting new trend is to use 2D Visual Markers that can be designed in very different ways for very different applications. This method is based on a marker that is an image, using a AR browser, scanning this image we can visualize a 3D object and we can interact with 3D object using the visual marker as an interface.

Some interesting applications about the use of visual markers are developed especially in the art. In Leon Keer's works AR gives birth to a new dimension to 3D street art.

AR is an "illusion" that could be associated to visual illusion create by the Anamorphic street Art of Keer. In both cases the problem is quite the same, especially when we wont visualize a perspective image overlapped on the real world and so we have to stay in a fixed point to visualize correctly the illusion. In Anamorphic paint we have to find the right point of view to see the transformation of 2D image in a 3D picture and in AR applications we have to find the right point of view to see the overlap of the perspective image to reality that we can see by smartphone camera.

AR LelystArt. is an Anamorphic street art where art is combined with Augmented Reality, in this case to see the AR animation you have to download the Junaio App, search for 3d street art and scan the marker (caution sign).

In this case the marker isn't a QR Code but it is a part of paint.

In Wisma Atria Singapore too, the anamorphic painting created on a wooden platform in front of Wisma Atria Shopping Centre, scanning the painting in the centre of the image with the Augmented Reality application of Junaio snowfall will appear on the screen of our smartphone or tablet. (snowfall 3d animation created by Joost Spek / 3d picnic)[8].

These examples show a new way to active the additional information linked to an image or to a site using a visual markers instead a QR Code.

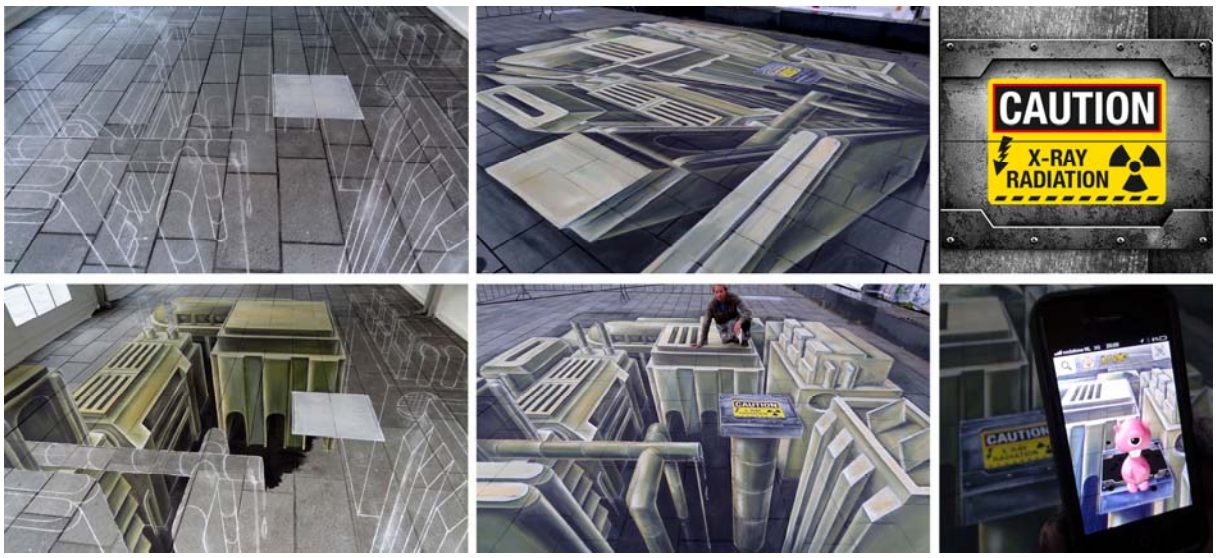

Fig. 11: AR LelystArt. Anamorphic street art made by Leon Keer and AR content made by Joost Spek/3Dpicnic. visual markers it is a 2D marker. It is possible to try from this image: download the Junaio App, search for 3d street art and scan the marker (caution sign).



Fig. 12: Wisma Atria Shopping Centre, scanning the painting in the centre of the image with the Augmented Reality application of Junaio snowfall will appear on the screen of our smartphone or tablet. (snowfall 3d animation created by Joost Spek / 3d picnic)

Very new approaches, based on natural features, are markerless Augmented Reality systems where each part of the real environment can be used as a target to determinate camera position and to place virtual objects in a correct way.
The news is not only allowing to use real objects as a target, but also overcome some limitations linked to markers systems.
First of all markerless augmented reality systems rely in natural features instead of fiducial marks and so it's not necessary to introduce any markers in the real environment.
Furthermore, another advantage of the markerless systems is the possibility of extracting from the environment characteristics and information that may later be used. However, tracking and registration techniques of markerless augmented reality systems are still more complex than markers systems.
Techniques developed for online monocular markerless augmented reality systems are based on features of normal image or object to be tracked, like the edges, corners, or textures, and so they could not be invasive like marker-based systems. [9].
For the Temple of Apollo, we are experimenting an Hybrid System. The idea is to use the markerless technology but in this case there isn't any natural features of the environment that we can use because the geometry of archaeological finds are very difficult to recognized. Therefore we are thinking to put 3D objects on the place, 3D Visual Markers that could be used to correctly localize the camera and to visualize 3D model in the right scale and in the right point in the real space.
These objects will be designed such as art installations, they could be considered like landmarks in the archaeological site and they are a part of a more complex Communication project consisting of MatchMed database, Plexiglass pannel and POV Point Of View.
The concept is to design a cultural brand a of AR Virtual Archeology developed by our research group, These 3D Visual Markers will became another interface to go inside AR virtual world, another analog "door" to go inside AR world.

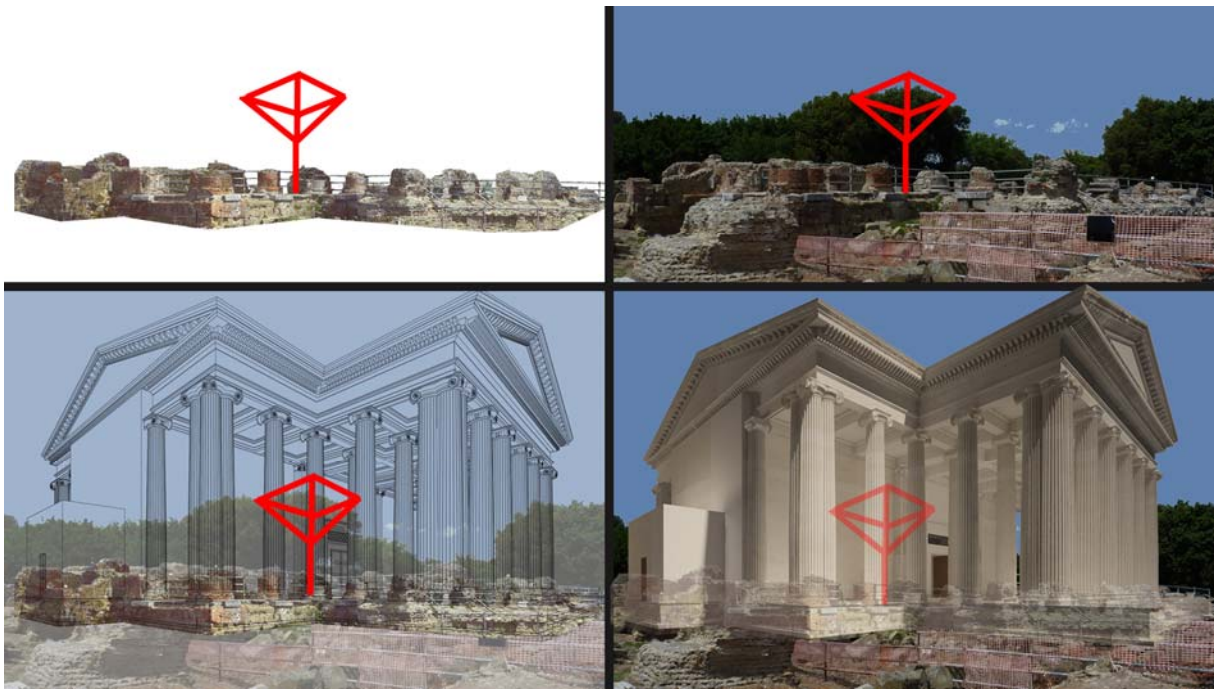

Fig. 1 3: Temple of Apollo, Archaeological site of Cuma. AR hybrid system, Extperimental use of 3D Visual Markers.

Bibliographcal References

[1] EVE, Stuart. *Augmented Reality, a New Horizon in Archaeology*. http://asorblog.org

[2] VLAHAKIS, Vassilios; IOANNIDIS, Nicolaos; KARIGIANNIS, Jhon ;TSOTROS, Manolis, GOUNARIS, Michael. *Archeoguide: an augmented reality guide for archaeological sites*. In: *Computer Graphics and Applications*, Sep/Oct 2002. Volume: 22 , Issue: 5. ISSN : 0272-1716 pp. 52 - 60.

[3] MC CLEAN, Eric. *An Augmented Reality System for Urban Environments using a Planar Building Facade model*. Masters of Science, National University of Ireland Maynooth, Department of Computer Science, Faculty of Science and Engineering. February 2013

[4] FIALA, M. *ARTag, An Improved Marker System Based on ARToolkit*. PhD thesis, National Research Council Canada, 2004.

[5] http://en.wikipedia.org/wiki/ARToolKit

[6] YOON, Suk June , ROH, Kyung Shik , HYUNG, Seung Yong, AHN, Sung Hwa. *Markerless Augmented Reality system and method using projective invariant*. Brevetto: US2011090252 (A1) 2011-04-21 http://www.google.com/patents/US20110090252

[7] JEBARA, Tony, AZARBAYEJANI, Ali, PENTLAND, Alex. *3D Structure from 2D Motion*. http://pubs.media.mit.edu/pubs/papers/sfm.pdf

[8] http://www.streetpainting3d.com/leon-keer

[9] http://www.arlab.com/arbrowser

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Paths to knowledge for the preservation of identity cultures

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Abstract
The need to read the material, with the specific aim of going back to the ancient structuring geometries, makes it necessary to pay more attention to the local culture and to the identity expressions connected with the shape and the material and aiming at penetrating into the sense of history which is of fundamental importance in the interventions in small and large scale.
There are some works, halfway between sculpture and architecture, which testify the use of shapes and models belonging to the cultural traditions of their local areas, but, at the same time, they are connected with different cultures. They are proper *architectures inside architecture*, which means they are architectural structures in a small scale and they also show the great creative skills of Sicilian artists.
The great variety of the elements taken into consideration shows a coherence of language, the expression of a way of doing architecture, even in small scale works.
In order to better emphasize these structural similarities, the research will make use of epistemological processes, supported by a peculiar perceptual discretion sensitivity in which, the survey through sensitive instrumentations and the representation through virtual models establish a dialogue which is preliminary to any preservation actions with a scientific base and necessary to remember instead of forgetting.

Keywords: Survey, Geometry, Representation, History, Fragments

1. A diachronic analysis for the recognition of an identifiable language *(R. Valenti)*

The cognitive journey of the present study is taken through time and space and its specific aim is interpreting mutation and persistency giving reason to a recent past which has borrowed from the characteristic forms of the territory.
In particular, the carried out research supports a culture of intervention based on an epistemological approach pointing at a dialogue with the place where the re-cognition of elements is fundamental for the decoding of the language necessary for any conservation intervention on small and large scale.
If architecture has to be considered not only as a creative process but also as a conforming act of the matter related to the context, interest is concentrated on the ways it has been structured and shaped. Hence, the story about the places goes through the reasoned knowledge of the old geometry in search of models which in time have, transversely, delivered the identity content.
The primary task often comes from a wider circulation of architectural-constructive references which, once stored in the local cultural knowledge, have become identity and have been subjected to time contamination.
Starting from here, the topic we are dealing with focuses on those architectural phenomena which on a smaller scale are contained in a more articulated system – within the spatial volume or simply as

grafts on the closing surface and delimitation of the total form – as elements of functional or decorative definition.
Actually these pieces of “architecture in architecture” which in its formal composition draw on the rules of the making and of the representing architecture are real jewels, extensively protected in the investigated territory; partly survived to the catastrophic events related to the earthquake which severely damaged the south-east of Sicily determining a deep fracture with the past, partly being the result of the wish for a carefully-planned reconstruction according to the tastes of the time.
The variety of examples clarifies the language coherence, implementable and verifiable through the redesigning of the visible which helps us perceive the invisible, that is, what time and nature have strongly wiped out.
The diachronic analysis performed through the instrumental survey is based upon the discernment and cataloguing of all those elements which on a smaller scale, even if widely spread on the Sicilian south-east area, present the assonances which can be considered an identity language originating from the imported cultures assimilated into the peculiar context with particular emphasis on the matter.
There are a lot of examples where it is possible to detect the models used outside the island, both in the geometric and sculptural shapes referred to the pre-and post-earthquake period. The earthquake hit in a “ruinous” way some areas of the Val di Noto in 1693 preserving only some architectural ”jewels” dating back to the XIV and XV centuries.
There are a lot of examples where it is possible to detect the models used outside the island, both in the geometric and sculptural shapes referred to the pre-and post-earthquake period. The earthquake hit in a “ruinous” way some areas of the Val di Noto in 1693 preserving only some architectural ”jewels” dating back to the XIV and XV centuries.
The investigation is expressed through a cognitive journey which, first of all, is based on a particular perceptive awareness; the control occurs later, gradually, while the pieces are analyzed from the geometric and symbolic point of view in order to undertake the necessary comparisons.
“Small scale pieces of architecture” have been chosen: parts of religious and civil buildings. They are characterized by the sculptural plasticity of matter with particular reference to the use of materials, of geometry and of communicative expressiveness which, for centuries, have represented a shared recognizable code. A coordinate system for the collective identity and sense of belonging.
A spatial code which, according to Salvatore Settis, sharpened in Italy from the Middle Ages to the Renaissance, moulding the memory lane; a code which makes it easy to read the context, experienced not only through highly expressive manifestations and reflecting social and political concerns, but also through all those key features which, though located in relatively close areas at the time, present a uniform interpretation conveyed through the relatively contemporary culture. Examples are the remains of Palazzo Migliaccio in Syracuse and of the Loggia of Palazzo Platamone in Catania, where the bichromatic tone of the stones with its geometric horizontal pattern prevails, similar to the engraved stone in the archivolts of the “bifora”, the double lancet window, of palazzo Maciotta Mergulese in Ortygia.
This last one, excellent manifestation of the “Chiaramontano” style, is an example of sculptural façade, a proper arrangement of figurative elements with a recurrent geometry. In particular, the thin twisted columns of the “bifora” and “trifora” are expressions of a transversely recurrent language.



Fig. 1: Palazzo Migliaccio, Ortigia. Palazzo Platamone, Catania.

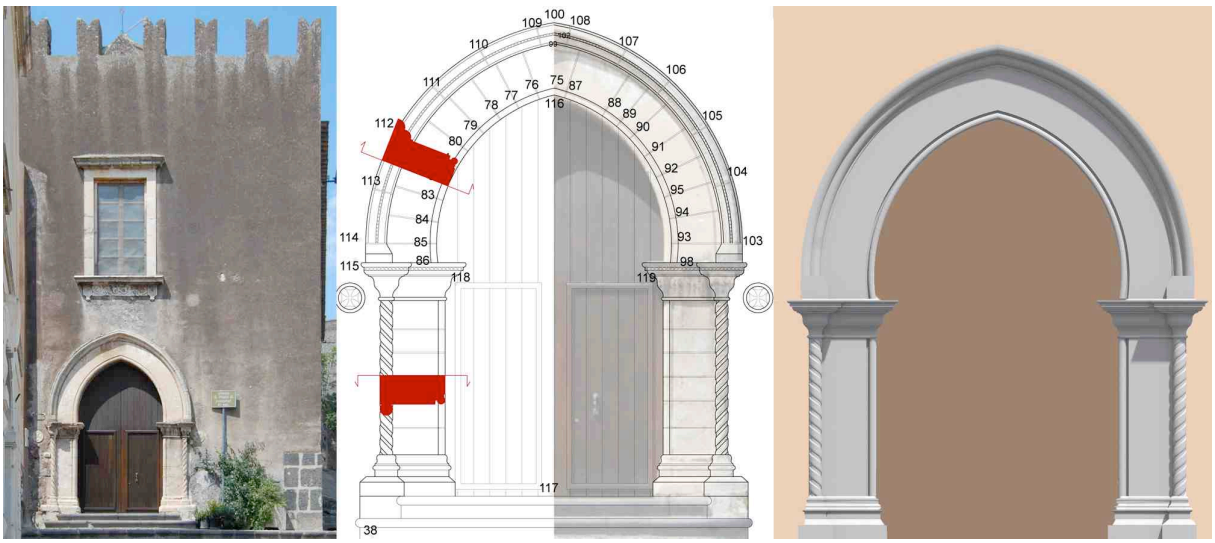


Fig. 2: Portal of St. Mary from Josaphat, Paternò (Catania). Graduation thesis by E. Paternò. Supervisors R. Valenti, S. Giuliano.

We find them full height in the Renaissance period “in the airy structure of the open loggia with twisted columns” of Palazzo Abela in Syracuse, a XIV century building probably redesigned in the XVII century by Andrea Vermexio, with relatively different proportions from the model of the end of the XIV century; Carlo Broggi re-proposed them faithfully at the beginning of the last century in the project for the “Umberto I” Civil Hospital in Syracuse.
If we travel through time and space towards the province of Catania, in Paternò, a small example of religious architecture such as the Santa Maria de Valle Josaphat Church, built in Norman Age, in 1072, by the count Ruggero’s wife, Adelitia, is part of the hill and in the façade presents a portal with a pointed arch supported by thin twisted columns, very similar in terms of elegance and slenderness to those of Palazzo Montalto, with a more elaborated moulded shape.
The cloister in late Gothic style of the Santa Maria del Gesù monastery erected between the end of the XV century and the beginning of the XVI in Modica consists of a triumph of twisted columns. The geometry of these elements presents a large variation of the twisted column from the traditional screw vertically zigzagging around the geometric pattern, previously mentioned for the loggias and archivolts, whose geometric spiral genesis is purely perceptive.
Though having a more massive structure, they call to mind the complex composition of the columns of the XIII century cloisters of St. Paolo fuori le Mura and San Giovanni in Laterano in Rome and those of the cloister of the Benedectine Abbey of St. Pietro and St. Paolo in Königslutter, Germany.



Fig. 3: Zig Zag geometric pattern. Jesus St. Mary courtyard, Platamone building’s balcony, Maciotta Mergulese building’s mullioned windows.



Fig. 4: Architectures' fragments. Aediculas: St. Antonio Abate's Church, Cassaro (Siracusa). Via Capodieci, Ortigia (Siracusa).

"The use of twisted columns in the medieval cloisters probably has a Solomonic meaning which refers to the Porticos of the Temple of Solomon, a meeting place of prayer for the Apostles after the Crucifixion of Christ" [Tuzi 2002, 68]. Solomonic is also one of the most mysterious pre-earthquake remains in Ortygia, embedded in the staircase of a building in Via Capodieci, found in the basement. It is a small aedicula which contains the symbols of Christianity, a real example of "small scale architecture" both for its plastic intensity and for the representative project design.
The survey and the drawing pattern of this fragment and in particular the two highly expressive twisted columns delimiting it deal with the cultural debate about the Solomonic columns. Their presence in Sicily is diffuse, probably thanks to the Spanish influence, in the iconology apparatus of religious buildings built after the 1693 earthquake, especially on the external façades which anticipate the complexity and the richness of the interior altars.
The present research, which follows the relief approach on a time crossing basis, has launched a fertile program, establishing a dialogue in favour of conservation interventions in accordance with the criteria of the "circular journey" of memory.



Fig. 5: Twisted columns. Altar of St. Maria dell'Itria's Church, Ragusa Ibla. Portal of St. Maria Annunciata's Church, Palazzolo Acreide. Aedicula of St. Antonio Abate's Church, Cassaro (Siracusa).

2. The character of an identifiable mark *(S. Giuliano)*

In a reference context regarding the epistemological process aiming at the identification and conservation of architectural characters, a certain role can be performed by the study of the XVIII century altars, paying attention to the relocation of the main protagonists, the artists, from the city to the little nearby urban areas.
The survey, carried out mainly at two levels of analysis, is the starting point for the fulfillment of the investigated phenomenon. The first level of analysis deals with the conceptual survey, coming from archives, historical sources and iconography. The second, on the other hand, is material, in close contact with the investigated object, corresponding to the architectural survey , which in the present study about altars has been conducted with 3D laser scanner technology.
Both the material survey and the conceptual survey represent the two essential non-separable ways in constant osmotic and dynamic relation which allow a grounded understanding of the artifact.
In order to carry out the research, it was considered worthwhile to define a historical, sociological and cultural framework of the events occurred in Sicily, especially in the city of Syracuse. Starting from the end of the XVII century, in fact, there is an artistic renovation connected to an earnestness for reconstruction as a consequence of the catastrophic earthquake which struck the Val di Noto in 1693.
In this flourishing period the Val di Noto enjoys the presence of a multitude of stonemasons, skilled in the art of building, and expert carvers, who arrived just after the earthquake. Among the most significant of them we mention Pietro Paolo Battaglia, head of a household of masons, Pompeo Picherali and Andrea Palma, who took the role of architects.
Since the XVIII century architecture reached its peak in Syracuse. A lot of reconstructions and completely new constructions were made.

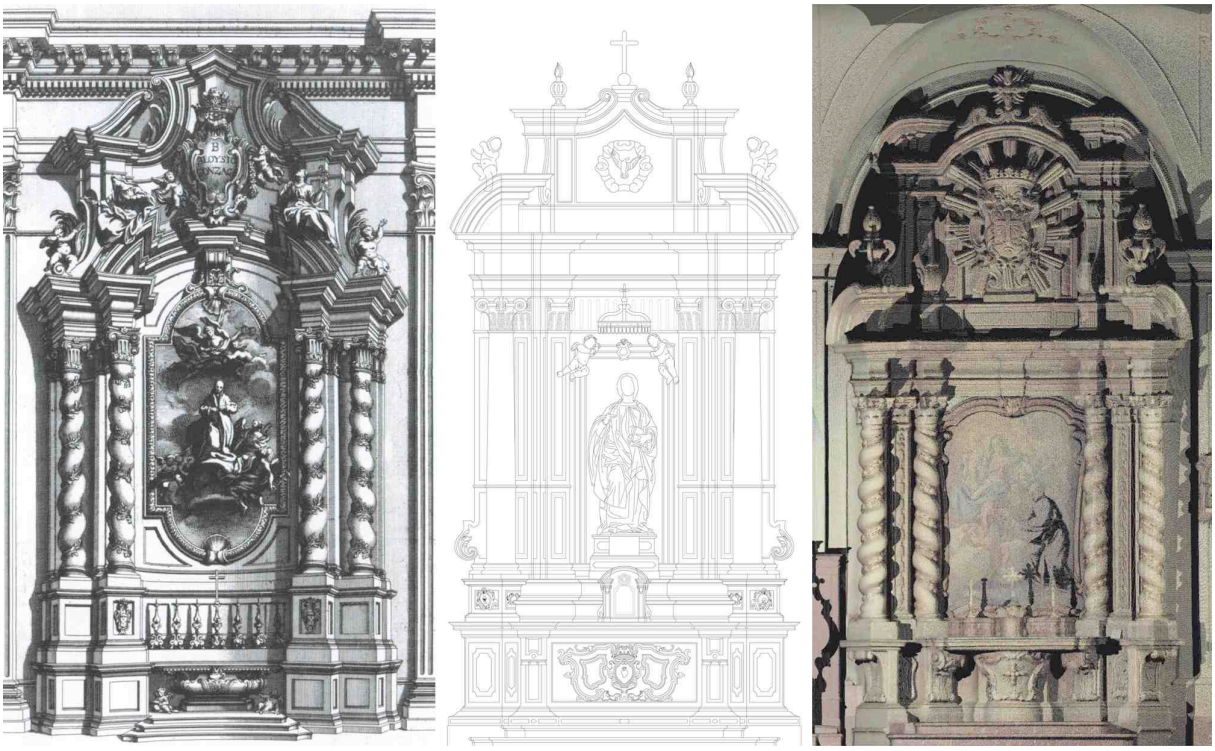


Fig. 6: Altar “a tosello”. A. Pozzo, treatise. On the right survey from identity representative altars.

The XVIII century altar in Syracuse has its own precise feature. It is an architectural object growing in its own space, neither inside nor outside, but annexed to the newly built church, conceived as a single unit.
To ease and enhance the research it was considered appropriate to prepare a typological catalogue of altars present on the territory of Syracuse and consequently to relate them to the “canonical” models theorized and built by the Baroque architects in Rome.
The first type of altar observed in the territory is the so called “a tosello” or wall-mounted altar, characterized by its position against the backwall. These can often be detected in the side chapels of churches.

The reference model for this type of altar can be found in the “Chiesa del Collegio” in Rome, as it is drawn by the Jesuit Andrea del Pozzo in his treatise.
We find other similar but relatively minor examples in Buccheri and Palazzolo Acreide, little towns in the province of Syracuse, and also in the side altars dedicated to Mary Magdalene in the church of the same name and to St. Gaetano da Thiene in St. Paul’s Church, respectively.
The altar in Buccheri presents a lower order with a multicoloured marble antependium and an upper order which on the contrary has a pair of columns rotated 45 degrees surmounted by a trabeation and a broken tympanum. The altar in Palazzolo presents the lower order in multicoloured marbles as well. The upper order, instead, presents a pair of twisted columns lying on corbels.
The second type of altar present in our research is the one with an “ascending triangle” pattern. This is a characteristic architectural feature in “full survey”, culminating with an aerial canopy on thin pillars supported by sculptural figures.
It is usually found in the centre of the apsidal area. This type of altar can be, probably, assimilated to that of the Blessed Sacrament Chapel by Gian Lorenzo Bernini in St. Peter’s basilica in Rome, whose “tronetto” or throne is completely inspired to the Bramante’s St. Peter in Montorio.

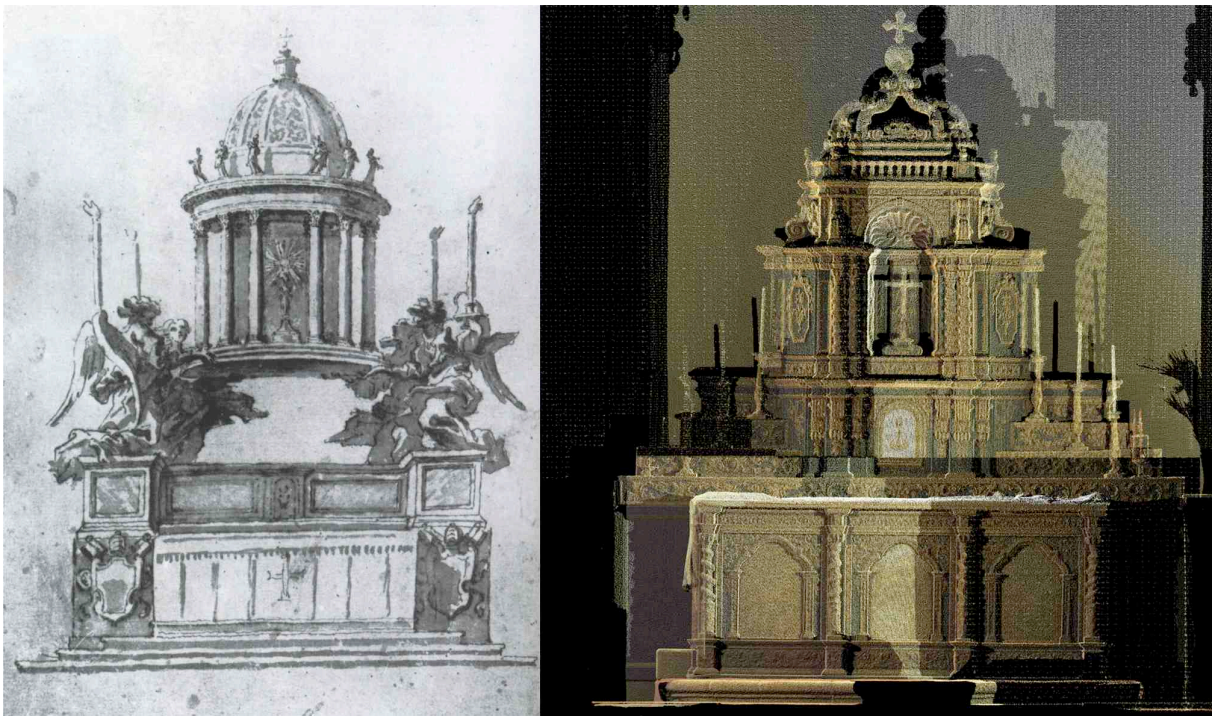


Fig. 7: SS. Sacramento’s altar drawing by G.B. Bernini. SS. Sacramento’s altar orthoimage, St. Paul’s Church, Palazzolo Acreide.

Made of wood, with decorations in golden stucco, it is the “ascending triangle” altar of the Blessed Sacrament of St. Paul’s Church in Palazzolo Acreide.
It is characterized by a dark wooden antependium, widely decorated with golden stucco, with three upstands on top which inlay the aerial canopy, without any accompanying sculptural group.
In this case, too, the altar is placed in the centre of the apse in the side aisle of the church.
Sicilian architecture has, as everyone knows, a privileged relation with decorations.
This study on altars, carried out from an architectural and sculptural point of view, cannot exclude the decorative features connected to the use of marbles and to the technique which had spread throughout the island since the XII century.
“If the purpose of Baroque is that of stimulating imagination, what imagination conceives must become real. The task provided by the technique is that of realizing everything is asked and wished for” [Argan 1975]. As such, the technique of altar architecture developed a lot. The specialization in every discipline and the consequent presence of professional figures is noticeable, among them the marble workers. They had great technical skills but, probably, poor artistic creativity. The inlay drawings in the antependia of the wall-mounted altars, in fact, despite their apparent variety in the same context, are extremely repetitive.

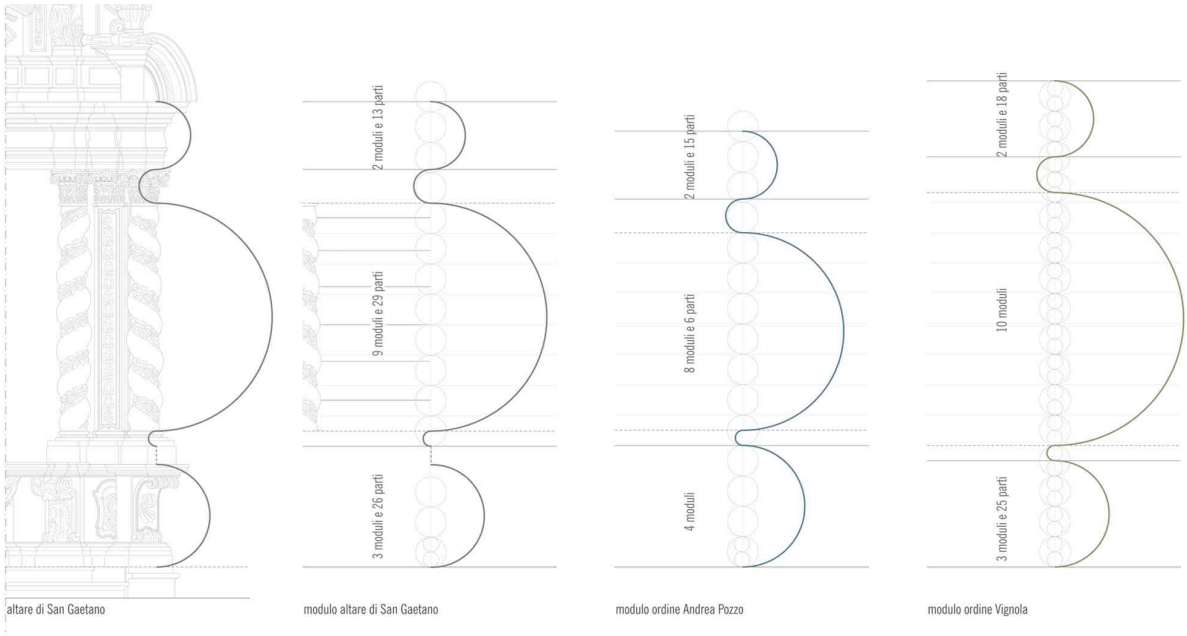
The pattern of the two dimensional inlays, only a few millimeters thick, could be perfectly defined on paper with indications about colours, being then reproduced from life on paper and transferred onto white marble slabs which constituted the stand of the inlays.
The craftsman, once decided how many parts he would divide the figures into, with the chisel obtained the socket for the thin inlays of polychrome marble, leaving in relief the parts which had to remain white according to the drawing. The slabs, so carved, were anchored with iron or bronze cramps.
The inlay technique is accompanied by the marble intarsia widely used in the decoration of the altar antependia. The underlying plan in white marble in the marble intarsia disappears from the composition, regressing to a simple support. The pattern was obtained from the combination of different marbles and stones.



Fig. 8: Typological abacus of altar frontals.

The strong creative development in the use of multicoloured marbles in opposition to the heavily ornamented baroque style slowly disappears from the third decade of the XVIII century, being gradually replaced with a higher geometric control of the structure. The marble slab is exalted for its own intrinsic features: colour and grain variations.
In order to satisfy and improve the knowledge on the investigated phenomenon, it was essential to carry out the morphological and dimensional analysis of the “small architecture” taken into account. Each of them is based upon “simple” geometric rules.

The graphical analysis highlighted the frontals of the altars inscribed in rectangles with golden or diagonal ratios. In the plan, especially on the “tronetti” level, geometries arranged on the circumference were also detected.
The decorative pattern and the architectural order characterizing the examined objects disclosed a strong and meaningful similarity to those codified in Vignola’s and Pozzo’s treatises, both in the proportions and in the juxtaposition of the classical mouldings.
Another recurring pattern detected by the research is the overlapping of pedestals: the lower one which represents the table or “mensa” and the upper one which completes the canonical order with column and trabeation in its most diverse forms of baroque pomp and fantasy.
Those are all compositive morphologies within a general framework of a research focusing its interest on a specific aspect – directed to the peculiarity of the Baroque period – emphasizing the scenic effect of architecture referred to a particular context in the Syracuse area.



elementi			altare di S. Gaetano			altare secondo POZZO			altare secondo VIGNOLA			CONFRONTI	alt. S. Gaetano / alt. POZZO			alt. S. Gaetano / alt. VIGNOLA		
ordine architettonico	trabeazione	cornice	15 M + 32 parti (totale altezza)	2 M + 13 parti	1 M	14 M + 21 parti (totale altezza)	2 M + 15 parti	1 M	16 M + 7 parti (totale altezza)	2 M + 18 parti	1 M		1,09 (rapporto totale tra le altezze)	0,97	1	0,98 (rapporto totale tra le altezze)	0,94	1
		fregio			21 parti			26 parti			27 parti				0,81			0,78
		architrave			28 parti			25 parti			27 parti				1,12			1,04
	coloma	capitello		9 M + 29 parti	1 M + 7 parti		8 M + 6 parti	1 M + 6 parti		10 M	1 M + 6 parti			1,20	1,02		0,98	1,16
		fusto			8 M + 3 parti			6 M + 18 parti			8 M + 12 parti				1,23			0,97
		base			19 parti			18 parti			18 parti				1,05			1,05
	piedistallo	cimasa		3 M + 26 parti	19 parti		4 M	14 parti		3 M + 25 parti	14 parti			0,93	1,35		1,01	1,35
		dado			2 M + 11 parti			3 M + 10 parti			2 M + 28 parti				0,70			0,83
		basamento			32 parti			12 parti			19 parti				2,66			1,68

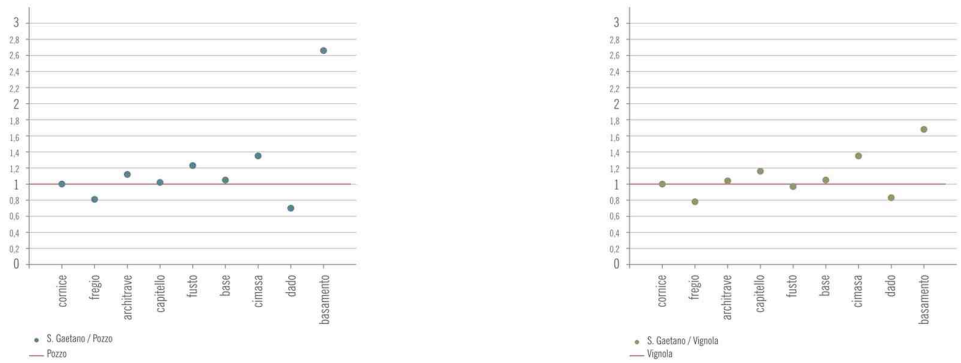


Fig. 9: Architectural orders studies. Graduation thesis by R. Curcio. Supervisors L. Trigilia, R. Valenti.

Bibliographical References

[1] ANDALORO Maria, ROMANO Serena. *Arte e Iconografia a Roma. Da Costantino a Cola di Rienzo.* 1ª ed. Milano: Jaca Book SpA, 2000. ISBN 88-16-40537-6.

[2] ARGAN, Giulio Carlo. *Storia dell'arte italiana.* 1ª ed. Firenze: Sansoni editore, 1975, vol. 3, p. 262.

[3]BOSCARINO, Salvatore. *Sicilia Barocca: architettura e città 1610-1760.* 2ª ed. Roma: Officina edizioni, 1986. ISBN 88-60-490-472.

[4] NOBILE, Marco Rosario. *Un altro Rinascimento. Architettura, maestranze e cantieri in Sicilia 1458-1558.* Benevento: HEVELIUS edizioni, 2002. ISBN 88-86977-26-3.

[5] PIAZZA, Stefano. *I marmi mischi delle chiese di Palermo.* 1ª ed. Palermo: Sellerio edizioni, 1992. ISBN 97-888-389-08200.

[6] SETTIS, Salvatore. *Paesaggio Costituzione cemento. La battaglia per l'ambiente contro il degrado civile.* 1ª ed. Torino: Einaudi editore, 2012. ISBN 978-88-06-21037-3.

[7] TUZI, Stefania. *Le colonne e il tempio di Salomone. La storia, la leggenda, la fortuna.* 1ª ed. Roma: Gangemi editore, 2002. ISBN 88-492-0377-2.

[8] VALENTI, Rita. Juan Andrea Ricci e il disegno dell'ordine salomonico intero fra pittura e architettura. In AA.VV. *Ikhnos.* Siracusa: Lombardi editori, 2003, p.11-34. ISBN 88-7260-132-0.

[9] VOZA, Cettina. *Guida di Siracusa.* 1ª ed. Siracusa: ERRE produzioni, 1997. ISBN 88-879-0911-3.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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THE LRC OF UAH, AS AN EXAMPLE OF HERITAGE REHABILITATION

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Abstract

The Alcalá City University Campus is known for the new use and the restoration of much of the old buildings that belonged to the XVIth Old University, and others historical buildings from de XVII, XVIII an XIX century. This recovery process is rewarded with recognition (1998) of the Council of Europe as a World Heritage Site by UNESCO. An interesting example of the modern practices on dynamic conservation of the historical heritage of the is the new Learning and Research Center (LRC) on the ruins of San Diego headquarter, built in 1859 on the site of the 1445 Franciscan convent of Santa Maria de Jesus. The aims of the new LRC are to preserve and document the archaeological remains from each one of the previous cultures. It intends to add value to the existing Heritage through a new project which involves not only an intensive use but a transdisciplinary complex including urban, architectural and functional changes which have been solved through a comprehensive rehabilitation project. Construction of the new building respects the most important archaeological remains that have been well documented and protected for later use and display. The new building is built into the skin of the head quarter of the nineteenth century. The overall performance respects the ancient remains discovered, clean the building of unwanted performances and adds the new architectural elements necessaries for the today use.

Keywords: rehabilitation, architectural heritage, reuse.

1. Background

The University of Alcalá was founded by Cardinal Cisneros in 1499 and is one of the oldest Universities in Europe. It operated continuously until 1836, when it was relocated to Madrid. [1] The academic activity in Alcalá de Henares restarted in 1977, when the University inherited a great number of religious and military historic buildings that were unused. This meant an important investment in human and material resources in order to restore the appalling conditions of large architectural heritage. UNESCO recognized this work in 1998, when the university was awarded the title "World Heritage Site". The preservation task continues. It also plays an important role within the education programs and it is a symbol of identity [2]. The last heritage intervention is the new LRC, which occupies part of Prince Headquarters [3]. It is located in San Diego Square in Alcalá City Centre, next to the University's foundational building, the College of San Ildefonso (1499) (Fig.1).

The Prince Barracks is a military building built in 1859. The plot had been previously occupied since 1453 by a building and orchards that belonged to the Convent-College of Santa Maria de Jesus (Franciscan Order). The convent became a military building and the Franciscan complex was demolished to build the new barracks after the government's confiscation of church properties in 1837.



Fig. 1 : San Diego place. On the left, the new LRC in the old Prince Barracks 19th-century. In the front, the University's foundational building, the College of San Ildefonso, 15th-century.

The building responds faithfully to the types of military architecture of the nineteenth century, consisting of large double bays constructions organized around courtyards [4].. The building presents itself to the public space with a sober brick facade, repeatedly perforated with large windows framed with limestone, also used in its perimeter plinth and cornice lines and imposts. Inside, the elevations are even soberer, with windows and doors cut on revoked lintel walls (Fig.2).

In 2005 the military abandoned the building and it was transferred to the University. Since then, various partial intervention projects took place, due to the building's large size. The demolition work of the first bay, which was followed by an archaeological study, started in 2009 [5]. The excavations revealed the remains of a primitive 13th-14th-century church, the remains of the 15th-century Franciscan convent church, the Chapel of San Diego (from the same age) and the walls and flooring of the convent. Excavations confirmed that the convent suffered looting and demolition. Its ruins were used to build barracks, especially masonry and stone remains. These remains have been graphically documented, and protected with gravel filling. Establishing their status and location has been key to the design of the new building. Interfering with the new foundation has been avoided and free space has been left to recover the remains and incorporating them into the new intervention (Fig.3).

2. Project

The LRC project has been developed by the University through the Intervention on Heritage and Sustainable Architecture Group (which belongs to the Architecture Department) and by the University's Technical Office. The project development has combined various goals, such as maintaining the pre-existing building (more on the compositional issues than concerning the formal language) through the introduction of a complex functional program within a given volume.

The Heritage rules of Alcalá assigned the building the maximum outdoors protection, so maintaining the façade and its formal and material characteristics was mandatory. The intervention basically consisted on rebuilding the interior space, maintaining a balance between the pre-existing conditions, the conceptual interpretation of the disappeared elements and setting a new program of needs through the use of contemporary materials and figurative codes within a logical and coherent project [6]. It is important to consider that the interior of the building had been continually modified over decades by the military, which did not preserve, except for the entrance hall, any relevant characteristic or original elements. In the 1870 cadastral plan, just 10 years after the completion of the building, there was no longer a clear distribution of the interior space, but a random partitioning system.

Beyond preserving the outer limits of the building as it was required by the law, we tried to emphasize some of its key features: the entrance hall access as a transition element between the public space of the city (the square) and the public space inside the headquarters (the courtyard); the placement of different levels of slabs in accordance with the original levels and the maintenance of the height of the windows to conjure up the ancient user's relationship with the outside space. Although the building was always very compartmentalized, much importance it was given to the restoration of the inner perception of the construction, whose urban perception it always was unified. Unnecessary divisions were eliminated as they interrupted the visual perception of this sober, austere and repetitive architecture.



Fig. 2: Prince Barracks building, including 1870 site plan and 1859 front drawing.

The global operation, very austere as well, it was performed using a contemporary contained language and limited to a structure of columns and slabs, and a roof structure to which the services are attached. A lift core and a longitudinal stair, which runs linearly across the building, are the only elements that cross and connect the different levels. The inclusion of some patios allows a unified vision of the building from different angles. In the formal aspect we tried to avoid ambiguous postmodern elements as well as an archaic mentality. At the same time we didn't force the uncritical incorporation of a disruptive language, as often happens in current interventions [7]. The goal was to balance the perception of the original volume of the building (a quality that we considered essential to it) and the functional requirements of the new building uses without giving up a modern prospective that doesn't compete or block the understanding of the space.

The facade of the San Diego square' and the interior courtyard facade are treated in different ways. In the exterior the original character of the building has remained, restoring the gable roof. The facade has been cleaned with water and sandblast, keeping the own signs of aging of bricks and stones, provided they didn't compromise the future integrity of the masonry. The only contemporary intervention was limited to the design of the new doors and joinery. At the southern end of the roof, matching the San Pedro and San Pablo Alley, a discreet glass gazebo was located that offers a view of the towers of the sixteenth, seventeenth and eighteenth centuries, which shape the skyline of the city.

All functional actions affecting the building facades have been concentrated on the courtyard, where the emergency stairs towers highlight. They consist on two prismatic metal framed which force the contrast between the intervention and the pre-existences. To keep the austere appearance of the military building the rest of the facade has basically been chopped and revoked and the fascia lines and stone plinths have been cleaned up. Skylights have been inserted in the roof to illuminate the upper floor.

The courtyard, minimally adequate with a protective concrete floor with a stamped finish, it is seen as a continuous and abstract surface on which the emergency stairs' towers stand. When adaptation works to advance the rest of the block will take place in the future, the yard might be easily modified, given the lightweight of the performance.

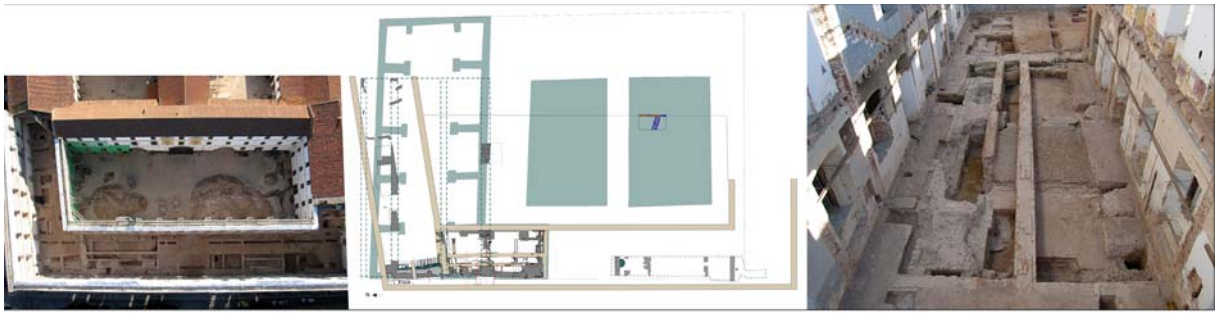

Fig. 3: Prince Barracks archaeological excavation. Including ground plan of the 15th-century Franciscan convent church.

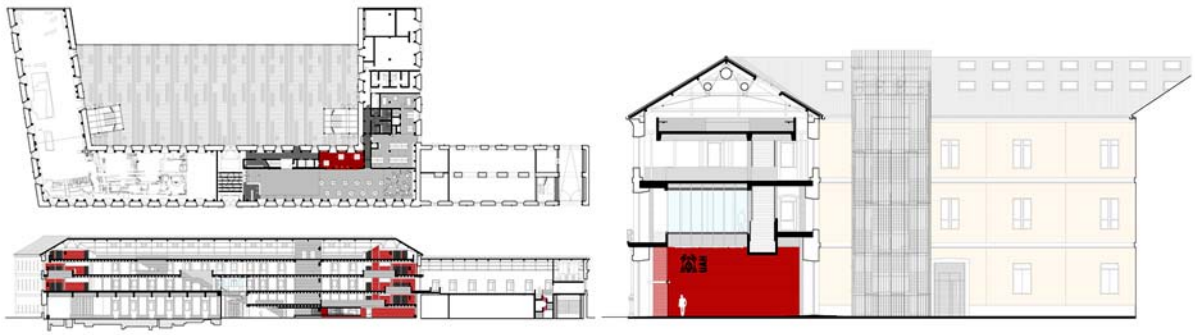

Fig. 4 : LRC project. Ground plan (with archaeological remains), longitudinal section by the main space and transversal section W-E by the main entrance and the courtyard.

The interior distribution of the barracks' original volume takes into account both the archaeological remains and the existing organizational structure of the military building. The passage from San Diego's Square into the first courtyard has been cleared, keeping the old hallway access. This will grant access to the barracks, and the various courtyards in the future on an independent basis. Those spaces could even be connected to city's public space.

The ground floor is divided into two parts by the entrance hall. The left wing of the building has been left as an area reserved for the future location of the University Art Museum, which has an important collection of Contemporary Spanish and Latin American paintings. The museum will be located on the remains of the fifteenth century chapels found during the excavation phase, which were cataloged and are protected until they could be recovered when the museum will be built. To allow more flexibility in the layout of this museum area, the space was created using a large spans structure without intermediate columns. This has allowed for avoiding interferences between the new foundation and the archaeological remains, and to free space inside (Fig.4-5).

The entry to the LRC occurs from the vestibule on the right side of the ground floor. From the entrance hall, past the access control desks, we reach the loan desk. The cataloging spaces and the technical floor are located behind it. The entire LRC program is developed on the upper levels, organized by floors and sectors. The organization in U of the old barracks, which was already present in the old three volumes set up (a central volume, coincident with the facade of S. Diego square, and two perpendiculars to this side) has been explicitly maintained by introducing service cores, communication cores and emergency halls, which physically divide the building coinciding with the same three volumes.

The central volume, more limpid and wider than the others, houses the large workrooms, and reading rooms. This multipurpose space offers books consultation as well as individual study spaces and, mainly, collective study spaces, much in demand by students since Bologna Plan was established. Only the first floor of the southern volume attached to the main building it is occupied, in continuity with the great central space. The ground floor is intended to services.



Fig. 5: LRC project. Longitudinal sections by the main space, by the courtyard and transversal section E-W by the main entrance and the courtyard.

The side volumes, perpendicular to the central one, house the library staff's work zones (right wing of the building) and other spaces such as silence rooms, researchers and graduate offices, some classrooms and rooms for seminars and research groups. The books deposit is located on the mezzanine, connected to all levels by an exclusive lift.

3. Construction

The building construction blended the new edification, built between the main structural walls, and the pre-existing elements, the facade walls and the archaeological remains located at foundation level. The stresses of the new construction were very restrictive in terms of static charges, distances between structural elements and fire load. The starting point was to embrace a very simple and sincere constructive solution, with very little differences between structure and finishes and where structure and facilities are exposed.

The foundation was made using micropiles attached to the interior face of the building's facade. The micropiles perforated the current foundation reinforcing it and reaching the firm below the water table. The pile caps were made above the ground floor, which cheapen the cost and created platforms under the ground floor windows. The use of this foundation technique has also prevented damage of the archaeological remains scattered around, which otherwise they would have suffered.

Given the resulting loads, the vertical structure was made with reinforced concrete columns erected on the capping beams and attached to the internal face of the building's facade. On the LRC's ground floor, adding an intermediate structural axis matching one of the old building's foundation lines, allowed us for thinner slabs. In the future museum's area, scattered with archaeological remains, we avoided this foundation line using deep beams made with self-compacting concrete. Above them, the centerline of vertical structure has been recovered from the first floor on. On the penultimate floor, due to the external walls section decrease, and matching the vertical line of structure, (widely separated from the walls) the used of steel columns of reduced section lighten the structure.

The floors were made with a mixture of flat concrete slab (25cm thick), in the transit zones, and a rib slab made "in situ" on the reading and study areas, performed with a linear recoverable formwork. A beam that longitudinally crosses the building, and that has been suitably perforated to allow the passage of the services joins both slabs. The stability of the external walls is ensured by the use of metal connectors and resins.

The original side gable roof is recovered. A 14 meters long laminated wood and metal trussed is the only structure that rests on the original walls. A perimeter concrete beam consolidates the stone cornice. A 12cm EPX insulation sandwich panel and an interior board made by recycled OSB particles forms the roof wrought. The outside is coated with a waterproof dry sheet, corrugated sheet and recovered tiles (Fig.6).

Electrical, lighting and fire facilities run through a general line along the inner building perimeter, and they are distributed between the ribs. The electrical facilities run through the lighting trays. The upper slab is perforated to allow their accommodation in manholes from where the worktables will be electrified.



Fig. 6 : LRC construction. From left side to right: foundations, protection of archaeological remains, internal construction and roof.

The air-conditioning system is designed with a four hot-cold tubes structure that is distributed through fan coils. A condensing boiler's heat generator is combined with a high efficient VRV system for cold. Conventional systems are supported by solar panels and pretreated air in a heat exchanger. The system has been designed thinking of the future integration of a geothermal pump fed by pipes buried in the backyard. The placement of insulation in facades has been omitted, taking advantage of the high thermal inertia of the perimeter walls. The calculations made in simulation programs give the building an A qualification in energy efficiency.

4. Conclusions

The new LRC is the latest accomplishment regarding the recovery of historic buildings for teaching purposes that follows the University of Alcalá tradition. Because of its volume and implementation in the historic city center, this latter embodiment could be considered as an effort to pursue a new type of intervention matching the current economic, social and cultural circumstances. This renovation has given a greater prominence to the architectural space, managing a limited formal and constructive repertoire, also expressed with a limited use of materials. It is an intervention in stark contrast to previous ones, traditionally more focused on the formal and aesthetic recovery, with a profuse use of finishes and materials traditionally associated to rehabilitations (hardwoods, stone, glass, plaster and stucco). The result is a wide space that can be run with the flexibility demanded by the constantly changing university needs and uses, of low maintenance, low energy consumption, and built adjusting costs to the current Spanish economic situation (Fig.7).

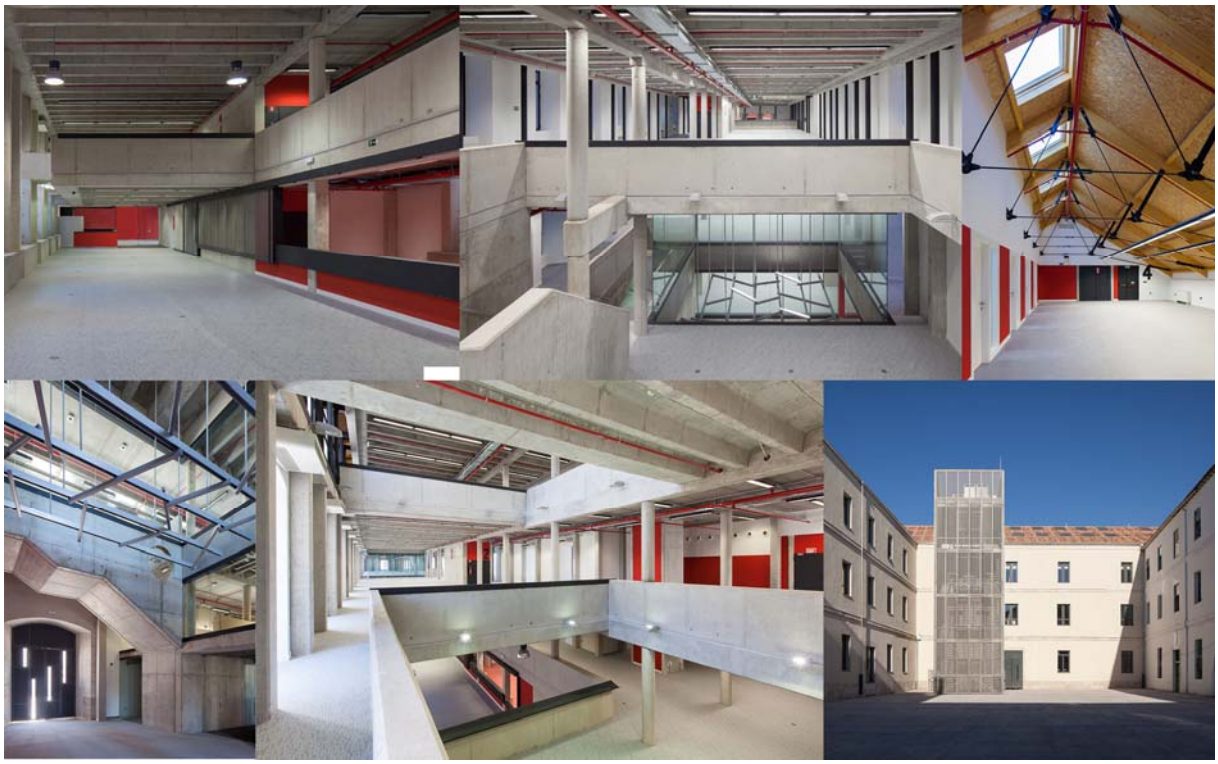

Fig. 7: LRC finish building views

Bibliographical References

[1] ECHEVERRIA, Ernesto. La fundación cisneriana como catalizador del urbanismo de Alcalá hasta su traslado en 1836. In AA.VV. *Universidad de Alcalá: de las armas a las letras*. Alcalá de Henares: Universidad de Alcalá, 2010. p.15-35.

[2] ECHEVERRIA, Ernesto, DA CASA, Fernando, CELIS, Flavio, CHIAS, Pilar. The University of Alcala de Henares (Madrid, Spain), as a dynamic example and laboratory of the recovery, rehabilitation, and conservation of the cultural heritage. In AA.VV. *Proceedings of XXIV International CIPA Symposium 2013.* Strasbourg: ISPRS Archives Volume XL-5/W2. 2-6 September 2013. p.237-243.

[3] BLANCO, Rivera. La Universidad de Alcalá, Patrimonio de la Humanidad. In AA.VV. *Universidad de Alcalá, Patrimonio de la Humanidad - World Heritage*. Alcalá de Henares: Universidad de Alcalá, 2012. p.19-37.

[4] LAYUNO, M. Ángeles. Cuartel del Príncipe y Lepanto. In AA.VV. *Universidad de Alcalá, Patrimonio de la Humanidad - World Heritage*. Alcalá de Henares: Universidad de Alcalá, 2012. p.181.

[5] SERRANO Elena, ACEDO, M. Carmen. *Informe preliminar de actuación arqueológica. Biblioteca central de Humanidades de la Universidad de Alcalá. Convento de San Diego*. Alcalá de Henares: Universidad de Alcalá, 2009.

[6] LINAZASORO, J. Ignacio. Modernidad y patrimonio. In favor of Anonymous Architecture. *Arquitectura Viva*. nº157. 11/13. Madrid. p. 96. ISSN: 0214-1256

[7] ALMAGRO, Antonio. A vueltas con el patrimonio. Lights and shadows in Spanish Restoration. *Arquitectura Viva*. nº156. 10/13. Madrid. p. 55-59. ISSN: 0214-1256

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Retrofit Actions on the Envelope of an Existing Historical Public Building: Energy and Economic Analyses

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Abstract
Several European directives invite Member States to take measures in order to reduce both energy consumption and pollution associated to existing buildings, especially those of public services. The energy and economic impact of several retrofit actions on an existing historical public building is evaluated in this paper. The study is aimed at both proposing a general operational methodology as well as highlighting a best-practice for the Italian territorial context, which has several historical buildings needing restoration.
The analysis has been focused on the Abbey of San Lorenzo ad Septimum, that is located in Aversa (southern Italy) and hosts the Department of Architecture and Industrial Design of the Second University of Naples.
First of all, the current energy demand of the building during winter has been estimated. At a later stage, three different retrofit actions were simulated and analyzed: 1) utilization of thermostats to regulate the target of indoor air temperature; 2) increase of thermal insulation of the external opaque walls; 3) reduction of both thermal transmittance and air draught associated to the fenestration systems.
The influence of each action on the building performance has been carefully evaluated in terms of both primary energy consumption and operating costs, with the main aim of estimating the potential benefits associated to the proposed measures.

Keywords: Historical buildings; Building simulations; Energy Saving; Energy efficiency; Retrofit actions.

1. Introduction
Even if a significant part of the Italian building stock was realized between the 1950s and the first part of the Eighties, as a result of the urban growth following the second world war, over 3,900,000 buildings were built prior to the 1920s [1]. Moreover, a lot of these constructions are characterized by historical-artistic values and therefore protected as Cultural Goods; the Italian cities show a beautiful mixture of admirable examples of buildings, characterized by significant historical-artistic value as well as including mosaics of ages and styles.
According to the Italian Legislative Decree 192/2005 [2], no energy retrofits are mandatory for historical buildings in order to postpone the energy performance to the cultural integrity. However the energy consumption of the civil sector in the European Union is about 40% of the total energy demand, with it generating 40-50% of the total output of greenhouse gases [3]. These figures imply that, with initiatives in this area, significant energy savings can be achieved, thus helping to attain objectives on climate change and supply security.
A survey of the references in the scientific literature illustrates a substantial lack of studies specifically focused on building retrofitting and refurbishment actions [3].

In this paper, the energy and economic impact of several retrofit actions on an existing historical public building is evaluated; measures compliant with architectonic features and respecting the historical heritage were considered and analyzed.
The study focused on a portion of the Abbey of San Lorenzo ad Septimum, that is located in Aversa (southern Italy) and hosts the Department of Architecture and Industrial Design "Luigi Vanvitelli" of the Second University of Naples.
The analysis is aimed at both proposing a general operational methodology as well as highlighting a best-practice for the Italian territorial context, which has several historical buildings needing restoration.
The primary energy consumption and operating costs associated to the current operation of both the heating system and lighting appliances of the Abbey during winter were evaluated based on field survey and manufacturers' data. These estimated values were compared with those achievable by adopting several retrofit actions on both the heating system serving the Abbey as well as the building envelope; the primary energy consumption and operating costs associated to the mentioned hypothetical measures were evaluated by using the whole-building dynamic simulation software TRNSYS 16 [4]. The performed comparison among the current status and the possible future scenarios allowed to evaluate the potential benefits in terms of primary energy saving and operating costs reduction and, therefore, assess the feasibility of each proposed retrofit action.

2. Description of the historical building

The Department of Architecture and Industrial Design "Luigi Vanvitelli" of the Second University of Naples is located within the Abbey of San Lorenzo ad Septimum. The abbey complex was built at the end of tenth century along the consular street named "Via Campana" and represents the result of three centuries of history. The church was raised around the year 1080: it has a nave and two aisles and shows several stratifications. The bell tower was rebuilt around mid-fifteenth century as a consequence of the earthquake of the year 1456. The main renaissance cloister has several round arches positioned over Doric columns; it acts as the connection among the different parts of the abbey complex: towards the north, there is the church; the garden is located towards the south; westward there are the minor baroque cloister and the eighteenth-century portion designed by the architect Ferdinando Fuga; eastward, there is the nineteenth-century portion that was completed during the period when the abbey was a College and Real School of Arts. Additional details regarding the historical building can be found in [5].
In this paper, only a part of the whole Abbey of San Lorenzo ad Septimum was investigated. In particular, in this study attention was focused on three main parts of the historical building composed of three floors per each:

- the nineteenth-century portion;
- the west wing;
- the east wing.

Figure 1 highlights the portions studied in this paper on the map of Abbey of San Lorenzo ad Septimum.
The nineteenth-century portion hosts 2 classrooms and 1 library, with a total volume of 5432 m^3 and a floor area equal to 302 m^2; the west wing hosts 5 classrooms, with a total volume of 7188 m^3 and a floor area equal to 517.69 m^2; the east wing hosts 5 classrooms and 6 bathrooms, with a total volume of 4483 m^3 and a floor area equal to 474 m^2.
The current thermal transmittance of the external opaque walls ranges from 0.699 and 1.484 W/m^2K, while the current thermal transmittance of the windows is equal to 3.47 W/m^2K.

3. Heating and lighting systems: state of art

The portions of the Abbey of San Lorenzo ad Septimum investigated in this paper are currently heated during the winter by using a water system. Hot water is produced by a diesel-fired boiler; according to the manufacturer data, the thermal efficiency of the boiler η_B can be obtained by using the following equation:

$$\eta_B = -0.001 \cdot P_{th,B} + 0.957 \quad (1)$$

where $P_{th,B}$ is the thermal output of the boiler.
Hot water is heated up to a preset temperature and circulated towards several fan-coils distributed throughout the building by means of pumps and insulated tubes; 96 fan-coils are installed with a nominal heating capacity ranging from 2.6 and 3.0 kW (at medium fan velocity) per each and nominal electric consumption (at medium fan velocity) in the range of 27÷45 W per each. At the moment, the

building is not equipped with thermostats to set the target of the indoor air temperature and switch off the heating system in case of the target temperature being reached.
The lighting of the investigated parts of the Abbey is currently obtained by means of 621 fluorescent sources with a nominal electric consumption from 55 W up to 200 W per each.
The primary power consumed by both the heating system and lighting appliances P_p was calculated based on the following equation:

$$P_p = \sum_{i=1}^{96} \frac{P_{th,FC,i}}{\left(\eta_{em} \cdot \eta_{dist} \cdot \eta_B\right)} + \sum_{i=1}^{96} \frac{P_{el,FC,i}}{\eta_{el}} + \sum_{j=1}^{621} \frac{P_{el,L,j}}{\eta_{el}} \quad (2)$$

where $P_{th,FC,i}$ is the nominal thermal output of the i-th fan-coil (obtained from manufacturer's data), $P_{el,FC,i}$ is the nominal electric power consumed by the i-th fan-coil (obtained from manufacturer's data), $P_{el,L,j}$ is the nominal electric power consumed by the i-th fluorescent lamp (obtained from manufacturer's data), η_B is the thermal efficiency of the boiler obtained from equation (1), η_{el} is the average electric efficiency associated to electricity production in Italy including transmission and distribution losses (assumed equal to 0.461 according to the Italian scenario [6]), η_{em} is the emission efficiency taking into account the thermal losses associated to the use of fan-coils as terminal units (it was assumed equal to 0.960 according to the Standard UNI/TS 11300-2 [7]), η_{dist} is the distribution efficiency taking into account the thermal losses associated to the circulation of hot water through the building (it was assumed equal to 0.925 according to the Standard UNI/TS 11300-2 [7]),and the indexes *i* and *j* represent the number of fan-coils and lighting appliances, respectively.
The total primary energy E_p consumed by both the heating and lighting system was calculated by assuming that both fan-coils and lighting appliances operate for 10 hours per day from November 15th up to March 31st (academic holidays and weekends excluded).
The operating cost *OC* associated to both the heating system and lighting appliances was calculated based on the following equation:

$$OC = UC_{diesel} \cdot \frac{E_{p,B}}{\rho_{diesel} \cdot LHV_{diesel}} + UC_{el} \cdot E_{el,FC} + UC_{el} \cdot E_{el,L} \quad (3)$$

where UC_{diesel} is the average unit cost of diesel (assumed equal to 1.41 €/liter according to the Italian market), ρ_{diesel} is the density of diesel (assumed equal to 850 kg/m^3), LHV_{diesel} is the Lower Heating Value of diesel (assumed equal to 44.4 MJ/kg), UC_{el} is the average unit cost of electric energy (assumed equal to 0.20 €/kWh$_{el}$ according to the Italian market), $E_{el,FC}$ is the electric energy consumed by fan-coils, $E_{el,L}$ is the electric energy consumed by the lighting appliances, and $E_{p,B}$ is the primary energy consumed by the boiler. The value of $E_{p,B}$ was calculated by means of the following formula:

$$E_{p,B} = \frac{E_{th,FC}}{\left(\eta_{em} \cdot \eta_{dist} \cdot \eta_B\right)} = \frac{\sum_{i=1}^{96}\left(P_{th,FC,i} \cdot OT_{FC,i}\right)}{\left(\eta_{em} \cdot \eta_{dist} \cdot \eta_B\right)} \quad (4)$$

where $E_{th,FC}$ is the thermal energy output associated to all of fan-coils and $OT_{FC,i}$ is the operating time of the i-th fan-coil.
Under the above-mentioned hypotheses, the current primary energy consumption and the operating costs associated to the operation of both the heating system and lighting appliances during the heating period are equal to:

- E_p = 3.02E+05 kWh
- *OC* = 37548.20 €

4. Retrofit actions

In order to both save primary energy and reduce operating costs, the following three retrofit actions were proposed and analyzed:

1) utilization of thermostats to regulate the indoor air temperature with a target of 20 °C;
2) addition of insulating panels to increase the current thermal insulation of the opaque external walls to be compliant with the Italian Law [8];
3) substitution of current windows to reduce the current thermal transmittance to be compliant with the Italian Law [8].

In order to estimate the energy primary saving and the operating cost reduction associated to the proposed actions, the portion of the Abbey of San Lorenzo ad Septimum described in Figure 1, the whole-building was simulated using the dynamic simulation software TRNSYS 16 [4]. This software allows to calculate the thermal load to be balanced taking into account the external climatic conditions, the thermal transmittance values of both the walls and windows, the air change due to air infiltration, the internal loads due to people and lighting appliances, the target for the indoor air temperature, etc. This simulation tools is widely used in literature for evaluating the energy performance of buildings upon varying the operating scenarios [9-12].
The simulations were performed from November 15th up to March 31st, with a simulation time step equal to 1 hour; both heating and lighting systems were considered as switched off out of school time.
In the following sections, the above-mentioned measures are described in more detail and the results associated to the above-mentioned three retrofit actions are shown and discussed.

4.1 Retrofit action 1: simulation results

As above-mentioned, currently the heating system of the Abbey is not equipped with thermostats to set the target of the indoor air temperature and switch off the heating system in case of the target temperature being reached.
The installation of a thermostat in each room is proposed as first retrofit action. In order to evaluate the potential benefits associated to this measure, the investigated portions of the building were simulated. The simulation was performed by assuming:

- thermal transmittance of both the walls and windows equal to the current values;
- air exchange rate due to air infiltration ranging from 0.40 up to 0.48 volumes/h (calculated according to the Standard UNI 12831 [13]);
- internal loads due to people compliant with the current academic timetable by assuming the students as seated at writing;
- internal loads due to lighting appliances compliant with the current academic timetable by assuming that 75% of the nominal electric consumption is transferred to the indoor air as heat;
- target for the indoor air temperature equal to 20°C.

Figure 2a highlights the hourly variation during the heating season of the sensible thermal load associated to the whole part of the Abbey under investigation, while Figure 2b reports the hourly variation of both thermal load and indoor air temperature for a single particular classroom during a typical day of operation. As can be derived from Figure 2a, the maximum sensible thermal load is equal to 137 kW, while Figure 2b illustrates the operation of the heating system that is switched off in the case of (i) the indoor temperature becomes equal to the desired target (20 °C) and (ii) out of school time.
Figure 3a highlights the hourly variation during the heating season of the operating costs of both diesel (consumed by the boiler) and electric energy (consumed by both lighting appliances and fan-coils) associated to the whole part of the Abbey under investigation, while Figure 3b reports the hourly variation of diesel cost and electric energy cost for a single particular classroom during the same typical day of operation considered in Figure 2b. As can be derived from Figure 3a, the total operating costs can reach a maximum of 36 €/h, while Figure 3b demonstrates that the operating costs are mainly due to the boiler operation and they are relevant mainly from 8 a.m. to 10 a.m. and from 5 p.m. to 7 p.m..
Figure 4a highlights the primary energy consumption associated to the current status of the building (calculated as described in the section 3) and the primary energy consumption obtained from the simulation after the introduction of the above-mentioned retrofit action 1. The latter value was obtained by integrating the primary power calculated with the following formula over the whole period of operation of heating and lighting systems:

$$P_p = \frac{P_{th,LOAD}}{\left(\eta_{em} \cdot \eta_{dist} \cdot \eta_{reg} \cdot \eta_B\right)} + \frac{P_{el,TOT,FC}}{\eta_{el}} + \frac{P_{el,TOT,L}}{\eta_{el}} \quad (5)$$

where $P_{th,LOAD}$ is the total sensible thermal load (obtained from simulations), $P_{el,TOT,FC}$ is the electric power consumed by all of fan-coils, $P_{el,TOT,L}$ is the electric power consumed by all of fluorescent lamps, η_B is obtained from equation (1), η_{el} is the average electric efficiency associated to electricity production in Italy including transmission and distribution losses (assumed equal to 0.461 according to the Italian scenario [6]), η_{em} is the emission efficiency (assumed equal to 0.960 according to the Standard UNI/TS 11300-2 [7]), η_{dist} is the distribution efficiency (assumed equal to 0.925 according to the Standard UNI/TS 11300-2 [7], η_{reg} is the regulation efficiency taking into account the losses associated to the on/off operation of the heating system associated to the control of indoor air

temperature (it was assumed equal to 0.920 according to the Standard UNI/TS 11300-2 [7]). As it can be derived from Figure 4a, using thermostats allows to save the primary energy consumption by about 62%. The percentage difference reported in this figure was obtained as follows:

$$\Delta E_p = \frac{E_{p,current} - E_{p,retrofit}}{E_{p,current}} \cdot 100 \quad (6)$$

where $E_{p,current}$ is the primary energy associated to the current status of the building, while $E_{p,retrofit}$ is the primary energy consumption achievable after the retrofit.
Figure 4b compares the operating costs associated to both the heating and lighting systems before and after the retrofit action 1: the introduction of thermostats reduces the total operating costs for both diesel and electric energy by about 67%. The percentage difference reported in this figure was obtained as follows:

$$\Delta OC = \frac{OC_{current} - OC_{retrofit}}{OC_{current}} \cdot 100 \quad (7)$$

where $OC_{current}$ is the operating cost associated to the current status of the building, while $OC_{retrofit}$ is the operating cost achievable after the retrofit.

4.2 Retrofit action 2: simulation results

The current thermal transmittance values associated to the opaque external walls of the Abbey range from 0.699 and 1.484 W/m^{2}K. Starting from 1 January 2010, the Italian Law [8] specifies the threshold values of thermal transmittance for the external walls of the renovated buildings depending on (i) the climatic zone where the building is located and (ii) the wall type (external wall, ground and roof); the threshold value of the thermal transmittance for the external walls associated to property renovations in Aversa is 0.34 W/m^{2}K.
The retrofit action 2 consists of using both the thermostats to regulate the target of indoor air temperature (at 20°C) as well as insulating panels [14] with thermal conductivity equal to 0.023 W/mK in order to achieve the threshold value of thermal transmittance suggested by [8]. Taking into account that the Abbey is characterized by several typologies of external walls, different thickness of insulating panels were proposed for each wall typology.
Figure 5a highlights the primary energy consumption associated to the current status of the building (calculated as described in the section 3) and the primary energy consumption obtained from the simulation after the introduction of the above-mentioned retrofit action 2 (calculated from the simulation results by means of equation (5)); as it can be noticed, the primary energy consumption is reduced by about 70%; by comparing Figure 5a and Figure 4a, it can be noticed that the addition of insulating panels allows to lower the primary energy consumption by about 8% with respect to the only use of thermostats (retrofit action 1).
Figure 5b compares the operating costs associated to both the heating and lighting systems before and after the retrofit action 2: the use of insulating panels reduces the total operating cost for both diesel and electric energy by about 75%; by comparing Figure 5b and Figure 4b, it can be noticed that the addition of insulating panels allows to lower the operating costs by about 8% with respect to the only use of thermostats (retrofit action 1).
The percentage differences reported in Figures 5a and 5b are calculated by using the formulas (6) and (7), respectively.

4.3 Retrofit actions 3: simulation results

The current thermal transmittance values associated to the windows of the Abbey is 3.47 W/m^{2}K. Starting from 1 January 2010, the Italian Law [8] specifies the threshold values of thermal transmittance for windows of renovated buildings depending on the climatic zone where the building is located; the threshold value for windows associated to property renovations in Aversa is 2.10 W/m^{2}K.
The retrofit action 3 consists of three main measures:

- using thermostats to regulate the target of indoor air temperature (at 20°C);
- adding insulating panels [14] on the opaque external walls to achieve the threshold value of thermal transmittance suggested by [8];
- substituting the current windows with new ones characterized by thermal transmittance values compliant with [8].

Thanks to the higher quality of window-seal associated to the new windows under consideration, a reduction of air exchange rate due to infiltration from 0.40÷0.48 volumes/h up to 0.12÷0.14 volumes/h was also assumed.
Figure 6a highlights the primary energy consumption associated to the current status of the building (calculated as described in the section 3) and the primary energy consumption obtained from the simulation after the introduction of the above-mentioned retrofit action 3 (calculated from the simulation results by means of equation (5)); as it can be noticed, the primary energy consumption is reduced by about 74%; by comparing Figure 6a and Figure 5a, it can be noticed that the substitution of the current windows allows to lower the primary energy consumption by about 4% with respect to the result associated to the retrofit action 2.
Figure 6b compares the operating costs associated to both heating and lighting systems before and after the retrofit action 3: the substitution of windows reduces the total operating cost for both diesel and electric energy by about 79%; by comparing Figure 6b and Figure 5b, it can be noticed that the substitution of the current windows allows to lower the operating costs by about 4% with respect to the result associated to the retrofit action 2.
The percentage differences reported in Figures 6a and 6b are calculated by using the formulas (6) and (7), respectively.

5. Conclusions

Three different retrofit actions were proposed to reduce both the primary energy consumption and the operating costs associated to the operation of both heating and lighting systems during the winter associated to a portion of the historical building hosting the Department of Architecture and Industrial Design “Luigi Vanvitelli”.
A general methodology (applicable to case studies different from that one investigated in this paper) to evaluate the potential energy and economic benefits associated to retrofit actions on existing building is proposed and described.
With respect to the proposed measures, the analysis highlighted that the utilization of thermostats allows to achieve the most significant reduction of both primary energy consumption and operating costs if compared to the other proposed retrofit actions; the utilization of insulating panels allows to achieve a more pronounced reduction of both primary energy consumption and operating costs with respect to the substitution of windows.



Fig. 1: Portions of the Abbey of San Lorenzo ad Septimum analyzed in this paper.

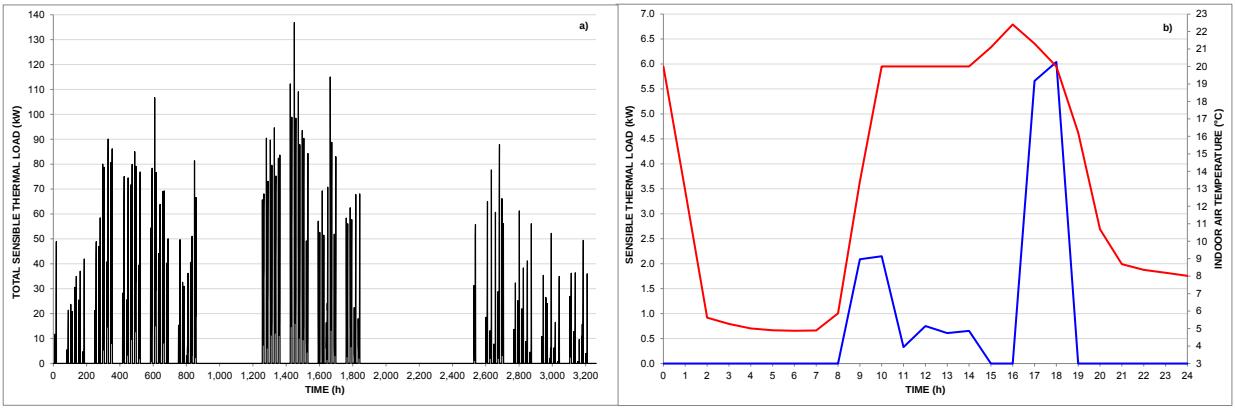


Fig. 2: Thermal load of the whole part of Abbey under investigation during the heating season (a); thermal load and indoor air temperature of a single classroom during a typical day (b).

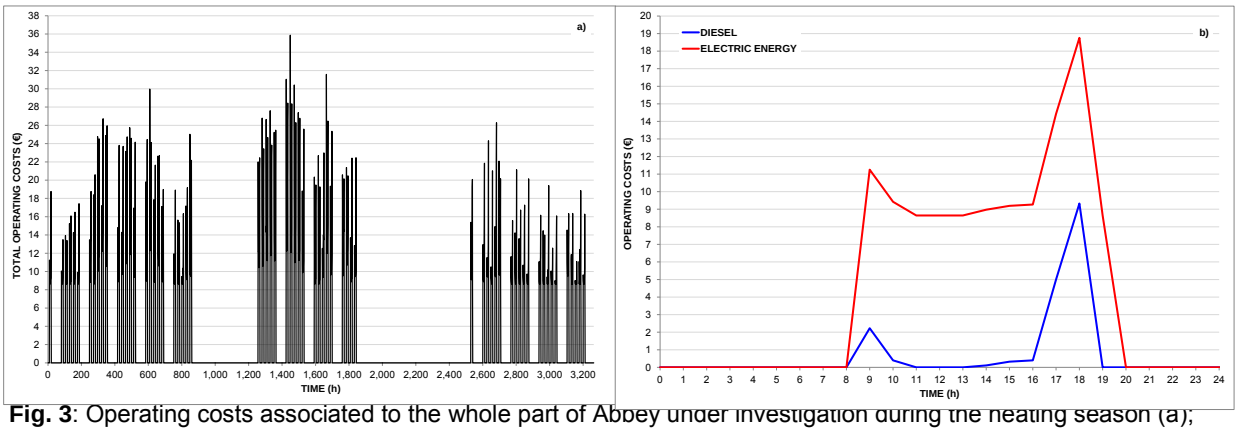
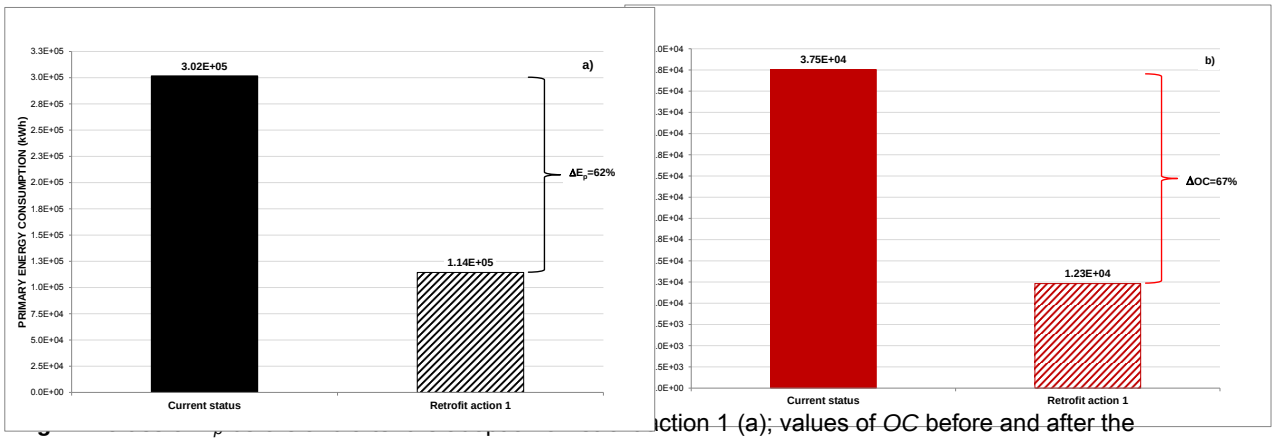
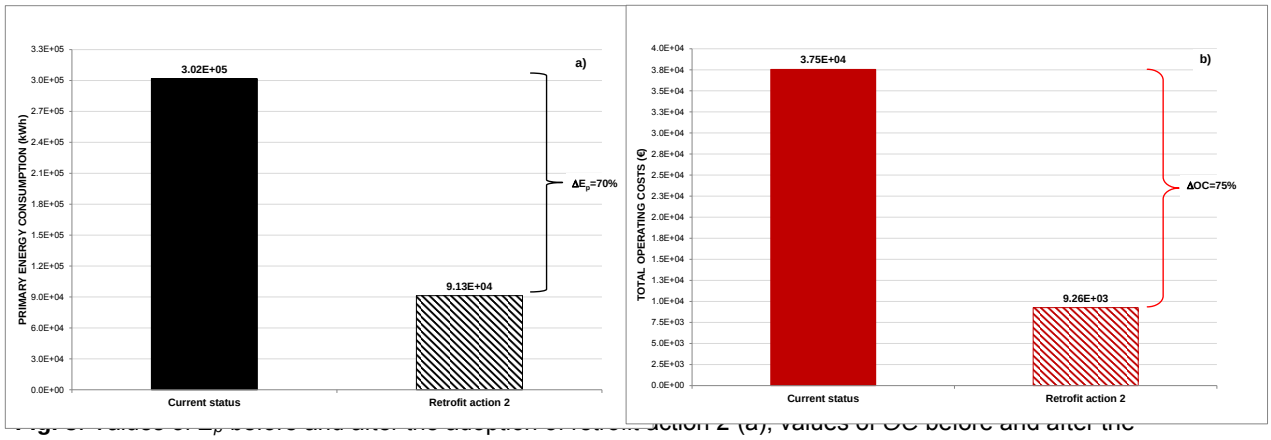


Fig. 3: Operating costs associated to the whole part of Abbey under investigation during the heating season (a); diesel cost and electric energy cost associated to a single classroom during a typical day (b).



...ction 1 (a); values of *OC* before and after the adoption of retrofit action 1 (b).



...ction 2 (a); values of *OC* before and after the adoption of retrofit action 2 (b).

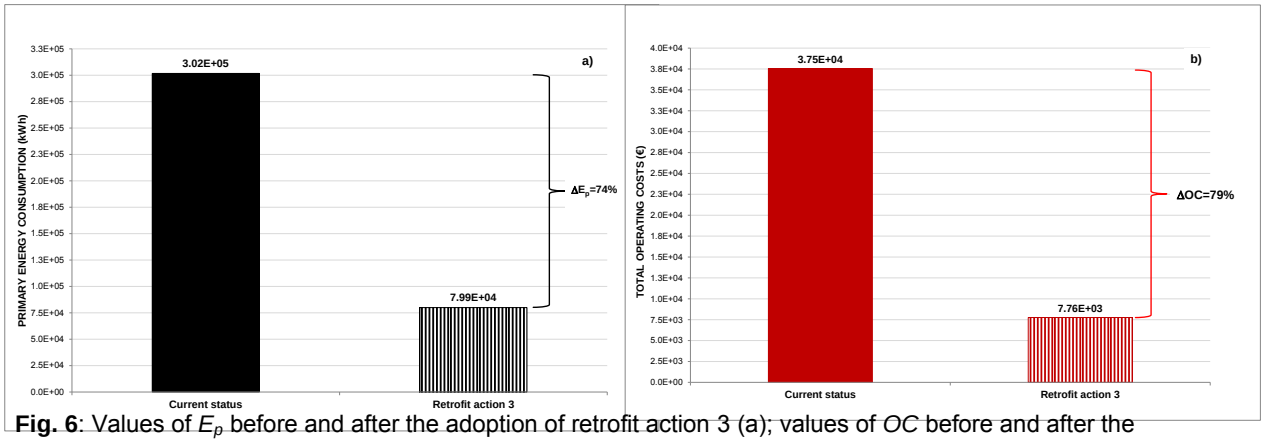


Fig. 6: Values of E_p before and after the adoption of retrofit action 3 (a); values of *OC* before and after the adoption of retrofit action 3 (b).

Bibliographical References

[1] DE ROSSI, Filippo, SCUTO, Vincenzo, TINO, Simonetta, VANOLI, Giuseppe Peter. Risparmio energetico come elemento qualificante nel recupero di palazzine anni '30. In *Proceedings of The 61th ATI National Conference*. Perugia (Italy), 2006.

[2] Italian Government, Attuazione della Direttiva 2002/91/CE relativa al rendimento energetico nell'edilizia, Legislative Decree n. 192 (2005).

[3] ARDENTE, Fulvio, BECCALI, Marco, CELLURA, Maurizio, MISTRETTA, Marina. Energy and environmental benefits in public buildings as a result of retrofit actions. Renewable and Sustainable Energy Reviews. Volume 15, 2011, p. 460-470.

[4] Solar Energy Laboratory, TRNSYS 16, A transient system simulation program, Tech. Rep., University of Wisconsin, Madison, USA, 2004.

[5] MELILLO, Luigia, JACAZZI, Danila, ARGENZIANO, Pasquale. Il sito di San Lorenzo ad Septimum sulla Via Campana. Prima di Rainulfo. Gli scavi archeologici nel sito ad Septimum. L'insula benedettina extra muros Aversae in età medioevale e moderna. La Via Campana da Capua a ad Septimum note per un repertorio critico della cartografia storica. *Le Vie dei Mercanti. Cielo dal Mediterraneo all'Oriente*. Napoli, edited by Carmine Gambardella, Massimo Giovannini, Sabina Martusciello, 2009, pp. 211-252. In AA.VV. *Proceedings of the 6th International Forum.* Capri (Italy), 5-7 June 2008.

[6] Italian Ministry of Economic Development:
http://www.sviluppoeconomico.gov.it/images/stories/normativa/DM-5-SETTEMBRE2011.pdf.

[7] UNI/TS 11300-2 - Energy performance of buildings Part 2: Evaluation of primary energy need and of system efficiencies for space heating and domestic hot water production

[8] Italian Decree n. 311/06: http://www.artechint.com/attestato-energetico.pdf.

[9] ROSATO, Antonio, SIBILIO, Sergio, SCORPIO, Michelangelo. Dynamic performance assessment of a residential building-integrated cogeneration system under different boundary conditions. Part I: Energy analysis. Energy Conversion and Management. Volume 79, 2014, p. 731-748.

[10] ROSATO, Antonio, SIBILIO, Sergio, SCORPIO, Michelangelo. Dynamic performance assessment of a residential building-integrated cogeneration system under different boundary conditions. Part II: Environmental and economic analyses. Energy Conversion and Management. Volume 79, 2014, p. 749-770.

[11] ROSATO, Antonio, SIBILIO, Sergio, CIAMPI, Giovanni. Dynamic performance assessment of a building-integrated cogeneration system for an Italian residential application. Energy and Buildings. Volume 64, 2013, p. 343-358.

[12] FALCONETTI, Pasquale, ROSATO, Antonio, SIBILIO, Sergio, PITZALIS, Efisio. Technical and architectural integration of a solar cooling system in a historical building. In AA.VV. *Proceedings of "Le vie dei Mercanti – X Forum Internazionale degli Studi"*. Aversa-Capri (Italy), 21st May-2nd June 2012, p. 1075-1081.

[13] EN12831:2003. Heating systems in buildings – method for calculation of the design heat load.

[14] STIFERITE Srl: http://www.stiferite.com/schede/Scheda_tecnica_STIFERITE_RP1.pdf.

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Urban planning and administration in a provincial city in the early 20th century

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Abstract
Between the end of the 19th century and beginning of the 20th century, the urban plan of a number of European cities underwent major transformations.
The birth and proliferation of innovative industrial enterprises caused the previous socioeconomic structure generated by an agricultural economy to evolve.
In the space of just a few years, factories, housing for workers and numerous public and private buildings for the new society were built.
For the first time, the evolution and expansion of cities were planned on paper before implementation.
The projects drawn up by the planners were no longer on individual building scale, but covered large areas, to the point of considering the evolutions in terms of the entire local authority area.
The road network in the existing city was amplified and new buildings were built, often demolishing part of the historic town. New single-function districts were added alongside the consolidated nucleus.
During this period, a series of analytical, design and regulatory tools were developed to allow cities to be developed congruently.
We therefore felt it would be interesting to follow the transformation of Rovereto (Trentino) where, in just under 15 years, the presence of a large number of troops and the introduction of industrial activities created a modern rational urban aggregation in place of the previous small-town dimension.

Keywords: urban transformation, expansion of cities, modern architecture.

1. The urban transformation of Rovereto at the turn of the 19th century
During the closing decades of the 19th century, many European cities adopted an urban planning scheme and began a complete reorganisation of land use, driven by social pressures, the need for new residential areas at the edges of the existing city and the necessity to confirm and transform the consolidated urban nucleus. The social and economic changes induced by the development of industrialisation and the parallel regression of subsistence agriculture led to often unplanned expansion of the suburbs which ended up modifying the consolidated image of the city closed within its medieval walls. The search for areas to allocate to the new buildings led to proposals to gut the historic city centres, demolish the city walls, separate districts according to social class and introduce factories into the city. By modifying the rules of the market, the social transformations attributed ever growing importance to income from the land which became the mainstay of the capitalist society.
During this period, cities and towns were provided with new infrastructure - drains and sewers, aqueducts, power mains and tramlines. For the first time in urban history, the resulting high degree of "urban disorder", scale of the activities and maximisation of profit by landowners made it necessary to define compulsory land regulation and planning tools, necessitating the drafting of building regulations and planning schemes.

The procedures and timing of the growth process differed in the various European urban agglomerations. Some cities expanded spontaneously, others according to established plans, irrespectively with sometimes positive, sometimes negative results.
In the case of small towns, far from the driving forces of the industrial mentality, the evolution came later and in the majority of cases took place in the total absence of any form of planning, with new buildings springing up alongside the historic city centre in an attempt to take as little land as possible away from agriculture. There are only a few cases of small provincial towns which grew consciously according to planning schemes and careful economic evaluations, in many cases based on policies drawn up on the basis of nothing but good sense and proving highly valid, to the point where they could still be adopted today.
One such case is Rovereto, a small city in the province of Trentino which, between 1890 and 1915, underwent major social and economic transformation. From a small market town at the centre of a number of agricultural villages with the same characters, it was transformed into an industrial and military centre.
From the second half of the 19th century, Rovereto based its growth on planning schemes drawn up by "city engineers" appointed by the municipality to coordinate and control urban growth. In the majority of cases, these planning and regulatory tools received only partial approval, but they nevertheless guided the subsequent transformation processes.
In the 19th century, more than in other cities or towns, in Rovereto (situated on the frontier of the Hapsburg Empire) attempts were made to reactivate the urban development process promoted by the Venetians in the 15th century (from 1418 to 1509) by introducing silk production. In just a few years, this modified the centuries-old economy, bringing a vitality which was maintained for a number of centuries. In the second half of the 19th century, Rovereto went through a further period of economic stagnation, partly caused by the agricultural crisis, combined with the crisis in the industrial sector (in 1873, the whole of Europe and the United States were experiencing the first economic depression of the industrial age). New activities were introduced in an attempt to revive the economy and urban development. Growth was hampered by central government, which considered it inappropriate to invest in a frontier territory where the Italian and German cultures had always existed side by side... an area which, after the loss of the Lombard Veneto, was becoming an ever more important part of the defence strategy as the Adige valley was one of the main axes of penetration from the Italian regions.
As in all municipalities in the Hapsburg Empire with a population of more than 10,000 inhabitants, in compliance with Law no. 206 of 26 November 1824[1], a building office[2] was set up to regulate public and private building activities. This was responsible for regulating and coordinating public and private building, including through preparation of the city's expansion plans.
In Rovereto, the city engineering department was run first by engineer Folinio Cristiano Chiusole[3], then by engineer Gaetano Gerola and later by engineer Ettore Gilberti. Working in the city from 1904 to 1922, it was Gilberti's job to give concrete form to the plans drawn up by his predecessors and advance new proposals for expansion with the public and private buildings required by modern society.





Fig. 1: Planning scheme covering the entire surface area of the municipality drawn up in 1902 by the city engineer Edoardo Gerosa.

Fig. 2: Detailed plan of the expansion to the west of the historic city centre, drawn up in 1902 by city engineer Edoardo Gerosa showing the planned route of the new connecting axes.

The urban transformation took its cue from the solicitations of enlightened politicians and rich landowners who, with the declared aim of obtaining new resources (sometimes through highly speculative operations), began by financing the modern infrastructure, then planning strengthening of the banks of the Leno torrent and straightening the course of the Adige river and constructing new road and rail axes. This was followed by construction of hydroelectric generating stations (for example, on the Flora and Ponale) to supply the city with electricity, gas (the 1872 plan shows the gasometer already in operation), aqueducts, drains and sewers.
In 1857, city engineer Chiusole drew up the first expansion scheme, including a connection between the existing nucleus and the railway and defining the city's first middle-class district around the road axis. The new district, to the west of the historic city centre, was organised around a linear axis (more than 15 m wide and about 800 m long) extending from the railway station to the new square where the various roads met - the axis of the medieval city and the axis of the 18th century expansion. The plan also included a hypothetical second link, proposing straightening an existing road to connect the church of Le Grazie with the Capuchin Monastery, then crossing numerous private smallholdings to join with an established road axis in the historic city centre (now Mercerie street).
From 1868, Gaetano Gerola intervened on the extensive land front, dividing the territory into large regular lots and assigning them to the modern activities at the service of the community - prison, magistrate's court, law court, schools (teacher training college, swimming school, kindergarten), a number of hotels (the Glira and the Venezia) and meeting rooms. Further roads were also proposed, including one which started from the southern edge of the historic city centre to join Borgo Santa Caterina with Borgo San Tomaso, constructed only 40 years later (Dante street was not in fact constructed until 1901-02).
During this period, the city administration located the areas assigned to industry in two different areas, one parallel to the Leno torrent between the historic city centre of Rovereto and Borgo Santa Maria, in part occupied by the spinning mills and factories built since the 16th century, and one "less artisan" near the railway which occupied agricultural land.
Given the scale of the transformations, in 1896, city engineer Edoardo Gerosa was appointed to draw up the first planning scheme covering the entire municipality. The division of the south west sector was the same as that adopted in engineer Chiusole's expansion plan, but this scheme proposed a more detailed land organisation, utilising only a minimum part of the existing routes. The expansion zone extended from the historic city centre to the railway station and was structured round two main highways (a sort of V), joined by narrower secondary roads. As well as tracing out the layout of the north south axis, the plan also proposed constructing a small park near the bridge. From there, a 25 m wide road went as far as Borgo Santa Caterina where it joined the existing road system, occupying part of the land owned by the Capuchin monastery. As well as providing guidelines for development of the city's south west sector, Gerosa also defined those for the areas to the north. In general, the planning scheme proposed creating wide roads defining large lots, those to the north destined for large industry, those to the south for small industry and workers' housing.
The urban development of Rovereto continued, adopting schemes for medium sized areas, including the plan drawn up in 1902 which proposed a new road joining the old Borgo Santa Maria with the railway and the new districts, without passing through the historic city centre (San Marco district).
To guarantee a fluid and continuous road network, it proposed reconstructing the bridge which had collapsed when the Leno flooded in 1798. Following preparation of the urban planning scheme, the city administration acquired the land along the new 25 m wide road axis (Dante street), subsequently proposing its division into medium to large sized lots (23 to be precise, including 5 on the left bank of the Leno). The lots to be allocated for public works were then identified and the remaining were sold to local businessmen to construct private single and multi-family housing.
To better coordinate the city's expansion, in April 1893, the city administration decided to update the building regulations[4]. For those wanting to construct new buildings or convert existing ones, the revision introduced the obligation to present the building authorisation with the inclusion of a general plan indicating the parcels in the area, the existing and planned roads and the buildings. The building dossier (signed by a qualified engineer and the building firm) had to be accompanied by the plan, the vertical section and a "*detailed and precise drawing*" of the main façade, and also the side façades "*if not identical*". Art. 15 of the regulation suggests that the municipality reserved the right to indicate the precise line and level for both new and converted buildings. The next article (art. 18) prescribed that, in the case of new or reconstructed buildings in "*narrow or winding streets*", an "*appropriate widening or straightening of said streets*" must be considered. The regulation then specified provisions on the dimensions (the height of the building, the rooms, the minimum surface area of the rooms, etc.), the quality of the spaces (lighting and ventilation index of the rooms) and numerous technical requirements (for example, the quality of the materials) to be respected during construction.
Despite the planning tools, for many years modernisation and development of the city remained a paper exercise as the agricultural and economic crisis of the 1870s affecting the entire empire limited the city administration's plans. The greater economic stability of the last years of the 1800s and

appointment of a young enterprising engineer allowed Rovereto to give concrete form to the economic plans and urban expansion projects drawn up for the city until that time.
In 1903, after engineer Edoardo Gerosa had retired, a competition was announced for the position of head engineer of the municipality of Rovereto. The notice, published in both German and Italian newspapers[5], required a diploma in civil engineering and a "good" level of proficiency in architecture. In fact, the city administration was looking for an engineer able to stimulate "quality" urban growth, according to the aspirations of the period, equipping the city with modern infrastructure and functional buildings of significant architectural worth. Unlike other provincial capitals in the Tirol, Rovereto was not therefore looking for a mere technical bureaucrat, but an eclectic curious designer, able to attract capital to build a new city able to rival Trento, always the most important city in the province of Trentino, seat of the church and an imposing military fort.
The political and administrative municipality of Rovereto wanted to have no doubts as to the quality of the man running the city engineering department. The notice therefore established a trial period of two years before definitive appointment which necessarily involved taking German citizenship. Despite the fact that it was not actually specified, this suggests that the governing authorities encouraged the appointment of people from outside, perhaps to combat the numerous acts of favouritism common at the time.
Many Italian engineers asked for clarification on the competition and a full thirty responded to the notice by sending in a formal application, attaching their scientific and professional curriculum vitae. Applications to take part in the competition came from engineers from Turin, Milan, Ferrara, Udine, Venice etc., but the selection never got underway. In fact, the competition dossier has never been found among the documents kept in Rovereto's historic archive and the minutes of the council sittings show that the commission was never even appointed.
After many months, the city administration decided to cancel the competition and enter into private negotiations. Burgomaster Malfatti contacted certain academics at Milan Polytechnic who indicated Ettore Gilberti[6] as a suitable engineer to occupy the post of city engineer, not least because he understood German[7].
Contact was made first with professor in architecture Sebastiano Giuseppe Locati[8] (letter of 22 June 1904) and the academic Camillo Boito (letter of 23 July 1904) who both considered the young student Ettore Gilberti suitable to occupy the post of head engineer of Rovereto. In particular, Boito praised Ettore Gilberti's technical abilities: " … *not only does he compose and draw with great grace and a lively imagination, he is also a precise and well-grounded engineer. He is well familiar with constructions and has no lack of practical experience, as on a number of occasions he has built certain modest buildings in his native Friuli. ... appointing Gilberti would not therefore be other than commendable.* …". Gilberti himself wrote a series of letters to the mayor of Rovereto. Before he had graduated, the municipality of Rovereto decided to take Ettore Gilberti on for a trial period of one year. (letter of 29 July 1904). Negotiations were rapid. Just six days passed between Boito's letter, the council's resolution and Gilberti's formal acceptance.
During the assembly of 9 August 1904, the representatives of the city resolved to appoint Ettore Gilberti provisionally (municipal notice of 20 August 1904) as head of the city engineering department, according to the provisions of the internal staff regulation from the city magistrates. In September, a few days after graduating, Ettore Gilberti was appointed head of the city engineering department of Rovereto and straight away became the technical interpreter of the objectives defined by the politicians to transform Rovereto into a modern city, built in homogeneous districts, flanking the already well-established garrison economy based on contracts and services and responsible for building barracks and forts with the economy of industry and banks.
Gilberti's perspicacity in resolving both urban planning and architectural problems soon emerged as right from his first assignments he dedicated the same attention to designing both the building and its surroundings, considering appearance, structure, technology and functions on both scales. This is clear from his designs and his early projects in particular consist of a considerable number of illustrations defining the immediate surroundings and the building on various scales, right down to the interior design.
Right from the start, Ettore Gilberti's thinking on urban planning is clear, together with the approach he would take in his work to transform and expand the city. He was called on to demolish the insalubrious districts, amplify the drains, sewers and aqueducts, introduce a public and private lighting system, widen and straighten the narrow tortuous streets, improve connections between the consolidated urban nucleus and the railway and establish the main routes crossing the city suitable for the new mechanical means of transport.
The city engineer of Rovereto tried to provide a rapid response to the numerous requests and although these did not always coincide with the political and social demands, they were nevertheless well received by the community. Gilberti certainly did not stop at the knowledge learnt at university. Through constant consultation of French, German and Italian journals, he developed the urban planning and architectural proposals he felt to be most appropriate to resolve the issues, without

becoming a follower of particular schools of thought. For example, he was always against complete gutting of an area, preferring selective demolition and trying, on the other hand, to define architecture able to create a greater sense of space. Ettore Gilberti immediately realised that what was currently happening in numerous German and European cities could not be implemented in Rovereto without completely eliminating the fine fabric of the city and its structures. His way of working makes it clear that the thinking of Gustavo Giovannoni (1873-1947) already existed in embryonic form. Modernisation of the existing buildings and public spaces could not take place by proposing radical demolitions altering the plan of the city and modifying the spatial distribution of streets and squares. Ettore Gilberti criticised the rigidity, technical narrow-mindedness and generic nature of the expansion schemes. For him, the urban planning tool could not be subordinated exclusively to resolving the technical problems of traffic, but must also consider the spatial characteristics of the city and thus its architecture.
The spatial conception of Ettore Gilberti was based on the concept of an interconnected organic composition of sequences of buildings, a refusal of the isolated building, of straight lines, uniform storeys, geometric plans and abstract building regulations. It was founded on the other hand on consideration of topographic details, the dimensional relationships between the buildings, asymmetry and variety to be evaluated through use of a three, rather than two-dimensional design process. These ideas can all be found in the urban planning proposals drawn up for Rovereto.
For example, in his first assignment in Rovereto (conversion of the Pergher house as premises for the Banca Cattolica), to improve hygiene conditions and the road system in the neighbourhood, he proposed shrewd selective demolition, without complete gutting. The local engineers had drawn up various solutions, but the city council and ornamentation commission systematically turned them down as they felt they had too great an impact on the volumes and appearance. Gilberti proposed eliminating the original portico to create a modest recess in the building, together with an airy formal articulation with light coloured marble and pilasters reaching the roof, further widening the road and thus eliminating traffic jams.
Gilberti's formal solution was approved as fully satisfying the requirements of aesthetics, form and spatial rationality expressed by the city administration and the clients. By maintaining the alignment of the existing façades, the uniformity of the row of buildings was retained, while at the same time widening the road and adapting it to form part of the new road system.
This practice was adopted in other projects (Casa Caracristi, the covered market and Casa Suster, constructed in various periods) in various districts in the city centre. Gilberti adopted the principle of minimal demolition and worked predominantly at architectural level, defining buildings with the maximum possible volume, without being spatially invasive as they set out to retain the existing as far as possible. To best satisfy the clients' requirements, in his plans, functions and forms, Ettore Gilberti adopted the language then in vogue, although to reduce construction costs, he used new materials and innovative building techniques.

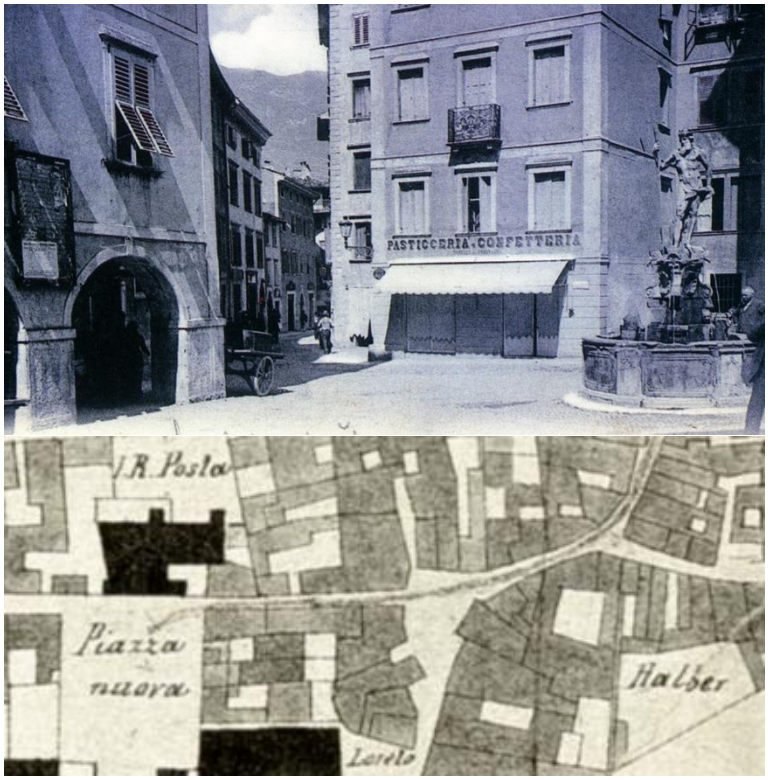
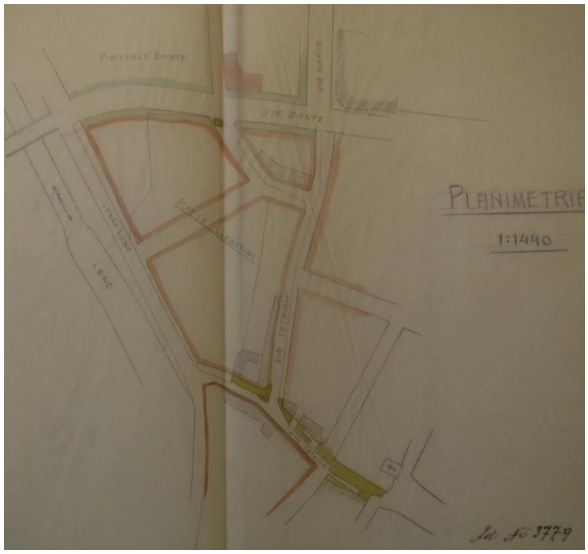




Fig. 3: Selective demolition in the historic city centre - modernisation of Casa Pergher

Ettore Gilberti completed the expansion schemes drawn up by engineer Gerosa, proposing modifications determined by assumption of the detailed plan for a large part of the projects. He also developed new and innovative plans completely independently. Working in synergy with politicians, above all Podestà Malfatti, he used the urban planning tools to try and obtain funding to construct infrastructure and public buildings.
The mayor and the engineer set out first and foremost to increase the council's land holdings, but they were aware that the practice of expropriation (now consolidated in Italy for public utility and included in Milan's urban planning scheme by Cesare Beruto in 1884) to open up roads and squares was not simple to apply. Above all, they did not fund the construction of public works. In Rovereto, they tried to proceed on the basis of the development scheme drawn up by the city council with acquisition of agricultural land which, after changing the designated use, was sold to private individuals who were required to develop it within a certain period. If they did not, the land was re-acquired by the municipality. Development was subordinated to the preparation of what we now call urban planning schemes. In some cases, such as for example the middle-class residential area of Via Dante, the expansion scheme drawn up by engineer Gerosa was "enhanced" by a modern-style compensatory action. To finance creation of a park, Gilberti in fact entered into a public-private partnership in which the city administration granted an increase in the volume of an existing building (the design for the extension was drawn up by Ettore Gilberti) in return for acquiring free of charge a large plot of land which was later divided up into residential lots (Gilberti himself tried to buy a lot). The council-owned parcels to be sold were indicated on the city maps.
In the plan for Via Dante, Ettore Gilberti was responsible for designing a school, a number of single-family houses (Villa Tacchi and Casa Tomasi) and a multi-family house (Casa Feller) which immediately became the headquarters of the military command. The city engineer also took on design of a number of residential buildings for workers' housing (Casa Fedrigotti), adopted as an example by Italian and Austrian designers.
The establishment of numerous industrial activities in the city of Rovereto led to the identification and allocation of numerous areas for the construction of workers' housing by the city council, public utility associations and institutes and consortiums formed by workers and businessmen. Taking advantage of a number of legal provisions (Law no. 37 of 9 February 1892 concerning points for new buildings for workers' housing, Law no. 21 of 31 July 1892, Law no. 144 of 8 July 1902) defining minimum size parameters, providing for substantial tax benefits and making state grants available, in the space of a few years numerous residential blocks of workers' housing were constructed in Rovereto. In Rovereto the municipality in fact used these laws to erect buildings which immediately after construction and with minimum adaptation were used as barracks, thus respecting the requirements of the Vienna War Ministry which obliged local authorities to build troop quarters. For these municipalities, this obligation considerably impoverished their modest coffers, not least because the rents of the military structures were established by central government with Law no. 93 of 11 June 1879 and Law no. 100 of 25 June 1895.



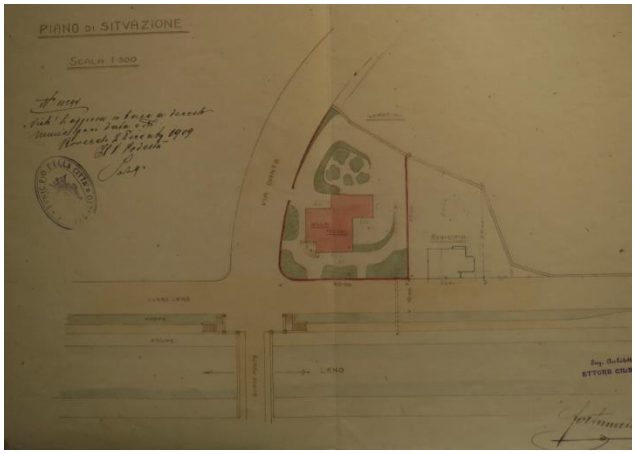


Fig. 4: Urban equalization: increase of the volume available to build public works.

Ettore Gilberti's concreteness and dynamism can be seen from the lot division scheme for the first residential neighbourhood, conceived with a typically middle-class mentality, which wholly re-proposed the Via dei Colli development in Florence, designed by architect Giuseppe Poggi. After close analysis, Ettore Gilberti decided to locate the district on the hill of Rovereto which enjoyed maximum exposure

to the sun. The development was conceived not just as a residential area, but also as an urban park with a sinuous road destined to become a promenade for the middle classes.
Following acquisition of the Antonini agricultural premises by the city council, Ettore Gilberti drew up a plan tracing out a winding route starting from the 19th century square, then becoming a sort of walk in nature. It also provided a more direct connection with Noriglio, until then accessible only by crossing Rovereto, and also a direct connection with the pellagra hospital built in 1898. The engineer designed the main infrastructure, then the mains water supply, drains and sewers and the public and private electricity network. When the parcels of land were sold, a number of lots were bought by city councillors (Red, Pinalli etc., and by Gilberti himself). The purchase deed included a clause committing the city administration to undertake design of the building. This was signed by both the buyers of the land and the municipality and specified the dimensions, form and technologies of the building. The contract also established the duration of the construction work, with penalty clauses for delays in consigning the building.
The city engineering department, or rather the head engineer, was responsible for drawing up the architectural design and an extremely detailed quotation, which became the construction costs, including the technical expenditure and profit made by the municipality[9]. The buildings had to be constructed according to the regulations laid down for municipal buildings and on the basis of a detailed metric estimate, correlated with an analysis of prices and contract specifications.
The private individual, after signing the convention, deposited the established sum in a savings bank. Through a call for tender (with discount bidding), the municipality awarded the contract and the building work began. Subsequently, the city administration drew the sums required for construction freely from the amount deposited (direct payment for materials and labour). If the building was consigned within the time limit established in the contract and in accordance with the design drawings, the private individual was obliged to accept it, renouncing the right to raise objections as to the quality of the materials or execution of the work, acknowledging the municipal supervision as sufficient to safeguard his interests and guarantee the compliance of the private parties involved.





Fig. 5: Land division plan for the construction of the middle-class residential district of Via dei Colli.

The plan and buildings themselves were fully coherent with the taste and expectations of Rovereto's middle classes and from then on, despite the city council's denial, Ettore Gilberti began taking on a number of design projects, many in his native city.
Another important urban planning operation promoted by Ettore Gilberti and backed by podesta Malfatti was the appointment, in 1907, of the brothers Karl[10], Julius[11] and Rudolf Mayreder to draw up the city's urban planning scheme. The brothers had previously been responsible for the urban planning schemes of Vienna (1892-1893) and Baden (1904). Together with his brothers, the academic Karl was attracted by the theories of Camillo Sitte (1843-1903), to the point where the Mayreder brothers adopted Sitte's theories in their design work.
Unlike many other city engineers, Ettore Gilberti felt the need for a "systematic" urban planning tool which defined long-term urban growth for the entire municipal area.
The plan proposed the straightening and (where possible) widening of streets in the historic city centre to adapt them for mechanical means of transport, and then the partial or total demolition of a number

of buildings, followed by redevelopment with modern buildings. As in Gerola's plan, the expansion zone was located to the north west of the existing urban nucleus, as was the primary road network, while the system of secondary roads was denser, defining the housing blocks which, as well as having a smaller surface area than in the previous plan, were also of a regular shape and more or less constant surface area. The plan was not approved, but it became the basis for subsequent interventions promoted by Ettore Gilberti.
While confirming the importance of the east-west connections, this plan suggested defining new north-south axes as the existing and/or planned roads were fragmentary and discontinuous.
The meeting with the Mayreder brothers was important not just for definition of future development in the city of Rovereto. It also enabled Ettore Gilberti to learn about the urban planning theories which were gaining ground in Austria and northern Europe and the new architectural languages which were spreading in the eclectic Vienna.

2. Conclusions

All this demonstrates that the 19th century growth of Rovereto was extensively planned. The urban planning hypotheses guided subsequent phases of development as the general planning scheme drawn up in 1908 by the Mayreder brothers was never approved at political level. It also shows that the urban expansion was the result of a strategic plan with major effects on the economy. The growth of a city cannot therefore take place without programming of any sort, in the absence of any form of development plan and without coherent and well-thought-out planning of public works.
Today as last century, urban planning schemes can, and maybe must, be the starting point for planning both the old and new parts of the city. The proposals in the plan must be evaluated with respect to real feasible projects, evaluating their feasibility in the smallest detail, including with respect to the economic commitment required. We therefore need to go back to the urban planning scheme combined with the architectural plan, hypothesising a rational and well-considered consequentiality based on the actual needs.
Planning should not create long-term expectations. It should rather ensure that building work can begin immediately. Correct timing can also lead to the rapid implementation of measures to contrast the economic crisis - now as in the past.
Today as yesterday, it is therefore necessary to promote integrated inter-sectoral visions of urban policies, enabling best use to be made of the endogenous dynamics generated by local resources, giving priority to the dimensions of sustainable development not exclusively linked to economic growth objectives, but rather to growth models based on a better quality of life and local well-being.
Planning must consider the transformation right from the start, successfully minimising future expectations.
It is also clear that it makes no sense to manage the city through the indices and parameters of urban zoning. Today as in the past, the most appropriate solution seems to involve removing management of the consolidated city from the urban planning discipline and giving it general strategies and more construction-type rules, aimed at the quality of the interventions and completion of a precise urban form, rather than the abstract quantity of buildings which can potentially be constructed.
We note ever more often the need for change to transform and improve our cities, but we continue to think separately - urban planning on one hand, architecture on the other.
Perhaps the time has now come to think of reintegrating the figure of the architect with the planning complexity of the city as urban planner, designer and composer.
The figure of Ettore Gilberti represents an amalgam of the two figures. He was a good urban planner, working with both the old and new, and also a good architect.
In architecture, Ettore Gilberti in fact managed to interpret the tastes and inclinations of the middle-classes, creating spaces and buildings for their use and on their scale.
At architectural level, he was responsible for a great number of designs for public and private buildings, adopting a range of languages, but always paying enormous attention to the functional and distributional characteristics.
Although he never achieved an autonomous architectural expressiveness, in his buildings he made confident use of pilasters, string courses, projecting window reveals, portals with imposing columns and broken-apex pediments and neo-renaissance loggias, designing buildings which are in many ways monumental, animated by well calibrated divisions with pictorial effect, although in most cases only superficial.
He made fluent use of neoclassical, eclectic and liberty styles. Buildings which were appreciated in their time and which have continued to function, demonstrating their functional and above all technological validity.

Bibliographical References

[1] CACCIAGUERRA Giorgio, GATTI Maria Paola, PAOLINI Adriana. *Ettore Gilberti: un professionista prezioso nella storia e nell'evoluzione dello IACP*. In: Cacciaguerra G., Tubaro G., Vuga A.. Costruire città. Le case popolari protagoniste dell'assetto urbano. Udine, GTC Editrice, 2012, p. 125-143, ,, ISBN: 9788890056734
[2] CACCIAGUERRA Giorgio, GATTI Maria Paola, PAOLINI Adriana. *Ettore Gilberti. Ingegnere Architetto e Urbanista nella Udine del '900*. In: de Marco A., Tubaro G. . Ambienti Costumi Costruzioni. Scritti in onore di Sergio Bonamico. Milano, Mimesis Edizioni, 2012, p. 64-90, ISBN: 9788857512730
CACCIAGUERRA Giorgio, GATTI Maria Paola, *Le vetrine: forma e tecnologia nelle realizzazioni dei primi Novecento a Rovereto.* In: Aa. Vv. Città commercio architettura, Firenze, Alinea Editrice, 2005, ISBN: 9788881258697
[3] GATTI Maria Paola. Da borgo a città. L'evoluzione novecentesca di Rovereto, in Memorie dell'Accademia degli Agiati, q. 252, 2002, ser. II, vol. V, t II, Rovereto (Trento), Edizione Osiride, p. 403-426

Notes

[1] *Raccolta delle ordinanze e notificazioni delle autorità provinciali della contea principesca del Tirolo e Voralberg, annata 1860* (Collection of the ordinances and notices of the provincial authorities of the County of Tirol and Voralber, year 1860) p. 105-109.
[2]The city administration was divided into the following sections - politics, health, accounting, military, building and electricity. The last of these was responsible for managing the urban infrastructure - electricity, water and gas. In all towns and cities in the Trentino between 1880 and 1910, this office acquired great importance as a result of the major engineering projects which were largely designed by the city engineers.
[3] Engineer Cristiano de Chiusole was responsible for the river engineering works which led to improvement of the Adige river.
[4] *Regolamento Edile del Comune Civico di Rovereto* (Building Regulation of the City of Rovereto), Tipografia Roveretana (company Sottochiesa), Rovereto, 1893.
[5] The announcement was published in the Giornale degli Affari, an insert with the Milan edition of the Corriere della Sera, in February 1904.
[6]Ettore Gilberti (Udine, 1876-1935) studied first at Padua, then at Milan where he graduated in 1904. While still studying, he had already undertaken a number of design projects.
[7]As explained in a letter sent by Gilberti to one of his high school professors, he began studying German during his military service. In fact, his knowledge of the language was elementary and the archives contain no letters written by him in German.
[8]Sebastiano Giuseppe Locati (Milan, 1861 - Milan, 1939) studied at the Brera Academy under Professors C. Boito and C. Formenti, graduating from the higher course in architecture in 1881. In 1894 he graduated in civil architecture at Milan Polytechnic. From 1899 and 1935, he was professor of decoration and architecture, architectural composition and practical architecture at the University of Pavia.
[9] For example, the Villa Red cost 39,785.24 crowns to build and was sold at 41,350.75 crowns, with a profit of 1,565 crowns.
[10] Karl Mayreder (1856-1935) first studied at Vienna Polytechnic's School of Building (1872-1877), where he was first pupil of Heinrich von Ferstel, then assistant to Carl König. He began his academic career teaching at the Technical University, becoming full professor of urban planning in 1899. Between 1923 and 1925 he was also rector. As a freelance professional, he founded a studio with his brothers Julius and Rudolf Mayreder, taking on both urban planning and architectural projects. Between 1894 and 1902, Mayreder was appointed as city planner and drew up the urban planning scheme for Vienna.
[11] Julius Mayreder (1860- 1911) studied first at Vienna Polytechnic's School of Building (1872-1877), then at the School of Arts and Crafts and finally at the Fine Arts Academy where he studied under Friedrich von Schmidt. He practised first in the studio of architect Victor Luntz at Vienna, the studio of professor Nordio in Trieste and then in the studio of architect Adolf Lang in Budapest. He later worked in the studio together with his brothers, often working completely independently.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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A SPECIAL LAW FOR SANA'A
The old city of Sana'a (Yemen): Proposal for a special fund for its conservation

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Abstract

Yemen has been facing a continuous political and economic crisis since 2011, and though the efforts UNESCO and other international bodies have made in the last 30 years, the state of conservation of Ṣanʿāʾis still a major issue today. The situation has worsened to the point that Ṣanʿāʾ is at risk to be soon included into the UNESCO *List of World Heritage in Danger*, while the Old City of Ṣanʿāʾ was registered in 1986 as a worldwide recognition for the importance of its old centre. As a matter of fact, Sana'a counts more than 8,000 historical buildings, and is one of the most authentic and meaningful examples of urban development in Southern Arabia.

A practical effort to face the situation can be the creation of a special law for its heritage management and conservation, taking example from the Special Law created for Venice in 1973, its special fund and dedicated team of experts.

The paper presents the perspectives of a similar approach in Ṣanʿāʾand discusses the possible outcomes of the creation of an independent body for the technical and financial management, control and operational dimension of the interventions. This organization will operate with a team that could plan and implement projects in a short time, to ensure the quality of operations and their compliance with current legislation and regulations, including financial transparency through public and verifiable budgets and auditing reports. It will take advantage by the added value of a skilled local team that can carry out the restoration and preservation according to traditional materials and building techniques.

Keywords: heritage management, Yemen, traditional materials and techniques, architecture.

1. Introduction:

Recognized worldwide for its importance as one of the most authentic and meaningful examples of urban development in Southern Arabia, the historic centre of Ṣanʿāʾwas listed in the UNESCO World Heritage Sites in 1986. The traditional structure of the city is characterized by urban and architectural elements that have succeeded in preserving their essence over centuries.

Today, however, the city is more than ever at risk, because its uniqueness, favoured by some geographical and cultural isolation, is threatened by neglect, uncontrolled modernization, improper interventions, lack of a comprehensive vision, lack of technical and urban management experience, and poverty. In addition, the 2011 political upheavals shifted the attention of the authorities towards the political instability and the related security problems, thus reducing the already limited resources

available for the conservation of its heritage. As in the city of Zabid, also Ṣanʿāʾ could soon fear an exclusion from the UNESCO list of World Heritage Sites.
The present document seeks to indicate a possible operating model for the preservation of Yemeni cultural heritage, which could allow the gradual recovery of the urban fabric, also thanks to the creation of a body with competence to oversee the development of the program. This model has been identified in the 1973 Special Law for Venice.



Fig. 1: View of Ṣanʿāʾ. Pier Paolo Pasolini wrote about this city: «Yemen, architecturally, is the most beautiful country in the world. Sana'a, its capital, is a wild Venice on dust without Saint Mark's and without the Giudecca, a city-form, whose beauty lies not in its perishable monuments, but in its incomparable design... it is one of my dreams»

2. Urban heritage conservation approaches

The concept that the urban heritage to be preserved cannot be identified with individual buildings or monuments, but, on the contrary, that single buildings and monuments are more significant because they are placed in a specific context is well recognized in the culture of restoration. This principle can be well applied to the city of Ṣanʿāʾ, whose charm is given by the complexity of its houses.
The negative example of some Italian historical centres, abandoned by their inhabitants not only because of reckless town plans that have favored the spread of bad neighborhoods, but also because of objective problems of mobility and absence of some facilities now necessary, leads us to believe that we should find some practical solutions on a case-by-case basis. If we want the life in Ṣanʿāʾ to continue to pulsate, we need a clear and unified vision, a broad-spectrum planning, a capacity of capillary action, qualified staff and appropriate legislation to regulate the activities. All what is needed should be combined with respect for its beauty, history, constructive traditions, and spirit of the community. With respect to its morphology, its horizon, its scenery, its vision.

3. The historical evolution of Ṣanʿāʾ

Yemen, with its 24 million inhabitants, is one of the most populous countries in the Arabian Peninsula, but it is also the youngest and poorest. For this reason, its literacy and school enrolment rates are quite low. Although only 30% of the population resides in urban settings, Ṣanʿāʾ has suffered a strong and rapid process of urbanization and modernization in recent decades. Ṣanʿāʾ is located in a mountain basin at an altitude of 2300 meters, in a semi-arid and mountainous region. It is the political and administrative capital and the most important cultural centre of the country. Its origins date back at least to the 2nd century AD, when the Sabaean King Shaʾir Awtar surrounded the existing Ghumdan fortress with walls, making it a "fortified city", as its name indicates. However, the oldest documents give us very little information about the events that led it to become the capital of the Himyarite Kingdom. From the 7th century, the conversion to Islam of the population was very rapid, so much so that, according to what is handed down, in the 6th year of the Hegira (628 approx.) the Prophet Mohamed himself ordered the construction of the Great Mosque (Jami' al- Kabyr) in the historic centre. Umayyad and Abbasid caliphs controlled Yemen through governors based in Ṣanʿāʾ, until in the 10th century when a local dynasty was constituted, the Zaidi imams, who ruled a territory that was extended up to the region of the mountains.
At the centre of important caravan routes through which the trade of incense, myrrh, spices and products from the East took place, the city expanded and had periods of great prosperity. Later, it lost relevance from the 15th century with the first Ottoman rule, mostly due to the constant attacks suffered by both occupants and the Zaidi for its possession. The second Turkish conquest, in 1849, was severely hampered by the imams and when finally at the end of World War I the Ottomans were forced to leave the country, again two imams ruled the city, isolating it from external contacts, along with all North Yemen, thus condemning the culture and the economy to a state of stagnation and backwardness. The South, meanwhile, was occupied by the British, who left it only in 1967 when the People's Democratic Republic of Yemen was born, with Aden as capital. In the North, in 1962, a revolution ousted the last Immam of the al-Mutawakeliah Kingdom and established the Yemen Arab Republic, with Ṣanʿāʾ as a capital. In 1990, after years of conflict and tension, the reunification of the country was achieved.
Ṣanʿāʾ currently has about 2,000,000 inhabitants, compared to 427,500 people estimated in 1986. This frenetic increase in population - caused by massive internal migrations after the unification and by the return of more than a million people from Gulf States after the Gulf War in 1990 - has been accompanied by a dramatic increase of the urban area. The real estate boom, that the city lived up to 2011, put at serious risk the integrity of the historic centre and its delicate balance. The use of inadequate construction techniques and non-traditional materials such as reinforced concrete, combined with uncontrolled urbanization, has affected many buildings, but also destroyed some historic sights of the city.

4. The architectural heritage of Ṣanʿāʾ

What makes the historic city of Ṣanʿāʾ special is its architecture: in its 8,000 houses, different styles and materials are mixed up with charming harmony. A typical building, tall until five, six, or seven floors, is constructed at the lower levels with basalt blocks, which support upper structures in brick. The oldest bricks are manufactured with local mud and dried in the sun. The exterior walls are decorated with elaborate friezes, white chalk plasters and stained glasses of alabaster. This typical tower-houses are interspersed with minarets and create a unique setting. The area of the ancient walled city shrines true architectural gems inside. Even the constructions from the medieval period, as well as the alleys and small squares, remain largely intact.
Another unique feature is the urban orchards and gardens, whose attractively vibrant green lightens the massive masonry buildings. Many of these were unfortunately destroyed to make way for new buildings.



Fig. 2: Detail of the decorations of the buildings. Photo Credits: Marteen de Wolf

There are 48 mosques, 11 public baths, and 10 specialized market areas (such as for clothes, grain, salt and spices, silver and gold, and cattle). There are still a good number of caravanserais. Only one of the eight main doorways of the city is intact: Bāb al-Yemen in the South. A medieval citadel overlooks the Eastern district, and on the Western side there is a big riverbed (Al Sāila), mainly dry during the year.

Nevertheless, the real uniqueness of Ṣanʿāʾ lies in its being an ancient city that is still densely populated and tries to integrate itself with modernity. This delicate step requires considerable effort as for maintenance and urban planning. All this must be held together with some contemporary effort to keep the city alive.

5. The international actions

The interest of the scientific community was triggered by the particular architecture of its buildings and by the city morphology, but also by its unique construction techniques.

Although steps taken so far for the conservation of very old buildings that are significant to the Islamic culture have been a lot, they have not always proved to be effective. Some first interventions date back to the 1970s, following Pier Paolo Pasolini's concerned call for the salvation of the city from rapid urbanization, which urged uncontrolled after the fall of the Imams' kingdom.

The international campaign for the preservation of the historic City of Ṣanʿāʾ resulted in its inclusion in the list of World Heritage Sites in 1986, and led to significant works for the preservation of its historic centre, such as the paving of most of the historic city.

Unfortunately, other maintenance and urban renewal activities, such as the creation of the domestic water system in the buildings of the old city, were not made with the same care. Consequently, the newly realized sewer and water systems of the city are jeopardizing the stability of the city because of infiltrations and moisture. Moreover, works of modernization have often seen the use of inadequate materials and modern buildings are not always in harmony with the context.

Also for this reason, as is clear from several studies conducted over the years by researchers and as shown by the inventory made by UNESCO, the problem is organic and general. The planning of the single interventions must be integrated into the planning of the city and the work needs to be

constant and attentive, but above all it must be realized in the city as a whole and not just in a few isolated buildings.

In 2008, when the effects of the political and humanitarian crisis were not so acute as they are today, UNESCO, in collaboration with the governmental authorities, presented a very detailed report on the status of the principal risks and damage that has been created to the ancient core. Those data were collected thanks to a project for the inventory of the heritage, which led to the creation of some GIS mapping (Geographic Information System) and contributed to the training of Yemeni young architects and students in architecture.

Many years of efforts by UNESCO and the Aga Khan Foundation of Architecture have failed to produce a firm commitment for protection by the side of the national authorities. However, it must be considered that a capillary action in the historic centre requires a considerable financial burden and management, with which Yemen cannot cope without the help of international organizations. The city has benefited from a number of monumental restoration works, funded by foreign archaeological institutes and other bodies, but these are isolated cases, while it is essential, before it is too late, to implement the plans that have already been identified in the past by UNESCO and GOPHCY (Organization for the Protection of historic cities in Yemen).

6. The Yemeni conservation law for the preservation of historic cities, areas and monuments

A step long advocated by all the conservation actors in Yemen has recently been taken in August, 2013, when a law was passed regulating the conservation of cities, areas and sites of historical interest in Yemen (No. 16/2013). Among its objectives, this proposes to "give effect to the commitments laid down in the conventions and treaties signed by the Republic of Yemen on the subject, including the Convention for the Protection of the World Cultural and Natural Heritage (UNESCO)" (Chapter 1 , Art. 3). Besides, it establishes penalties for lawbreakers and for those who contribute to the degradation of the sites of interest. In addition, it arranges the creation of "agreements with international organizations for the protection, conservation and preservation of historic cities and sites of interest in Yemen" (Chapter 2, Art. 6).

Until now, the absence of a legislative framework had made it impossible to perform activities and to implement recommendations and plans in collaboration with international organizations such as the Italian Cooperation or UNESCO. Its existence, today, allows us to open the challenge for their implementation concretely and with new vigour.

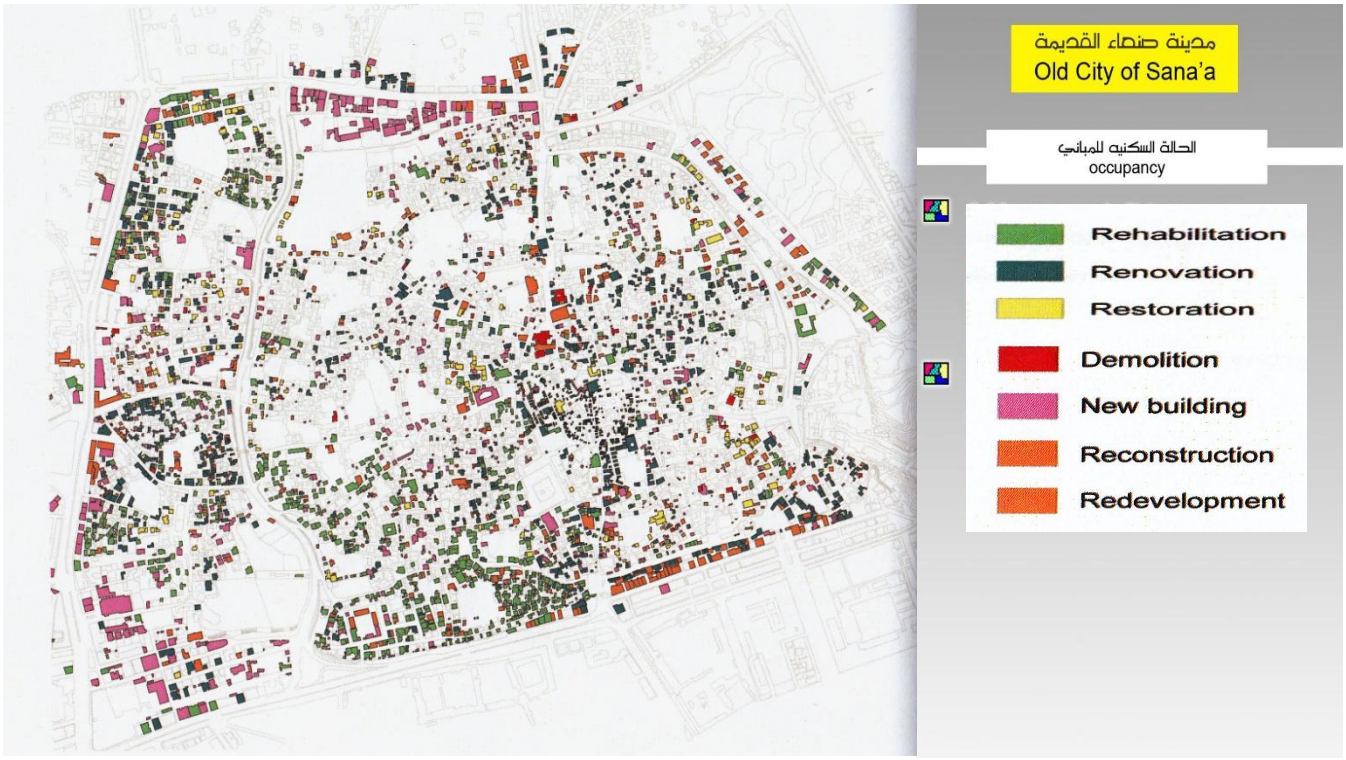

Fig. 3: View of the transformations taking place in the Old City of Ṣanʿāʾ. Source: UNESCO - World Heritage Centre / Arab States Unit. 2008

7. The “adapted” restoration

In order to be included in the guidelines developed by UNESCO in the field of conservation, providing a holistic view of the city and making it possible from the financial point of view, a conservation action has been hypothesized. It will work in view of the “adapted” restoration mentioned by Jaques Feiner in his 1997 work. This scholar has developed an analysis of the architectural styles and types of buildings in Ṣanʿāʾ, where he also advanced proposals for the conservation of the city, which combine the conservation of the heritage with the right to use public and private spaces, typical of every city, in accordance with its traditions.

He proposed to intervene on buildings throughout restoration works that, though keeping their traditional character, would make them habitable with comfort, and to promote ancient knowledge by involving local workforce specialized in the use of traditional materials and techniques.

In this way, it would be possible to proceed, simultaneously with the restoration of buildings that are abandoned or in ruin, with the revitalization of the urban fabric in the historic centre, with a boost to employment and with generation of income. Not only: if it is true that, as pointed out by Bonnenfant, the use and maintenance of local materials are more expensive than today’s ones such as cement, by contrast, ancient building systems are the only ones capable of ensuring the functionality of the structures without compromising their stability, being conceived and developed for the climate and geological conditions of the region. They are the only ones capable of conserving its humanity, force, vital energy, identity, in addition to beauty, without excluding that the generalization of their use could help make costs more affordable.

SWOT ANALYSIS (Strategic Planning)

Strenght	**Weakness**
- Unique urban architectural context - UNESCO World Heritage Site since 1986 - Creation of a body responsible for the protection of the World Heritage - Recent creation of a legislative framework - Definition of Conservation & Development Plan for the city - Sites mapping elaborated by international bodies	- Lack of maintenance of the buildings - Execution of works that are undermining the stability of buildings - Prevalence of work executed with non-suitable materials - Low level of local awareness - Rapid disappearance of local knowledge - Lack of education of the staff responsible for the protection of historical heritage - Difficulty in prosecuting abuses committed
Opportunities	**Risks**
- Unique city where old and new can still be integrated - Support by international institutions and private organizations concerned with the conservation of Ṣanʿāʾ - Presence of local and traditional maintenance and conservation techniques - Existence in the city of still expert workforce	- Rapid uncontrolled urbanization - Boost to modernization - Economic crisis and political instability - Complex bureaucracy - Low effectiveness of previous interventions

Fig. 4: Chart on the swot analysis. Source: IVBC.

The extraordinary nature of this urban environment has long been recognized at international level, but it does not enjoy the same wide recognition yet by the side of the local community. The objective difficulties in which the country has fallen since 2011 with the political crisis have made it difficult to intervene, and in some cases they have even compromised the *status* of its heritage. However, there are some presuppositions for the realization of effective conservation actions, given the now historic presence in the country of international organizations (UNESCO, foundations, scholars, private institutions), who over the years have contributed to advance new researches, to increase the information, and to grow the awareness on the part of the authorities.

8. The "special law" model for the creation of an independent operating body

In view of what has been illustrated so far, a situation of urgency has emerged, in which the risks of the conservation of the historical, artistic, cultural, urban and architectural heritage of Ṣanʿāʾare extremely high.

As anticipated, the intervention model judged adequate and exportable is the same as the one already tested in Italy with the Special Law for Venice n. 171, in 1973. This law was the result of the great fear caused by the 1966 catastrophe, when an extraordinary high water flooded the entire city of Venice. The event, of extraordinary proportion, but not isolated, activated a very in-depth reflection on the need to intervene on Venice and the lagoon area, in order to avert the danger of the disappearance of its inhabited centres within less than a century. The newness, as well as the key aspect that for us seems interesting to borrow from that law, was the combination of a new specific regulatory framework with the provision of dedicated funds and the creation of a specific body responsible for their management.

Along the lines of what happened at that time in Italy, here we propose the creation of a unitary body that could be designated for the implementation of specific actions on the old buildings of the historic centre, according to a plan agreed with all concerned bodies and in full compliance with the guidelines in the field issued by the Yemeni authorities over the years and by UNESCO.

The need to establish a body independent from GOPHCY and the city government comes from the urgency to intervene operationally in short terms, and from the necessity to access to international funds directly.

Therefore, it is necessary to create an international competent and working team that is independent from other local authorities and institutions, while operating in synergy with them. Such a team should include specialized operators both for the planning and for the conservation and restoration systems of the buildings, beside skilled labor force that can carry out activities according to tradition.

The use of local staff and the respect of traditional building techniques will improve the economic situation by creating job roles, while the access to international funds, facilitated by this procedure, will allow them to intervene in short time even when the public or private funding would not be sufficient.

9. The intervention plan

9.1 Creation of the International Committee for preservation of Ṣanʿāʾ

The special initiative for the conservation of the historic centre of the city of Sana'a involves first the creation of an operating core, as described in the previous paragraph, known as the *International Committee for preservation of* Ṣanʿāʾ. The start-up of this team including technicians and local or international experts corresponds to the first phase of the intervention.

9.2 Building Capacity

In order to broaden the Yemeni participation and to create new skilled professionals, a period of training of the local staff will be essential, through training courses for young graduates in engineering and architecture, or possibly upgrade courses for some GOPHCY experts.

9.3 Functions

The tasks of the Committee can be summarized as follows:

- updating of the mapping of the deterioration of the buildings;
- identification of conservation priorities;
- definition of the general and particular criteria of re-qualification and conservation works;
- planning and evaluation of any proposed projects;
- collection, management and disbursements of national and international funds;
- preparation of tender notices for the provision of funds for restoration;
- evaluation and acceptance of requests for intervention by the side of owners;
- monitoring of the compliance with the established rules during and after the interventions, even for the granting of money;
- evaluation of the guarantees offered by the companies that will operate on individual buildings.

The Committee would have the functions of planning and supervising the restoration work on the identified buildings. In addition, they would play control functions on the successful completion of the projects, by proceeding with the report of any abuse or violations. This body would have financial control, acting as a guarantor for the proper use of financial resources, thanks to flexible management free from the most expensive bureaucracy. It would ensure the full compliance of the activities with the UNESCO and GOPHCY guidelines.

9.4 The first group of interventions

The action plan has the great advantage of being able to make use of studies and mapping of the buildings of the historic centre already carried out by different agencies operating in the city. After updating the survey on the state of conservation of the buildings, they will proceed to the selection of about 70 buildings, according to criteria of urgency, of advance of the state of degradation, or of relevance and interest of the building. The first funds could then be used to test the efficiency of the working group and to measure the interventions.

9.5 Impact on the social fabric

The program will generate a virtuous mechanism of protection, able to safeguard the city, to send a sign of activity recovery and, at the same time, to create a team of technicians and skilled labourers, reliable and recognized by the institutions for conservation and restoration. The works will require the intervention of small teams of artisans or of individual workers. In this way, the value of the intangible heritage, that is, the culture and knowledge of the Yemeni builders, who are the last custodians of a millenary tradition at risk of extinction, would see its significance recognized. As indicated in all guidelines, the restoration and enhancement of traditional knowledge are part of the activities that permit to respect the authenticity of a site. This is because the heritage is more than ever linked to the life and evolution of the city. These results meet the main objectives of the Convention for the Safeguarding of the Intangible Cultural Heritage that intends to protect the cultural elements and expressions, and to promote (at local, national and international levels) awareness of their value as vital components of the life of a population.

9.6 Collection of funds

Alongside with the establishment of the Committee, the collection of funds will be started, illustrating in detail the promoted activity. Possible funders may be:

- Arab Fund
- Social Fund for Development - Yemen
- Italian Cooperation
- UNESCO
- American Friends of Yemen
- Gulf Cooperation Council (GCC)

9.7 Subjects of funding

Funds may be directed to:

- acquisition, and conservative restoration of properties to be devoted to residence, or to social, cultural, productive, commercial and craft activities, which are essential for the maintenance of the socio-economic characteristics of the settlement;
- construction of primary infrastructure works;
- provision of resources for the execution of restoration and preservation works of private real estates.

9.8 Initial budget

We are confident of being able to start the program with initial funding of 5 million euro, considering that each building renovation is planned to cost at least € 50,000.
20% of the amount will be initially absorbed by the creation of the operational structure, including training courses. As regards the headquarters and logistics they will be able to use, at least in part, public structures. A certain portion should also be addressed to the awareness and diffusion campaign of the project at the population.

9.9 Conclusions

The historical and cultural heritage of Ṣanʿāʾ is now in serious danger. The urgent need to protect this World Heritage Site recognized by UNESCO is not only limited to preserve the value of individual buildings. Today more than ever, there is a need to preserve the complexity and the vitality of a thousand-year-old city. In other words, we must act quickly, so that Ṣanʿāʾ can maintain its authenticity.
It is impossible to leave the burden and responsibility of the Yemeni heritage only in the hands of government and community bodies. The international community has the duty to support them in the fulfilment of the responsibilities that they have already decided to assume: as a matter of fact, at

present, they are not able to realize plans of similar scope and delicacy because of financial and management difficulties.
The creation of an independent body will allow: planning and implementing projects within a short time; ensuring the quality of the operations and their compliance with the current legislation, regulations and detailed plans that will be processed contextually; guaranteing financial transparency through public and verifiable balance sheets and financial reports.
It is an urgent and necessary action, which will have the benefit to generate a small local economic system, as a "secondary" effect. In addition, all this will enhance knowledge, providing a recovery opportunity for an urban fabric that is weakened by poverty and unemployment.

Bibliographical References

BONNENFANT, Paul. *Ṣanʿāʾ, Architecture domestique et société.* Paris: CNRS Editions, 1996.

FEINER, Jacques Paul. *La Vieille ville de Ṣanʿāʾ. Analyse morphologique comme fondement de la sauvegarde patrimoniale*, Thèse 1652 presentée au département d'Architecture del l'Ecole Polytechnique Fédérale de Lausanne pour l'obtention du grade de docteur es science techniques, Lausanne, 1997.

LEWCOCK, Ronald B. *The Old Walled City of Ṣanʿāʾ*. Paris: UNESCO Press, 1986.

UNESCO. *The inventory of the historic city of Ṣanʿāʾ. A tool for urban conservation*. Paris: UNESCO Press, 2008.

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The case of the XVII century "Teatro Farnese" in Parma: integrated conservation, between conservation and valorization.

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Abstract

The project of reutilization and valorization of the ancient Farnese Theatre in Parma represents an excellent case study in order to apply the principles of the "integrated conservation process" defined by R. Di Stefano in 80's. Thus, the first guarantee for conservation of historical heritage is not only in finding and applying the most suitable techniques of structural and formal restoration, but, most of all, in identifying the most appropriate use of it.

Actually, the great wooden Farnese theatre, built in the XVII century by Farnese family in the magnificent Palace of Pilotta, in the historic centre of Parma, and severely damaged over the centuries, had hosted performances only nine times since its construction and now it remains "museum of itself", constituting the scenographic, and unique in the world, entrance to the National Gallery.

This paper aims at presenting the study carried out on this masterpiece in order to revitalize it. Starting from an historical and structural analysis of this monument and recalling the interesting and cultural debate on its possible "reuse" as theatre, the project of reutilization herein proposed has dealt with structural, functional and safety issues, together with the theoretical ones of restoration.

At the end of a path in balance between structural and functional improvement and preservation of built heritage, the monument can increase its cultural and economical value, gaining a new life.

Keywords: cultural valorization, restoration, wooden structures, XVII century theatres, integrated conservation

1. Introduction

The Farnese Theatre, one of the greatest seventeenth century theatre in Europe, is located into the magnificent Palace of Pilotta, in the heart of the historic centre of Parma, in northern Italy.

It was built for want of the duke Ranuccio I Farnese and it hosted only nine performances between 1628, when it was inaugurated, and 1732[5].

It was opened again in 1913, when the city celebrated the centenary of Giuseppe Verdi, but in 1944 an air raid destroyed it.

Between 1957 and 1965 the theatre was rebuilt, implementing an historic restoration, and from 1986 it constitutes the scenographic entrance to the National Gallery.

Soon after its rehabilitation, the debate on the renaissance of the theatre as a place for performances started and it's still open.

The paper aims to show how, with a few technical and functional solutions, directed to optimize the use of the theatre, its cultural and economic value can be enhanced, so this monument, unique in the world, can be brought to a new life.

2. The object of the study

2.1 The structure of theatre

The majestic Palace of Pilotta is formed by many great masonry buildings erected around three courtyards. Thanks to its dimensions, beyond measure compared to the historic urban context, it dominates the city centre. The early structure was built at the beginning of the XVII century in order to become the new residence of the Farnese's entourage[5]. The construction site lasted for three centuries, but the enormous building is still uncompleted. The theatre was projected by the architect and scenographer Giovanni Battista Aleotti between 1617 and 1618, taking the place of the pre-existing chamber of weapons[5]. The volume of the room is enormous: it is 87,22 m long, 32,16 m large and 22,16 m tall. The fourteen bleachers shape a "U" sector for the audience, crowned by two loggias: the first one is in Doric order, and the upper one is in Ionic order.

The wooden structure existing today is the exact copy of the original one, which was destroyed by the bombing occurred in 1944. The historic restoration was realized reproducing the metric surveys, with the support of ancient photos and reassembling the few fragments saved. All the load-bearing structures and the bleachers themselves, the loggias and the wooden decorations were rebuilt, following the original project. The floor and the stage was also rebuilt maintaining the original declivity and the structural damages of the walls were restored[2]. All the wooden surfaces were processed with fireproof paints, therefore the colour of the wood became light ocher[2]. Originally, these surfaces were almost entirely painted. To distinguish the few original elements from the new ones, the latter were left unrefined. Finally, the roof was repaired. To cover the 32 metres span, the architect G. B. Aleotti had realized a composed truss, made by reticular beams which elements were connected one another by joints; the whole structure was stiffened by ties. The new parts of the roof reproduced the original one, but many metal ligatures were added all over the trusses in order to reinforce them. Originally, the structure of the roof wasn't visible because a canvas representing "Jupiter and the Olympus" hid it[2].

Therefore, the present look of the theatre reproduces the original one, but the aesthetical aspect is heavily different: most of the decorations and the paintings are lost and the decors are missed.

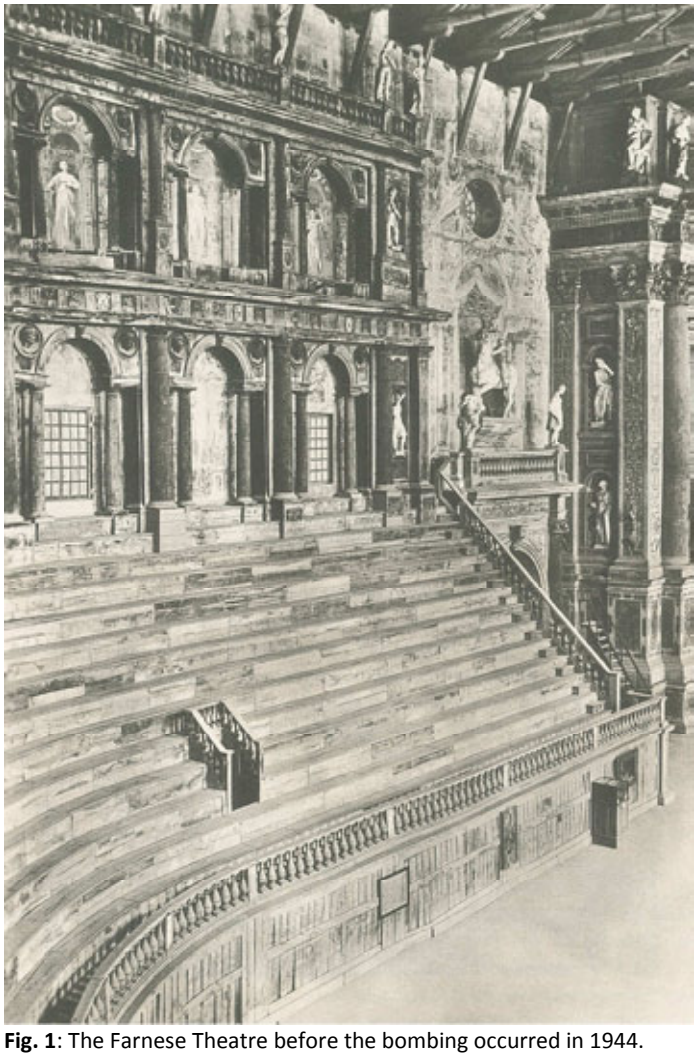

Fig. 1: The Farnese Theatre before the bombing occurred in 1944.

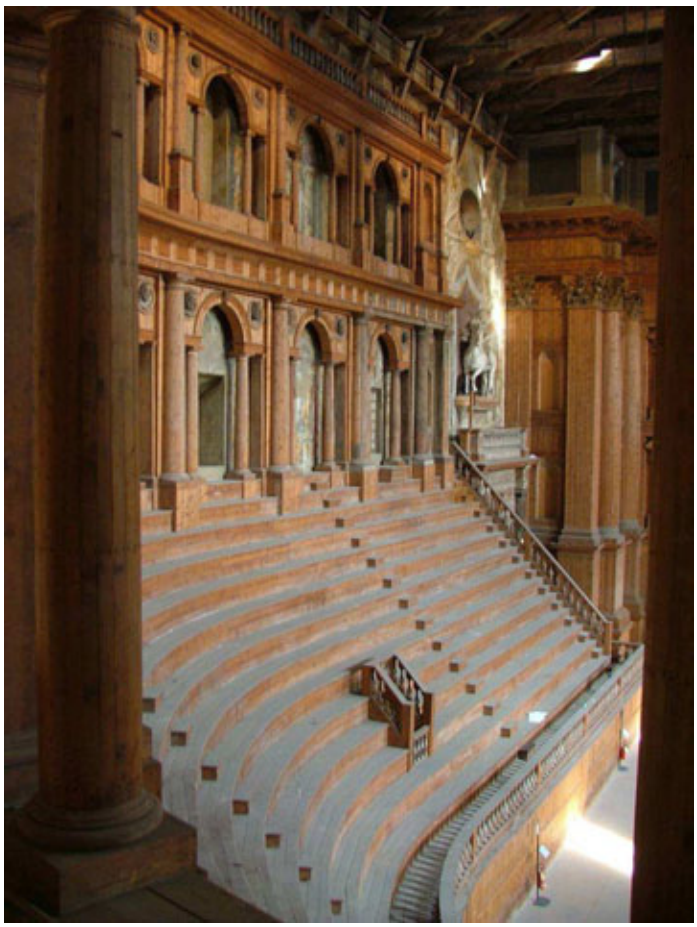

Fig. 2: The Farnese Theatre after the restoration realized in 1957-65.

2.2 The use of the theatre today

After the restoration of the structures, many proposals were moved for the use of this fascinating place.

Till now, occasionally the theatre hosted theatrical and musical performances, and also a few art exhibitions.

Nowadays, the theatre is a museum of itself. The entrance is set up by a Corinthian wooden portal, miraculously surviving the bombing. Reaching the parterre, a gorgeous view appears: the wooden bleachers constituting the cavea, crowned by the two orders of the “serliana” loggias; the proscenim characterized by the giant order; the triumphal arches at the two sides of the stage with the equestrian sculptures on their top; the beautiful wooden trusses supporting the roof. Unfortunately, the access to the bleachers and to the loggias is presently forbidden because of safety reasons.

Under the bleachers, along the north-west side wall of the theatre, some remains of the many sculptures are exhibited. Behind the stage and partially under it, part of the itinerary of the National Gallery takes place. A gangway connects the parterre to the stage; from it a footbridge, installed in 1979 in the occasion of an important exhibit and since then become permanent, brings into the heart of the National Gallery. So the theatre, where the exhibit starts, and the gallery are parts of the same great museum.

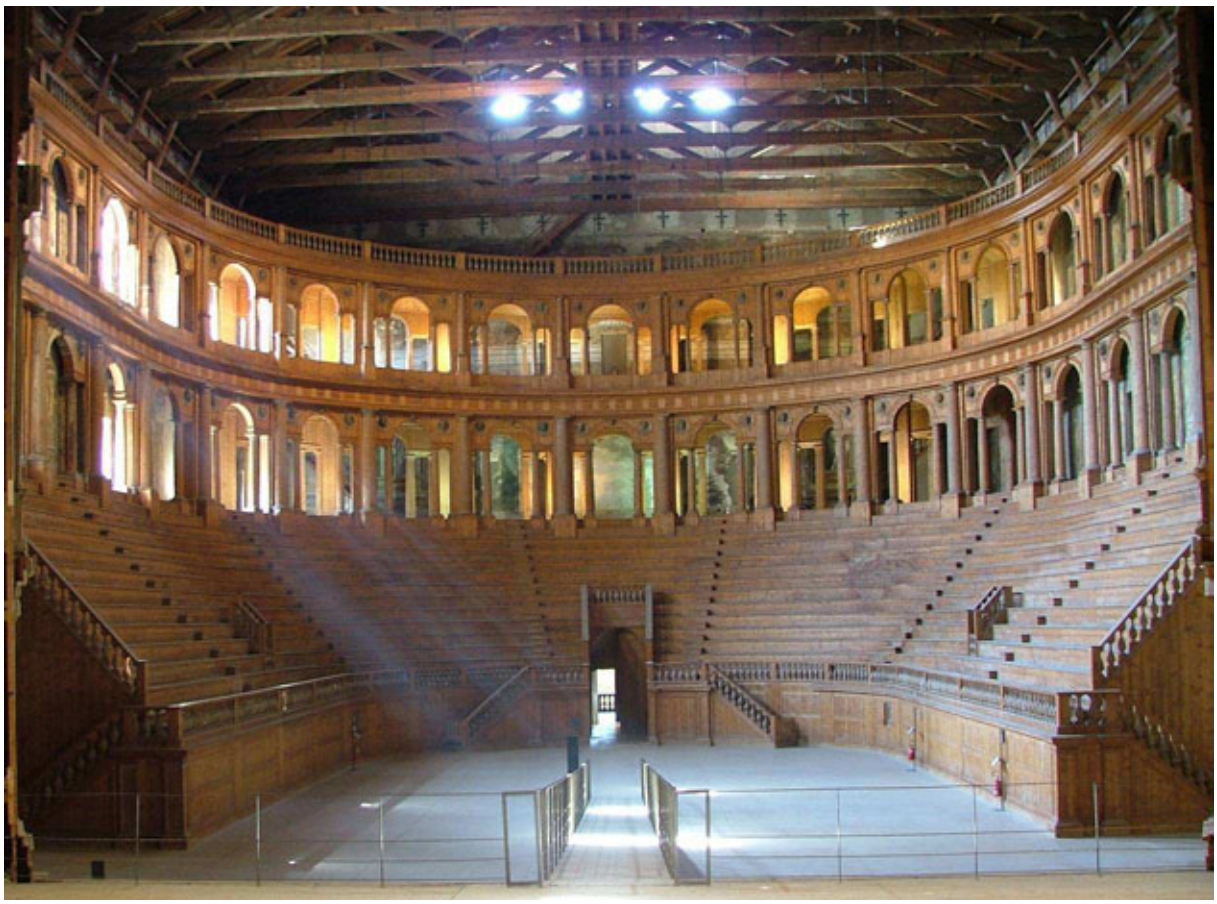

Fig. 3: A view of the theatre today, shot from the stage.

3. The historic debate around the opening of the theatre

Soon after the bombing, when the opportunity to rebuild the theatre was verified, a lively debate on its renaissance started.

Some proposals were moved to adapt the theatre to the needs of the modern shows, or to convert it into a cinema[2]. Thanks to the Office for Conservation of Monuments and to the Ministries of Education and Public Works, it was decided to realize a conservative restoration[2]. In 1957 the restoration began: the lost elements were integrated, differentiating them from the original ones, and the evidences were replaced in their own location.

The restoration was completed in 1965 and, the later year, a great concert was organized to inaugurate the “new” theatre. The technical committee, appointed to verify the accessibility of the audience, approved the opening of the theatre only in case of exceptional events, like that one, and to let the public use only the orchestra in order to preserve the wooden structures. The vigilance committee demanded the opening of four fire exits, but this structural intervention was judged unacceptable for the preservation of the monument. So, the concert was cancelled a few days before the date. The cancellation of this great event caused a great polemic with a nationwide echo.[2]

This was the dilemma: was the best solution to keep the theatre as a monument or to destine it to performances of extraordinary artistic and cultural appeal?

In 1967, the City Council unanimously decided to use the theatre for great events.

4. The project for the reopening of the theatre

In 2011 the Municipality of Parma achieved the authorisation from the Ministry of Culture to use the theatre to host an important concert, once the static safety of the structures and the flow of the people in case of emergency were guaranteed.

Therefore, the project here presented analyzes the load resistance of the structures and proposes a solution for the arrangement of the public, suitable, as possible for an historic building, to the current safety legislation.

4.1 The analysis of the static safety of the wooden structures

In order to verify the stability of the structures, first of all, the existing metric surveys were checked and completed with the measuring of the precise dimensions of every element which constitutes the wooden cavea. These data were essential not only to calculate the payload of the structures, but also to verify if the bleachers fit the rules to host the audience and to design a suitable arrangement of the seats. The cavea is formed by fourteen bleachers, spaced out by stairs and crowned by to two loggias, only in part accessible and reachable from the two spiral staircase situated at the sides of the main entrance. All these elements are wooden made as the load-bearing structure, which is formed by reticular beams leaned against the perimetral walls of the theatre. The bleachers are made by fir-tree boards 3,5 cm thick, which shape seats 50 cm deep, stiffened and bound by wooden strips put far 70 cm one from another. Steps are 50 cm large and 24 cm tall and they are made by the same kind of boards which formed the seats.

The assessment of the load resistance was carried out on the stairs because in this area the weight of the structure is the greatest, as well as the load prescribed in the event of crowding. First of all, the features of the materials like the woody type and the degradation of the wood structures, were inspected, in order to define the parameters for the assessment work. Considering the moisture of the material and the surroundings, the reducing coefficients were identified. The distributed load was evaluated to be q_k=4 KN/m^2 for theatres. Thanks to these data, the load-bearing capacity of the structures was checked through a finite elements numerical model. Also the connections of the structures, joined by bolts, were verified.

The results of all these evaluation showed that the load-bearing structures are safe, both the bleachers and the loggias: the safety index obtained is 1,8. Therefore, the structures are considered resistant and safe in anticipation of the reopening of the theatre to the public.

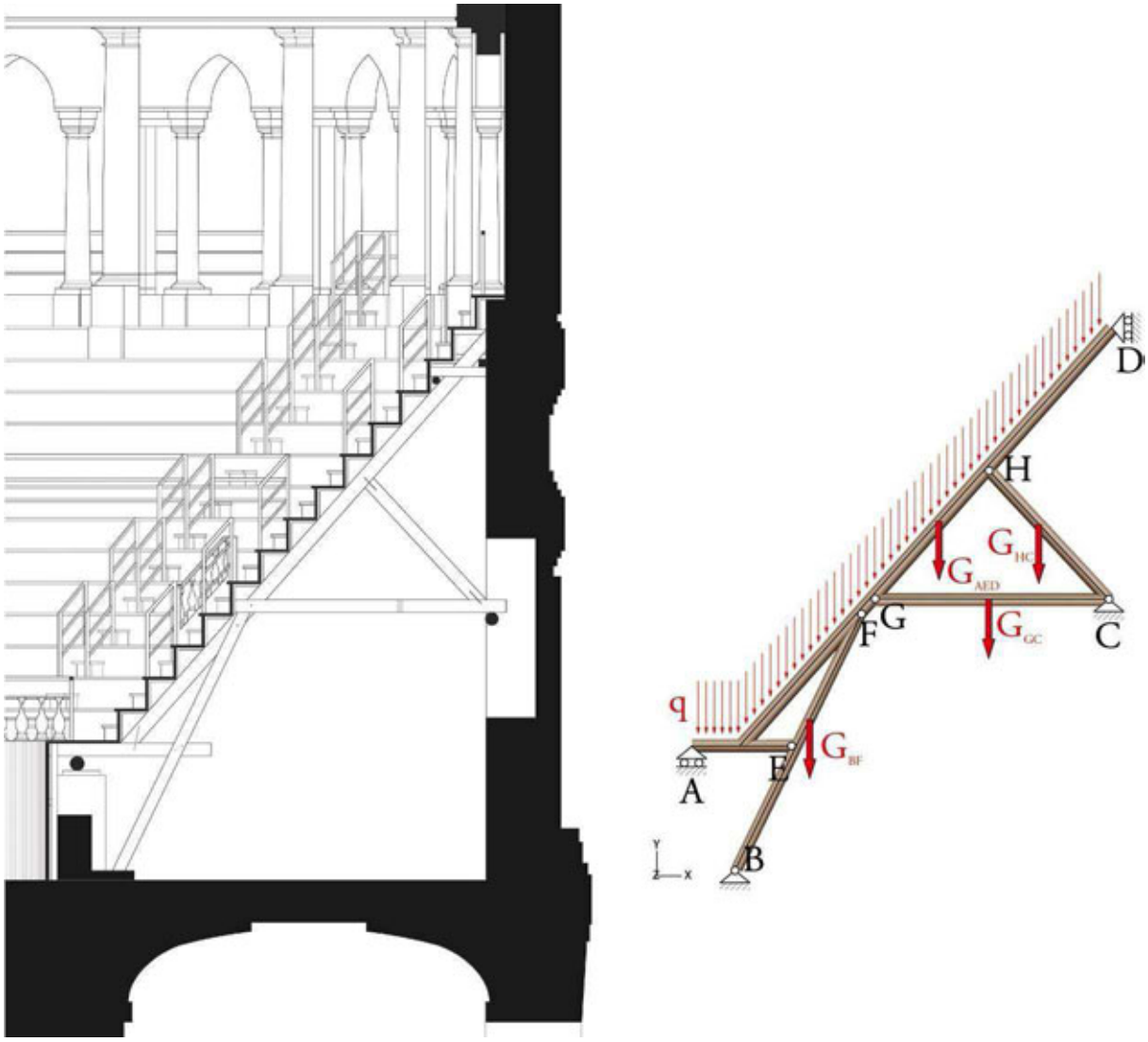

Fig. 4: The cross section of the bleachers realized to calculate the load-bearing capacity through a finite elements numerical model schematized on the right.



Fig. 5: A view of the load-bearing structures under the bleachers.

4.2 The issues concerning the opening of the theatre

Once the security was proved, a functional plan for the cavea was studied with a view to the reception of the audience, identifying the most suitable solutions both to preserve the monument and to guarantee the safety of the people, as the legislation requires.

In order to respect all these aims, the design proposal is to define the seats using removable cushions, so the wooden structures won't be damaged. Following the safety norms, disregarding them only where necessary, the seats will be divided into sectors delimited by parapets and separated by passages, both along horizontal and vertical axis. In this way, in case of emergency, people will be directed from each sector to the allocated exit and the structures will not be stressed too much. The bleachers will be vertically gathered into two sectors separated by a passage, large as one seat, to let the people flow. This passage is narrower than the legislation requires, in order to respect historic restrictions. For this reason, the maximum seating capacity will be halved, in order to guarantee the safety: only six of the fourteen bleachers will be used. This arrangement allows to furnish 571 seats. The insertion of a parapet at the top of the cavea is necessary for the safety and a second one will be placed in the middle of the bleachers in order to avoid the audience to fall down. Presently, the stairs which lead to the bleachers have no parapets. In order to preserve the wooden structure and to maintain its original appearance, all the parapets, projected with a minimalist design but with dimensions appropriate to the current safety legislation, will be placed only for the last of the performances.

In case of emergency, the stairs already existing will be used to the flow of the people, including the two spiral staircase at the sides of the main entrance, which lead to the first loggia. Into these staircases it will be necessary to install hand rails which can be permanent. The access to the stairs which lead to the small terraces over the triumphal arches will be forbidden, in order to preserve the few frescos surviving the bombing. To protect also the paintings between the columns, barriers will be placed over the upper loggia.

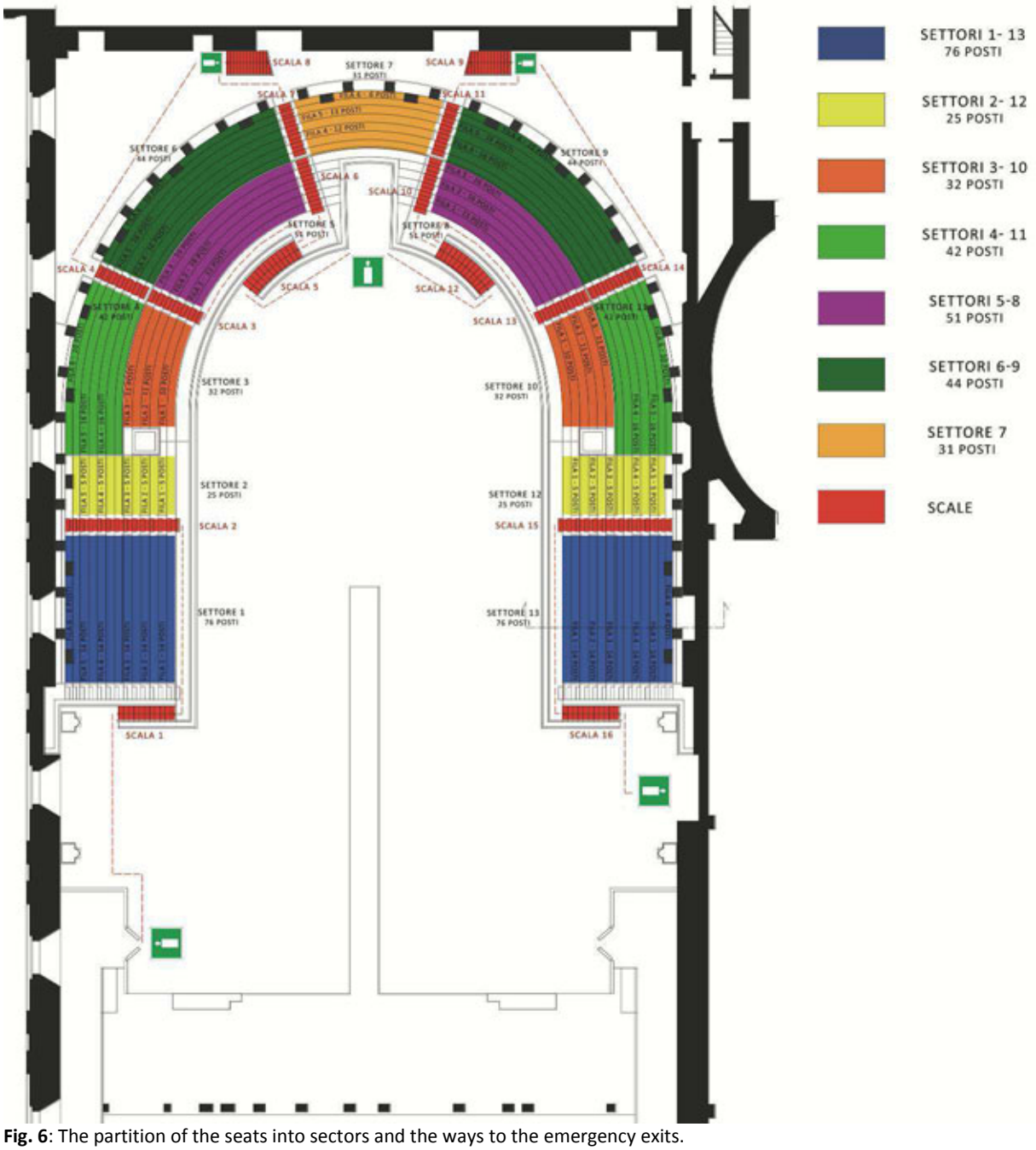

Fig. 6: The partition of the seats into sectors and the ways to the emergency exits.

5. Conclusions

One of the aims of restoration is to hand down the monuments in their best possible conditions[1].
The structural consolidation and the preservation of the materials are necessary to the survival of the building, but sometimes it couldn't be enough: in order to optimize the intervention, it should be supported by the functional and economic valorization of the monument[4]. Conferring the most suitable function to the building means to maintain it lively and often to increase its economic value: in this way the conservation is guaranteed. The "integrated conservation process", defined by R. Di Stefano in 80's, encourage this kind of restoration intervention, which integrates the material conservation with the cultural and economic valorization[3].
The successful conservative restoration realized on the Farnese Theatre assured its structural and material conservation. Nevertheless, it risks to be wasted if the theatre is considered only as an archaeological evidence to be shown to the visitors. Bringing back the theatre to its original function, would allow to bring much more interest on it and to increase the visitors a lot. In this way, not only the life of the theatre, but also a great income, will be assured for long: these are all guarantees to the safeguard.

The project here proposed proves that simple interventions which don't interfere with the historic meaning and the conservation of the monument, can increase a great deal its cultural and economic value, ensuring it a long life.

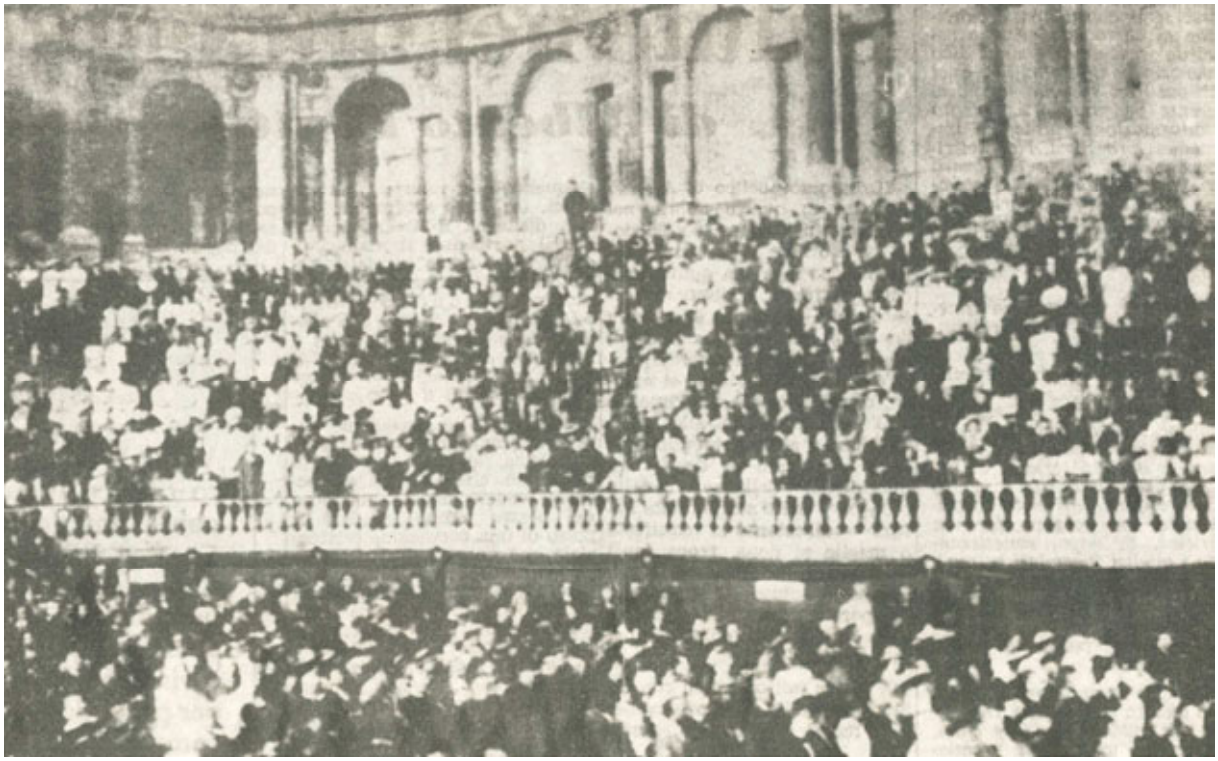

Fig. 7: The theatre crowed on the occasion of the centenary of Giuseppe Verdi in 1913.

Bibliographical References

[1] BRANDI, Cesare. *Teoria del restauro*. Torino: Edizioni di Storia e Lettere, 1963. ISBN 8806155652.

[2] CAPELLI, Gianni. *Il teatro Farnese di Parma.* 2ª ed. Parma: Public Promo Service Editrice, 2003.

[3] DI STEFANO, Roberto. *Il recupero dei valori. Centri storici e monumenti. Limiti della conservazione e del restauro*, Edizioni Scientifiche Italiane, Napoli, 1979. ISBN 8849506228.

[4] DI STEFANO, Roberto. *Monumenti e valori*, Napoli: Edizioni Scientifiche Italiane, 1996. ISBN 8881143208.

[5] FORNARI SCHIANCHI, Lucia. *Il Palazzo della Pilotta a Parma.* Milano: Franco Maria Ricci Editore, 1996. ISBN 8821609308.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Micro_CITIES

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Abstract

Most of the Italian architectonic patrimony is made up of little villages well integrated with the territory.
This research is directed towards three Micro_Cities on the Sicilian Ionic coast showing: three examples of integration between site, architecture and space fruition.
On the Strait of Messina the landscape has delineated some “great rooms”, i.e. spatial surrounding, looking out over the sea. The Micro_Cities that we have chosen are part of this complex system.
The area to which these “rooms” belong is closed at the back by Peloritani Mountains, on lateral sides by Cape Sant’Alessio and Cape Alì and the ground is inclined in the direction of the coast line.
The research analyses, with the same method, Mandanici, Forza D’Agrò and Alì.
This study mixes the usual investigations on the surveys with the unconventional analysis related to the fruition of the space.
The method, innervated by an essential structure, is an open path that directs you to the perception and comprehension of these sites.
The whole village centre has been analysed with conventional surveying by hand while the architectural highlights have been surveyed by laser-scanning techniques.
The representation of each Micro_City also comprehends:
a. site plans and some re-elaborations that take into account the texture and the local factors;
b. territorial cross sections that illustrate the relationship between the village and the landscape;
c. navigable 3D models;
d. graphic re-elaboration of the data related to the fruition of exterior spaces by local population.

Keyword: Landscape, survey, representation, Micro_Cities, digital city models

Scappavano arrampicandosi all'Antinnamare
con gli strumenti del loro mestieruzzo,
come se lassopra (…) sperassero di trovare sabbia,
acque salate e barche da varare.
Stefano D'Arrigo

1. Introduction

The definition of "historical centre" or of "minor historical centre" has been much discussed in the international and Italian cultural panorama from 1950's to the present day. The term *minor* has, often, had a dimensional meaning related to the number of inhabitants or the extension of the centre; in other cases it has assumed the sense of less importance from the artistic and cultural point of view. In 1987 the "Charter of Washington" gives a broad definition of the old town centre: "Aggregation housing whose meaning is irreplaceable in the historic and cultural field of humanity".
The whole of Italy is scattered with little towns perfectly integrated with the territory, so its history and its culture is strictly linked to them.
Manieri Elia subdivided the minor towns in two big categories those that have the hypotactic structure and those that have the paratactic one. The former ones, in the late Middle Ages, are in a pre-mercantile state and their structure is organised all around the architectonic highlight, such as a castle, a church or a palace. The latter ones, that have a paratactic structure, are those where "the village is articulated in a rich set whose parts are related in many different ways". In Sicily the first centres often have their roots in the Greek or Roman Era. They have continued to develop from Byzantine and Medieval Eras up to the 1700 Century.



Fig. 1 Pictures of Forza D'Agrò, Mandanici and Alì

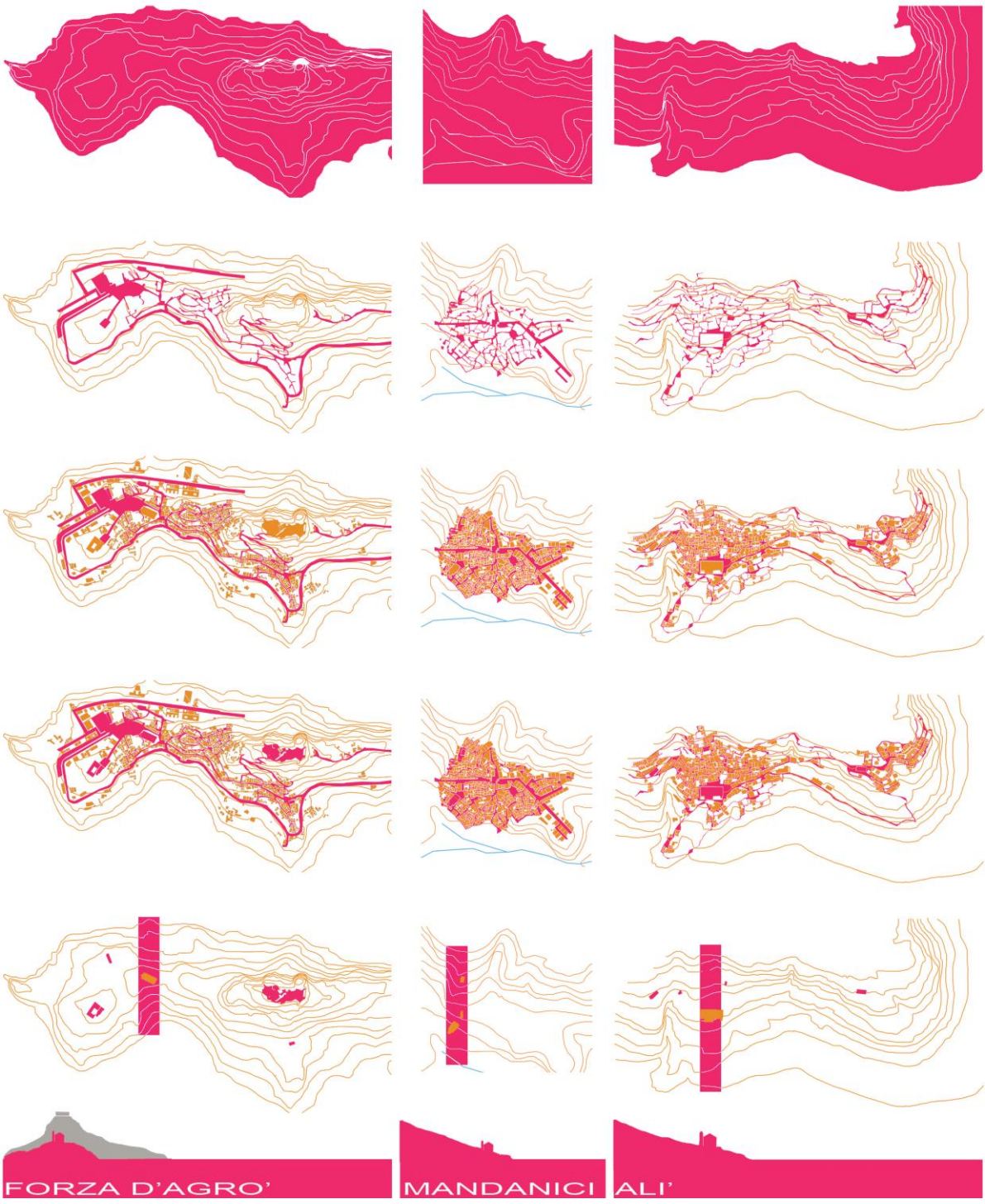

Fig. 2 The structure of Forza D'Agrò, Mandanici and Alì.

In fact, during the period of the Industrial Revolution, some of these little centres were abandoned and the population went to the big cities where there was more chance of finding work. It could be useful, in this paper, to use a different term to indicate this kind of minor town. The word Micro_Cities, in my opinion, emphasizes the complex structure of these villages that have been real cities and that could become so again. Each centre has its peculiarity, its historic and geographic characteristic. In the past our society studied these centres to understand the anthropologic and economic phenomenon, to solve the hydrogeological instability and to study the architectonic highlights.
Not much research has analysed this centre with a global approach. So now it is interesting to try to carry out new research that takes into account the actual economic and cultural conditions.
Now we are in the Era of Informatic Technology where most relationships and communications are virtual. So these little towns could become attractive again. Moreover their peculiarity, their small

dimension and their disseminate quality of heritage, make them almost invisible to the new media that prefers big cities.
In the Age of Images, where everything is possible, where everything has already been seen, these little centres seem to be invisible. This research tries to compare three little towns in the area of the Peloritani Mountains.
The three centres that overlook on the Strait of Messina have the same historic and geographic context in common. The way chosen for this research tries to link together material and immaterial heritage.
The latter could support the deep knowledge of these places and could modify people's perception of the sites. Changed awareness, could be useful for improving economic and demographic recovery of these towns.
In fact every hypothesis of re-use could be useful to "make innovation preserving at the same time not only the warp of the stones but also the specific weft to human relationships".
This research, from the disciplinary point of view, tries to conjugate conventional and unconventional representations, seeking for a new approach to the communication of the material and immaterial heritage of Micro_Cities.



Fig. 3 The pattern of land parcels of the three centres.

2. Field of investigation

The area of the Peloritani Mountains extends between two slopes of the north-eastern part of Sicily. The slope that overlooks the Strait of Messina is the Ionic one. Here the foothills of Peloritani Mountains define large and complex spatial fields. Every field could be defined as a real room overlooking the Strait.
The "back wall" part of this room is made up of the foothills which are coloured by the Mediterranean Maquis shrubland.
The lateral walls, amazing and very recognizable, are the Capes which at the same time define the space and determine the view. The ground is sloping, and going down towards the coast. The celling is the blue sky of southern Italy while the last wall is a large window which overlooks the sea and the Strait.
The area belonging to the three towns, which have been analysed, extend from Cape Sant'Alessio to Cape Alì. Here the territory is dotted with little villages[1] some of which are hidden in the folds of the ground, invisible from the sea and main roads; others however occupy the ridges and are the most important element of the landscape. In fact they can be seen and at the same time they have a view all around.

[1] Excluding the costal centres, that have been built recently because of the increasing tourism, the other centres that are important to the comprehension of the site are: Savoca, Casalvecchio, Fiumedinisi, Allume, Sciglio, Forza D'Agrò and Alì.

This area is characterized by the deep, hard tracks of the four torrents, named Agrò, Savoca, Pagliara and Nisi. These torrents after a short tortuous stretch widen towards the coast and show a thin trickle of water in the stony bed.
The straight lines of highway and railway reaffirm the direction of the old *Roman Strata*, while the paths that ascend the foothills, steep and tortuous, follow the traces of the old Byzantines and Basilian roads which join the two slopes of the Peloritani Mountains[2] .
The very steep ground has a dark yellow tinge, its many folds generate ridges and the sharp valley line. Only the use of long terracing allows cultivation of citrus and olives trees. The villages that belong to the Ionic slope of the Peloritani Mountains, rise near the torrents, and are linked to the Basilian cult developed on the oriental side of the Sicily during the XII century.
The mode in which these centres have developed is called “comb”. The towns were built in the Era of the Greeks or Romans were located near the coast while the towns that originated from the late Middle Ages, had a defensive role. Moreover the latter had some links with defensive structures on the coast, as is the case of Forza D’Agrò and Alì.
The research tries to identify the connections between the cities that have developed along this part of Ionic Coast. Mandanici, Forza d’Agrò and Alì are only three of numerous centres which belong to this particular landscaped field. Before proceeding with the analysis of comparing these Micro_Cities it could be useful to make a short description for each one.

2.1 Forza d’Agrò

The profile of Forza D’Agrò draws the south wall of this landscaping field. It is a sharp sign where the bell towers and the high facades of the churches carve, with their stony mass, the inconsistent blue of the sky.
The centre rises on a ridge and, like the others, has a difference in level from the lower point to the higher of almost one hundred metres. I.e. the Cathedral of Santissima Annunziata is located at the altitude of 360 MSL while the Norman Castle is perched at the altitude of 426 MSL.
The structure of the centre today goes back to 1300 but the most important architecture, like the Augustinian Convent, was built in the second part of the XVI Century. The Norman Castle was built in the XI Century but its present shape was determined by restoration carried out in the XVI Century. The Cathedral, which is the structural core of the centre, was built in the XV Century and then rebuilt in a new position in the XVII Century.

2.2 Mandanici

From the green lemon trees, olive trees and the Mediterranean *macchia* (or Maquis Shrubland), little houses pop up. These, very close each other, show little projections and deep hollows with their facades orientated towards the solar radiuses. The facades have different inclinations and trace the infinite facets of an urban organism.
Mandanici is a little village hidden in a fold of the Peloritani Mountains along the course of Dinarini Torrent.
Its history is, probably, connected to the Greek Chalcis colonies while the most important monuments are built in the late Sicilian Baroque style.
Mandanici rises on very steep irregular ground, there is a difference of about 70 metres between Santa Domenica Cathedral, built near the Dinarini Torrent, and the Church of the Carmine in the upper part of the city which dominates the site.
The shape of the ground and the local rural economy have caused the fragmentation of the soil, giving rise to a dense urban tissue, with buildings of 2-3 levels that are built on little land parcels measuring 25-40 square metres.
The urban paths have been shaped by the slope of the terrain and by the direction of the flow of meteoric water. Many of them are no wider than 2 metres and often the inclination of the soil generates steps. The extent of building and the small dimension of the passages with time have created many underpasses.

[2] “This system is similar to the Basilian centres localized along the torrents, many of them were related with a non-secondary viability. In fact we can suppose the existence of an important street along the ridge of the Dinnamare Mountain, where a set of orthogonal axis were connected ascending the beds of the torrents going down on the opposite slope. This system, cutting the Peloritani Mountains obliquely, made a link between the costal streets of the Ionic side and the Tyrrhenian ones. The net of the Basilian centres is at the centre of this system. SS. Pietro and Paolo of Itala, SS. Pietro and Paolo of Agro, S. Salvatore of Bordonaro, S. Filippo Grande, S. Maria of Mili, and S. Maria of Mandanici, were built to control these important streets of connection.” Reported in Vie di comunicazione e potere in Sicilia (sec. XI-XIII) by Lucia Arcifa

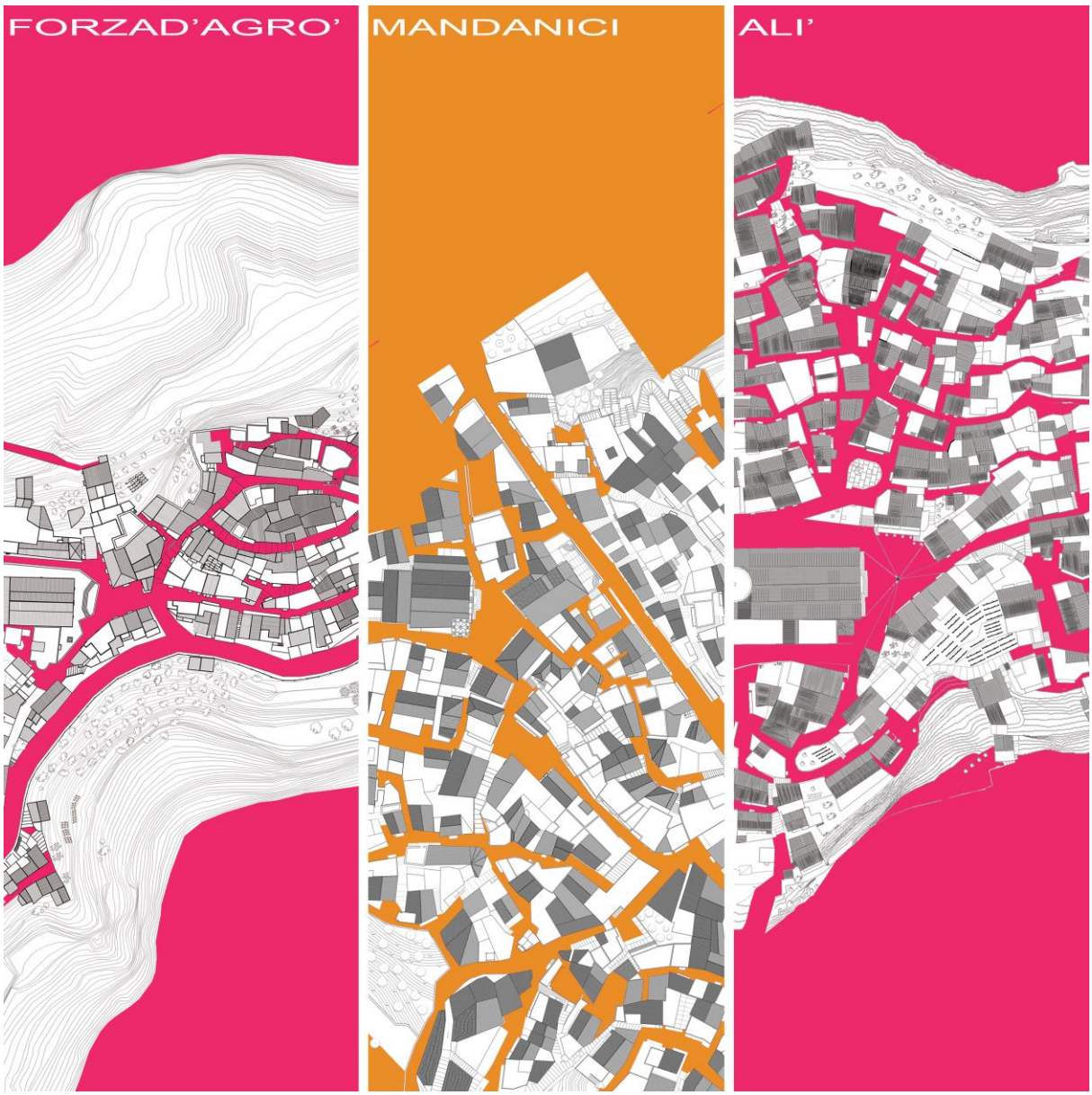

Fig. 4 The plan of Forza D'Agrò, Mandanici and Alì

2.3 Alì

The "great room" overlooking the Strait is closed on the northern side by Cape Alì. In the upper part, on the slopes of the Sant'Elena Hill, between the dense terracing of olives trees and citrus trees lies the village of Alì, at an altitude between 400 MSL and 490 MSL.

The village can boast very ancient origins but its present structure dates back to a period of expansion and richness: the middle of the XVI Century. In this period the Cathedral, dedicated to the cult of Saint Agata, and the Convent of the Capuchin were built.

3. The method

The research analyses Mandanici, Forza D'Agrò and Alì, with the same method,

This study mixes the usual investigations on the surveys with the unconventional analysis related to the fruition of the space.

The method, innervated by an essential structure, is an open path that directs you to the perception and comprehension of these sites.

The whole village centre has been analysed with conventional surveying by hand while the architectural highlights have been surveyed by laser-scanning techniques.

The representation of each Micro_City also comprehends:

a. site plans and some re-elaborations that take into account the texture and the local factors. In fact every building has been indicated with a colour, a cover system, a specific detail; so a sort of

“emotional plan” which suggest experiences and sensations, which the architectural drawing does not always allow, has been made.
b. territorial cross sections that illustrate the relation between the village and the landscape
c. navigable 3D models;
d. graphic re-elaboration of the data related to the fruition of exterior spaces by local population.



Fig. 5 The scans of the Cathedral of Mandanici, Santa Domenica, of Forza d’Agrò, Santissima Annunziata, and of Alì, Sant’Agata.

The method used in this research forms a parallel between the three Micro_Cities and, at the same time, identifies the common elements which are related to the shape of the terrain, to the sense of the site, to the inhabitants, to the local traditions and the historical phenomenon that have happened in this particular geographical and cultural field. To create this parallel, after the analysis of each centre and after completing the survey and the representation, only a few themes were enucleated.
The analysis uses the drawing as a tool, to simplify the reality, to reduce the unnecessary information and, at the same time, to optimize the communications emphasising the crucial data. A preliminary analysis, maybe the most direct and evident, this is possible by comparing a panoramic photo of the three centres. Immediately you can sense the hypotactic structure hypothesized from Manieri Elia. In fact the Micro_Cities are all organized around their cathedrals. The latter, real urban out of scale, draw the profile of the centres and orientate their structure. Both the Cathedral of Forza D’Agrò and the Cathedral of Alì dominate the village with their mole. The dimensions of the cathedrals have necessitated the construction of large terraces of ground to level; so their mole and height appear more evident.
The other element around which these villages are orientated is the system of defence. This is represented at Forza D’Agrò by the Norman Castle and at Alì by the bastion located near the coast.
All the centres have a great religious building very close to them. The most ancient is the Basilian Monastery in Mandanici, erected in the XI Century, while the Augustinian Convent in Forza D’Agrò and the Convent of Capuchin in Alì were built in the middle of the XVI Century. (Fig.1)

From the orographic point of view the analysed centres, and many of the fifteen Micro_Cities which populate this area, are located in the range of the 400 metres above the sea level. The maximum rise is about one hundred metres and normally the cathedral is placed in the flattest area of the site. The three centres have a very dense urban pattern. Nevertheless the urban tissue of Forza D'Agrò appears frayed because it is organised all around the Rocca of the Norman Castle.
The tissue, made by little houses two or three levels in height, is much frayed, with real little parcels measuring 35-45 square metres. Mandanici has land parcels almost square; in fact most of them are no wider more than 3-4 metres and have the same depth. Forza D'Agrò and Alì have land parcels a little bit larger, the frontage is about 4-5 metres and the depth is 9 metres.
The paths, which belong to the town, draw a cobweb which is spread over the ground and leaves many thin signs. Tortuous, interrupted alleys define the shape of irregular rounded blocks. The blocks, like mosaic tesserae, form the shape of the town and underline the orography of the site. In fact the principal streets follow contours while the secondary paths cut them obliquely to reduce the slope. Blocks and paths, sometimes, seemed to converge in the central square making a radial pattern.
The central square is, usually, very big and its shape is determined by the union of two streets: it's the case in Forza D'Agrò and Mandanici. The paths are often a sort of cul de sac and, in the central part of the village, especially in Mandanici and Alì; there are many underpasses created by the saturation of the land parcels. Many streets are, indeed, long staircase, which are necessary to overcome the slope of ground. (Figs.2-3)
The research, which is still in progress, has investigated different aspects of these three centres. Here only a few notations and drawings have been reported and they are limited to the core of these centres: the central squares and the cathedrals. (Fig.4)
The instrumental survey has been limited to the latter which have, obviously, many common elements like the orientation, the typology with three naves, transept and dome; the squared bell tower, and the façade morphology. A well-defined survey was the first step to analyse concordances and discordances. For these reasons the three Cathedrals were surveyed with laser scans. (Fig.5)
These three Micro_Cities have a special link to the site. The reasons are clear when the history of their foundation is analysed. In fact some of these cities developed along streets that connected some important centres in the past: it is the case of Mandanici. In other cases the centres had had a defensive role, as is the case of Forza D'Agrò and Alì. These, besides, have found a balance which has allowed them to develop over many centuries. If the centres are observed from the exterior these things are all evident.
They, as living organisms, offer themselves to solar radiuses and enlarge their mesh towards the landscape and the Strait. The position, perched on the slopes of the mountains, permit every house to find at the same time the Sun and the scenery.
From the outside the villages are sunflower fields where each facade turns to take sunlight and is also well placed on the slopes of the ground.
The towns, inside, are a labyrinth made by a complex fragmented space. The perspectives are interrupted and the capacity to orientate is supported by vacuous elements only. The curtain embroidered behind a glass door, the chair in the shadow of a balcony, the white smoke of the stoves, the washing swaying in the air, the flower pots on the road, the old men who always sit on the same sunny bench.
Every element, alone, is inconsistent and illusory but these data, all together, give significance to the space which became the scenery of the community made of men and woman. This is what the emotional plants show. In these drawings every land parcel, every house, has its texture. Sometimes the texture is realistic, a colour or the grain surface or a detail; sometime information is aleatory, mutable or incoherent. (Fig. 6)



Fig. 6 Emotional plan of Forza D'Agrò, Mandanici e Alì

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Endangered Heritage: a Polemic Intervention in one of the most protected areas of the Vicentina Coast Natural Park

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Abstract
With this paper, part of a research project, that takes a holistic approach and about memory and the preservation of the tangible and intangible heritage of Aljezur, south of Portugal, whose territory almost preserved at its majority, is however too coveted for its tourist potential, we want to warn about the contradictions of a law that supposedly protects and promotes the maintenance of a unique landscape and ecosystem, but also allows its disfigurement, authorizing projects that, contrary to logic, common sense and good taste, contribute to its destruction, defacing places that for centuries remained virtually untouched and protected its inhabitants, changing the landscape and introducing new paradigms of experiences in a community where always respected each other without sealing paths, without create real boundaries, proposing, under the guise of development and a new concept of tourism, in rural areas, the destruction of one of the most protected and untouched places in the heart of the municipality of Aljezur. A once magnificent place where for centuries stood merely an ancient and ancestral farm - with its housing – Monte – with its traditional language - and its agricultural support small scale buildings, begins to resemble a new village whose architecture appears under the guise of sustainability and tradition, since is in *taipa* (adobe or sun dried bricks), integrates characteristics of other places, anywhere, other than where it goes lifting, disfiguring landscape, in contravention of the vernacular architecture contradicting the memory and also the maintenance and preservation of material and immaterial heritage which is the opposite of what will be sustainability.

Keywords: Aljezur, Vicentina Coast, Heritage, Traditional Architecture, Sustainability

"Alas! How little does the memory of these humans inhabitants enhance the beauty of the landscape..." (Henry Thoreau)

1 The Project
This paper is an integral part of a research project named - *Aljezur "between vision" of the place and memory* - which aims for the cultural analysis and the protection of tangible and intangible heritage of an territory which is an integral part of the Southwest Alentejo Natural Park and Vicentina Coast. Incorporating various disciplinary valences that promote a close and critical view regarding heritage, memory and the preservation of the cultural identity of a depressed and aged county that urges to boost. Thus, according to our research supported by a multidisciplinary team, and for a continuum of several articles published and presented at various seminars, national and international conferences, for nearly three decades. We assume not only an EMIC approach and a systematic participative observation, but also an attentive reading of all documentation and legislation that have been published on the present territory, particularly since it was considered protected landscape in 1987, and later Natural Park in 1995.
We intend to contribute to the wider debate within the academic community and also the civil society, regarding the necessary and compelling regulated protection and ethically sustained of a natural landscape and also of its urban territory. In the sense, that it assumes a symbolic, social and material impact. Not just for those who reside there and experience it in everyday life, but also for all who seek it in search of an alternative to mass tourism and concrete, that have mischaracterized the rest of the

Algarve region, which political power and the local authority, seek to offset not understanding or ignoring the potential of an extraordinary material and immaterial heritage that may become irrelevant very soon, since it will be destroyed in its essence.
In this context, we wish to emphasize the contradictions, excesses and some legislative permissiveness that have allowed a slow degradation of a territory of the Algarve coast. Integral part of a vast area of landscape legally protected for over 25 years, but whose beauty and unique location has been constantly a special target for greediness based on touristic and real estate pressure among political powers.
Assuming that the underlying concept of “natural heritage” is all that is inherited from previous generations, maintained or preserved in the present and bestowed for the following, the concept of "natural heritage" can thus be very close to natural heritage and includes a pressing need of safeguarding the biodiversity and the ecosystems, but can not ignore the role of man and all those inhabitants that always have protected it [1].

2 Aljezur, a case study



Fig. 1 NETO, Maria João Pereira (photos). Traditional architecture in Alzejur. On the left an urban house, while on the right an rural house (“monte” house)

We will focus our approach on a recent and very controversial intervention of rural tourism with the terminology of countryside accommodation [2], in accordance with Portuguese law in the municipality of Aljezur, southwest of Portugal, in what is still called by local Vale Palheiro (Haystack Valley) located until 2013 in one of the most beautiful, untouched and protected places of the Natural Park of Soutwest Alentejo and Vicentina Coast, part of footpaths of the so called Rota Vicentina: “a long distance path along the Sw coast of Portugal. Comprising the Historical Way and the Fishermen’s Trail, totals 350 km to walk, between the city of Santiago do Cacém and the Cape of St. Vincent, the most south western point of Europe”[3].

According to the path’s website ”besides the implementation of the path, the project also foresees its integration into the region’s tourist offer and local community and its exposure at national and international level. Conceived as a public structure. The Rota Vicentina intends to establish itself as a defining characteristic of the region, becoming viable via the most natural of human practices – walking – and contributing unequivocally towards to the sustainability of rural areas through the promotion of economic activity, stimulation of existing activities and services, maintenance and enhancement of local culture and traditions, encouraging new business creation and promoting the destination out of season”[4].
We believe this to be an example of good practice that associates nature tourism with protection of the immense cultural and natural heritage of a privileged territory, and that when monitored does not destroys its core heritage. However, not being our scope to focus our approach on existing controversies interventions, targets of previous analyses and duly published [5], we do not want also to obviate the reference to the proximity of the major urbanization called “*Espartal*”. For us, one of the biggest attacks on common sense, good taste and aesthetic sensibility that have occurred in recent years, in the country, having generated authentic architecture and urban aberrations, which led to adulteration and wounded a perennial way the balance and beauty of the unique landscape. Disfiguring the "spirito locci", as advocated by the ICOMOS Declaration of Quebec, in October 2008.
However, we can understand it, even with all criticism, given its approval on the verge of the legislation that fully integrated the territory of the protected landscape in 1987, later Natural Park in 1995. Thus, and resuming our reasoning, we intend in this context, to report a new and immense attack on the integrity of a unique heritage, disfigured in its essence through a tourism *project in rural*

area [6]. Authorized at the threshold of the review of the new Park Land Use Plan [7] would come to prevent any intervention of this nature on this or in another place so preserved, against all logic and common sense, and being highly contested by the inhabitants who still resist and did not leave the municipality.

As we have been analyzing, despite several appeals to common sense and dialogue leading to equilibrium between the main actors and agents of the process by some members of the civil and academic community in which the project coordinator is included, we continue to watch to proliferate in recent decades of a mindset that insists on resistance to change assuming a semi autistic position, but sometimes contradictory, highlighting, but also rejects the categorization, classification and asset preservation of a unique and unrepeatable scenery but simultaneously planned, managed, discussed and performed by " bureaucrats " who are unaware of the realities and aspirations of local people that since there is the Park were prevented from making small changes to their homes or agricultural support in defence of nature and the overriding need to protect the leading, or greatly contributed to the abandonment of traditional and ancestral agricultural practices.

Remains a failure to dialogue between the local government, the central power and the county's population. Aljezur is a council already very depressed not only by unfavourable demographic situation with an aging population, but also in their socio-economic aspects. However its inhabitants stoically resist, tying to survive against all odds: impositions and restrictions promoted by a legislation, which sometimes led to the abandonment of cultural and survival practices: a way of life deeply rural only for allegedly not complying with the laws that supposedly "defend" a rich heritage that has remained untouched or little changed in its essence for centuries. But on the other hand, allow or tolerate an assault situation for landscape balance in a privileged region, as we consider the exemplary case that today we bring to this conference.

Also worth noting: the analysis of the legislation that has been published over these three decades that emphasizes the need for application or maximization of gains arising from the classification of the territory, as well as the possibilities of finding alternatives to a sustainable development model that does not only assume the tourist seasonality, leveraging the advantages of sustainable and ethically responsible tourism [8]. Based on the balance in the preservation of natural and cultural heritage that enhances the added value of their insertion in a Natural Park. This case can highlight initiatives such as the Route Vincentian that fits in sustainability logic and new opportunities that can enhance protecting nature in its essence.

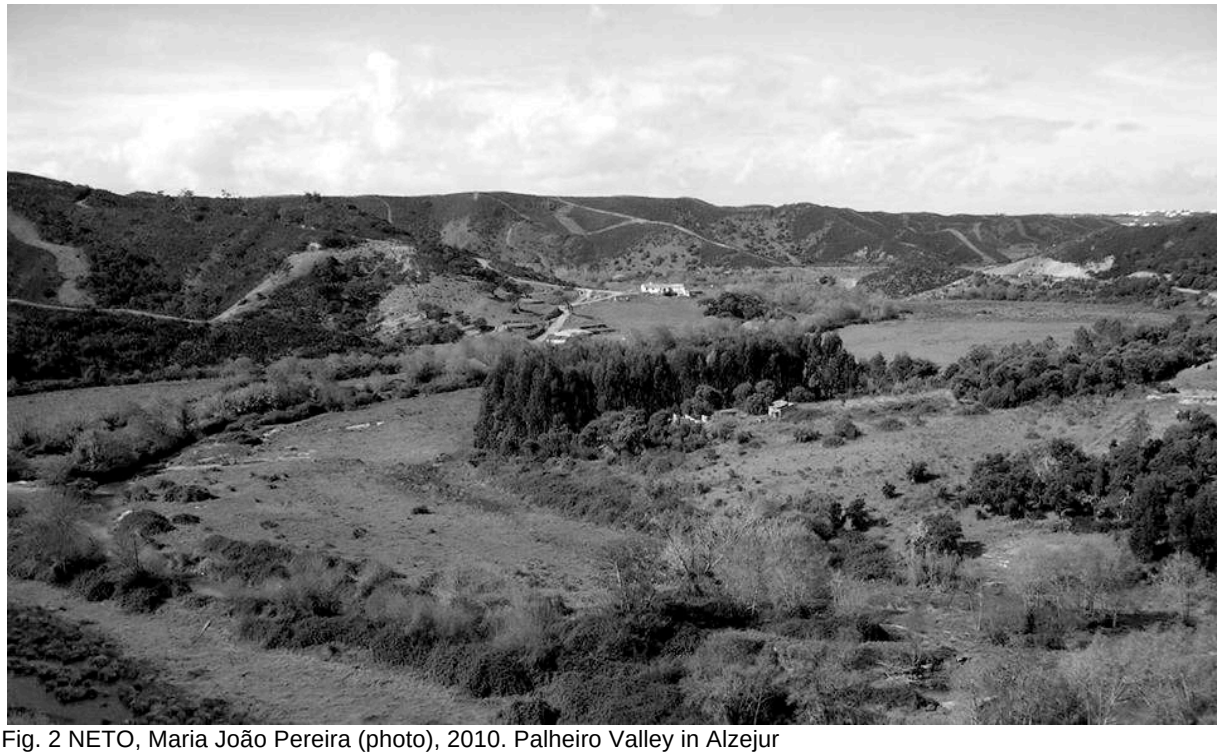

Fig. 2 NETO, Maria João Pereira (photo), 2010. Palheiro Valley in Alzejur

3 Aljezur and the Vale Palheiro

Aljezur is a municipality located in the southwest of the Algarve, the most southern region of Portugal. And has always been a predominantly rural area whose population for centuries depended on the products of the sea and land. Although in more recent contexts, the fish, with the advent of tourism, was particularly disposed to southern Algarve, to the nearest markets in tourist areas. During the 60s

of the twentieth century, agriculture had experiencing an increasing abandonment and the county was hard hit by high emigration crisis that was reflected in its demographic structure that has marked his aging in a continuous process. The economic and social history of this municipality is going to reflect on the history of this case study: the Vale Palheiro and surrounding land that stretched almost to the sea, were owned by a single family of aristocratic roots and rural land tenure, about 150 years ago. Family whose origins and history is mixed with the county itself.



Fig. 3 NETO, Maria João Pereira (photos), February 2013. Rural house in Palheiro Valley.

With the progress of time and the distribution of property by successive processes of inheritances, the land map has been changing, the country has changed and the countryside has been slowly dying. The legislation has arisen in order to protect a landscape of extreme beauty and virtually unspoiled, has been not sufficiently understood or provides confidence by those who resisted. Having been overtaken his goodness or subdued by the prohibitively excessive that even restricting the passage of cattle on the banks of streams or planting and harvesting in areas where for centuries had planted and produced a bit of everything from rice to sunflowers, not forgetting the wooded component and the cork production [9].

The Palheiro Valley has been an agricultural property that dominated part of a wonderful territory where even the sixties, early seventies of the twentieth century withdrew cork (today there are oaks, protected by law and which is extracted cork in the area) and rice fields were extensive and spread - by long valleys to the sea. Consisted of traditional hill, perfectly integrated into the landscape [10] and with her mingling, the residence of the farmer, the tenant (non-owner), and an agricultural support, a warehouse and the cattle.



Fig. 4 NETO, Maria João Pereira (photos), February 2014. Overview of the Vale Palheiro, in Alzejur

The direct descendants of the most recent owners, a branch of the family that held the ownership of much of the land that ended up near the Atlantic, sold it to a enterprise in the capital, which quickly presented a project for Tourism in rural areas.
In reality, this project hides itself under the supposed sustainability perspective, because the buildings Certain that they were was intervening in one of the most sensitive areas of the Natural Park, where since the promulgation of the 1987 Decree nothing could be constructed or altered for being illegal, including an enlargement of a window. Any intervention in the area had to pass the scrutiny of the highest authority: those responsible for the Natural Park and in the majority of cases they were rejected.

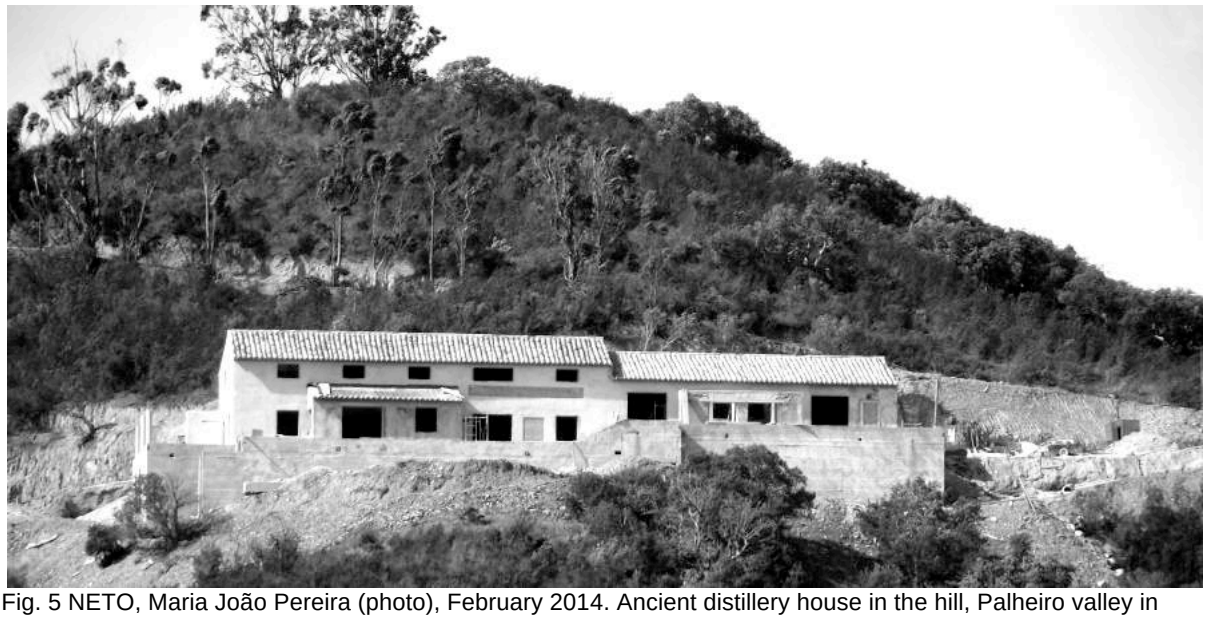

Fig. 5 NETO, Maria João Pereira (photo), February 2014. Ancient distillery house in the hill, Palheiro valley in Alzejur



Fig. 6 NETO, Maria João Pereira (photos), February 2014. Palheiro valley in Alzejur

The new owners, a company based in Lisbon, purchased most of the properties around, and suddenly, to the consternation of many began to be built a small private village. A supposed rural tourism space on its legal designation of country houses altering paths and subsequently applies to local authorities to be fenced.
This behaviour contrasts with all the logic of community local tradition, which always respected the private property, allowing the free movement and land crossing. This pathway was one of the roads that the older generations made to go to the near beach of Monte Clérigo. More severe, this intervention is destroying and is digging one of the most beautiful and untouched hills, destroying oaks, terrorizing migratory birds, cows, other indigenous animals and damaging the local flora, protected by law. Which is impacting in the calm landscape and its patrimonial value by a deafening roar of machines and trucks that bring the raw materials to the place where supposedly elaborates the adobe bricks.
At the present time, early 2014, the aforementioned project was too quickly approved by the ICNB (National Institute of Nature Conservation), compared to what would be usual in March 2010 [11]. This project has just been launched in the summer of 2013 and encompasses about 44 acres and a total of 700 m2 of construction. Where besides the owner habitation (on that was once the traditional hill, and

now highly modified) are included six units of housing, stables and an arena next to the stream bed, in a flooding area. Also included in this project is a building to support the honey production and a distillery, which is strategically placed in what was once a beautiful and untouchable slope, which was destroyed and excavated to give origin to a huge building completely deranged from everything else, in a place where there never was any construction.
are allegedly made in adobe and earthen architecture, even though they included steel and concrete, as we have observed and recorded photographically during the last months. If this is an untouchable place them it should be impossible to be changed according to the present legislation. So, this construction constitutes by itself a huge wound in the landscape and a deep imbalance in cultural and intangible heritage of Aljezur and in the whole Natural Park. It is in our understanding and that of many of the older inhabitants of the county and the true guardians or keepers of its memory, a real plague and an aberration: because it disfigures the park landscape; because it does not suit the local architectural language and tradition of this region [12], taking two or more floors and mixing traditional architectural raw materials with iron and concrete; because it contradicts everything that has been previously denied, for nearly three decades, to those who resided or worked there and which always succeeded in preserving the essence of this place; because it contradicts the law itself, as it is based to achieve the project for rural tourism – countryside accommodations.
Finally, because it contradicts one of its key articles: "the developments of tourism in rural areas referred to in subparagraphs a) to c) the following paragraph shall preserve, restore, and enhance the natural heritage and landscape architectural, historical, their locations and regions where located through the reconstruction, rehabilitation or expansion of existing buildings, in order to be assured their integration into the surrounding ... " [13]

According to the law "countryside accommodations are the properties situated in villages and rural areas which are integrated, for their design, building materials and other characteristics, in the typical local architecture". In this paradigmatic and exemplary case study, it is assumed the opposite, in the name of development and private investments. Thus, we consider this one of the saddest and most exemplary cases of (un)sustainability and disregard for local culture, and a huge heritage attack to one of the most beautiful and until now protected natural regions of southern Europe. Paraphrasing Ghandi: “Earth provides enough to satisfy every man's needs, but not every man's greed.”

Notes

[1] On this subject see Sven Arntzen and Emily Brady (eds) – Humans in the land – the ethics and aesthetics of the cultural landscape - Unipub, 2008, chapter 2 about the complexity of cultural landscape: humans and the land, preservation and change- p.41-76.

[2] Law 39/2008 de 7 de Março 2008 with some alterations Law 228/2009 14 de Setembro de 2009

[3] http://www.rotavicentina.com/about-the-project/?lang=en

[4] *ibidem*

[5] NETO 2010, NETO 2012, NETO 2013

[6] As we can see through the definition and legal Framework above mentioned

[7] See Law - Resolution of the Council of Ministers nº 11 B/ 2011, February 4th, 2011

[8] NETO, Maria João Pereira *et al.* (2013) – Landscape as cultural heritage – the several dimensions of heritage management- Aljezur and the Vicentina Coast- Portugal – Le vie dei Mercanti – XI Forum Internazionale di Studi, Proceeding Book, p.372-378

[9] Vale Palheiro can be translated to the equivalent of Haystack Valley.

[10] See Fig. 2 and Fig. 3.

[11] The all process took less than a year: between March 2010 and the emerging new law in February 2011

[12] FERNANDES, JANEIRO 2008, p.33-36

[13] According to legislation aforementioned

Bibliographical References

ARNTZEN, Sven, BRADY (eds). *Humans in the land: the ethics and aesthetics of the cultural landscape*. Oslo: Unipub, 2008

FERNANDES, José Manuel, JANEIRO, Ana. *A casa popular do Algarve: espaço rural e urbano, evolução e atualidade*. [s.l.]: CCDRA, 2008. ISBN: 9789898208-00-2

NETO, Maria João Pereira. "Os territórios da Utopia- entre o ideal e o real- ou a (in)sustentabilidade das áreas de paisagem protegida". In *Livro Actas – I Seminário Internacional Academia de Escolas de Arquitectura e Urbanismo de Língua portuguesa – Uma Utopia sustentável*. Lisboa: FA/UTL, 2010, p.378- 384

NETO, Maria João Pereira. "Lugares e espaços do olvido em territórios das Terras do Infante". In *Livro de Actas II Seminário Internacional Academia de escolas de Arquitectura e Urbanismo de Língua Portuguesa – Palcos da Arquitetura*. Lisboa: FA/UTL, 2012, p.146-152

NETO, Maria João Pereira. "Regulação e desregulação: um caso exemplar: ou as contradições de uma paisagem protegida: Aljezur e a Costa Vicentina". In *Para uma ética do Território.* JORGE, José Gorjão (coord.). Lisboa: FA/Ulisboa, 2013. p.141-148

NETO, Maria João Pereira, KONG, Mário Say Ming, JANUÁRIO, Pedro, GARCIA, Andreia. "Landscape as cultural heritage – the several dimensions of heritage management- Aljezur and the Vicentina Coast- Portugal". In *Le vie dei Mercanti – XI Forum Internazionale di Studi, Proceeding Book.* [s.l.]: [s.e.], [s.d.]. p.372-378

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Havana: urban configurations and heritage conservation

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Abstract
Against the background of contemporary global urbanization, Havana must be regarded as a completely exceptional case. The current urban situation defines several urban configurations that epitomise the seven most important components of the specificity of the urban for the Cuban Capital as a whole while at the same time each of these configurations synthetises the specificity of the urban situation of its parts. Heritage conservation is a key factor of the current urban situation.
In recent years, Havana has gained increasing attention especially in terms of urban development. However, the main interest remains strongly focused on the *Habana Vieja* quarter, which was declared a UNESCO World Heritage site. The government-led development program to renovate the old city has achieved relevant successes despite Cuba's difficult economic situation. However, *Havana Vieja* only constitutes a small part of Havana's heritage of urban architecture. Our analysis shows that Havana's historically and architecturally significant area is much greater. Due to the great diversity and richness of its urban structure, the city at large is a unique example of our global heritage. This heritage is nonetheless threatened in different ways. The paper elaborates on this issues and on what strategies has been defined and how planning has reacted to these different specific situations.

An Exceptional Case
Against the background of contemporary global urbanization, Havana must be regarded as a completely exceptional case. While at the global level, urbanization is progressing undiminished and the creation of overflowing urban landscapes and megacities is seen in diverse locations all over the world, this development seems to be bypassing Havana almost without a trace. The Caribbean metropolis has experienced comparatively little growth in the past 50 years. With its approximately 1.4 million inhabitants in 1958, Havana was one of the large metropolises of Latin America. A rapid urbanization process and an intense construction boom marked it. The skyscrapers along the Malecón, which today form a still-incomplete skyline, bear witness to this fact. Today, Havana has a population of around 2.2 million, with the demographic development having stagnated since 1980 and the population aging at a fast pace [1]. The suburbanization process has been halted, and even today, the city's outer limits are clearly discernible[2].
The reason for these developments is mainly to be found in the nature of the Cuban Revolution, which primarily aimed to improve conditions outside Havana. Accordingly, revolutionary Cuba pursued an explicitly decentralized development strategy. The main aim of policies was directed towards developing rural areas as well as small and medium-sized cities. The further development of the nation's capital, by contrast, was only given secondary priority[3].
In recent years, Havana has gained increasing attention especially in terms of urban development. However, the main interest remains strongly focused on the *Habana Vieja* quarter, which was declared a UNESCO World Heritage site. The government-led development program to renovate the old city has achieved

[1] Cazanave Macías, "Pautas Metodológicas Para El Diseño De Espacios De Intercambio Social Accesibles Por Adultos Mayores. Caso La Habana Vieja."
[2] Schmid and Peña Díaz, "Deep Havana."
[3] Scarpacci, Segre, and Coyula, *Havana, Two Faces of the Antillean Metropolis*.

relevant successes despite Cuba's difficult economic situation[4]. This favourable situation contrasts with the attention to other areas. The paper elaborates on these issues and on what strategies have been defined and how planning has reacted to these different specific situations. The sources of these analyses are three projects that have been carried at the Centre for Urban Studies of Havana: The projects SeDUT, Atlas Urbano de La Havana, and Sustainable Urban Rehabilitation for Centro Havana. The two former have been developed in collaboration with several Swiss Institutions such as the ETH-Zurich and Metron among others. They used mapping as a research tool and were instrumental for the identification of seven urban configurations. Each of them was given a symbolic label addressing its key features namely The Blue Strip, Deep Havana, Central Havana, Hidden Havana, Industrial Cities, Satellites of Modernity and National Havana. The latter project deepened in the systematisation of heritage components with a wide scope in one of the most complex municipalities of the metropolis. Historic, Urban and Architectural heritage components were identified and registered within the so-called Atlas of Cultural Heritage for Centro Habana[5]. This new knowledge was used in order to define activating projects able to revert the negative situation. The key common issue linking the three projects have been the attempt of understanding specificities of the urbanisation process and finding approaches able to inform current planning tools.

Urban Configurations and Heritage

Havana´s current urban situation defines several urban configurations that epitomise the seven most important components of the specificity of the urban for the Cuban Capital as a whole. At the same time each of these configurations synthetises the specificity of the urban situation of its parts. Heritage conservation is a key factor of the current urban situation. Although in most of them heritage components are present in three of these configurations heritage and its conservation, are key components of the current urban situation. Nevertheless they play different roles.

The Blue Strip and Deep Havana represent the antipodes of the urban situation: One the one hand there is the Blue Strip. It is the shiny area that concentrates the best qualified zones and the places that constitute the branding of the city e.g. the best-off neighbourhoods, most of the hotels serving the international tourism, and in general most of the main facilities operating in hard currency within a dual system. The main metropolitan functions such as Banks, Media and Government facilities are concentrated here. Moreover main recreational attractions are within this area: the modern Downtown Vedado, the beaches and the historical centre. On the other hand there is Deep Havana. It summarises the rupture of the balance between centrality and periphery-generation shown by its location south of the Harbour and in the gravitational centre of the city. Nevertheless although close to the central areas and with hot spots of centrality within itself it is still perceived as far, disconnected and downgraded. The area has been somehow neglected and almost no tourist related nor foreign joint ventures related to foreign investment take place in there. Qualification of public spaces and services is generally low.

The presence of the Historical Centre within The Blue Strip evidences the successful impact of the heritage preservation measures carried out in this area during the last three decades. After being included in the World Heritage List _ along with the colonial defensive system _ the area was benefited by a comprehensive program of recovery. Its transformation capacity and positive impact became more visible during the 90´s. A set of special economic and political measures granted the capacity to obtain the economic means to both recover the most valuable zone of urban, architectural and historical value of the country. The set to value of this heritage has been the key engine of this process. It has turned a downgraded area into a highly appreciated part of the city by both Cuban and foreign visitors as well as by locals. The program has been in general terms successful in avoiding gentrification and a clear social orientation characterises it. The program has been registered as an international Best Practices initiative and within Cuba is regarded as a model that should be further developed and adapted to other areas beyond the colonial historical centres[6]. The fact that these programmes can be considered one of the most significant actions over the built environment along the last five decades in the whole country makes it explicit the professional, technical and organisational potentialities embedded within the Cuban society to deal with and protect its heritage in a clever way. Additionally it has been proving how tourism, private initiatives, State-lead programmes and other stakeholders can align themselves in order to increase the wealth of the Cuban Society using heritage recovery as a key component of the strategies they have forged.

Threatened Heritage: Other configurations

Cuban policy of decentralization ensured that the existing urban structure was preserved. Only few new housing projects were constructed in Havana, and these (e.g., Alamar) were added to the city without destroying existing neighborhoods. Unlike in almost any other city of comparable size, the historic quarters of

[4] Schmid and Peña Díaz, "Deep Havana."
[5] Rey Rodriguez, Peña Díaz, and Sánchez, *Centro Habana. Un Futuro Sustentable*.
[6] Cazanave Macías, "Pautas metodológicas para el diseño de espacios de intercambio social accesibles por adultos mayores. Caso la Habana Vieja."

Havana were not destroyed by urban transformation processes, but were preserved. Havana can therefore be regarded today as a museum of urbanism: All phases of its historical development, from the colonial and republican periods to the metropolitan phase of the 1950s and the revolutionary period, can be traced with extraordinary clarity in the urban landscape. Havana Vieja only constitutes a small part of Havana's urban heritage. Havana's historically and urbanistically significant area is much greater. Due to the great diversity and wealth of its urban structure, the city at large is a unique example of our global heritage.[7]

Chateloin[8] has demonstrated the existence of urban zones with cultural and historic value (ZUVHC). Roughly one fifth of the total built up area of Havana is considered within this category. Such representation reinforces the exceptional character of the trace of urbanisation in Havana since most of these areas have not suffered transformations since they were built. The most important of these ZUVHC is the Historic Centre La Habana Vieja i.e. the above-presented case. Nevertheless two other configurations show a different status quo regarding both the comprehension of the value of this heritage and the actions in place to preserve it. They are basically Havana Central and Hidden Havana.

Havana Central embraces most of the area that in the XVIII century was beyond the City Walls. During this Century the area became the logical space to accommodate further growth and already in 1862 the extramural population doubled in size that living within the walled area[9]. Military requirements associated to the peculiarities of the defensive system (City Wall, Campo de Marte, the presence of the Shipyards) among other features, had forced before the allocation of settlements in a separate fashion from the city core. Consequently suitable space had been preserved for the inescapable expansion. The axes of today´s Paseo del Prado _the eastern border of the configuration_ ,Reina Street and Carlos III Avenue in the Northwest and Monte _Southwest _ were key elements of the consolidation of this area between the 18th and 19th Centuries. The continuation further west of the latter was known as Calzada del Cerro in reference to the crossing of the neighbourhood it articulates. The area of El Cerro _South Western part of the configuration _ was first the space for the settlement of the non-Spaniards. "Its existence is associated to the development of the national identity of the Creole (criolla) Oligarchy. There they found a space for development with certain autonomy and differentiated from the space of the Spaniards[10]. This neighbourhood had an impressive splendour and fast decay took place all within 19th Century"[11] constitutes together with current Centro Habana key pieces of this configuration. It also engages the southern area of the historic core of Old Havana. This area lacks the concentration of monumental buildings and spaces of representation of the colonial period. Its development is much connected to the port and the former shipyards. Presently the impact of the recent impressive physical renovation and social programs is not still as visible as in the northern part. It used to be a much more modest zone where working class people lived amid a much less significant architecture. It also reaches further south the areas of the Municipality of Habana Vieja just beyond the UNESCO area around the bay, the northern part of Cerro and most of Centro Habana.

The Blue Strip frames it in the north and Deep Havana in the South. It is therefore just in-between the populous gravitational centre south of the bay and the privileged coast-oriented northern fringe. The back of the Malecón along the San Lázaro Street is its northern frontier. It extends towards Infanta in the west and Via Blanca cuts it the south between the Sports City (Ciudad Deportiva) and the Fishing Port (Puerto Pesquero).

The specificity of this configuration resides in the contrasting paradox given by the confluence on the same spot of three conflicting elements: its privileged location _ accompanied by high levels of centrality _ coexists with the enhancing concentration of heritage assets both of material and immaterial character framed by high levels of deterioration of both the physical and social tissues. The latter aspect has been affecting the possibility of its heritage to be recognised by average citizens. It is not rare either to hear in the voice of both practitioners and certain academics expressions such as "we should make tabula rasa of all this area and start from scratch again". This situation shows the contested character of this area. Nevertheless there is not any comprehensive program in place to deal with this complex situation. Consequently even though there have been important punctual actions supported by the state and isolated private initiatives seems to have understood the value of centrality, the lack of coordinated action threatens the possibility of keeping this valuable piece of heritage.

The second of these configurations is Hidden Havana (HH). HH has been labelled a configuration with their cores in the foundational areas of three former towns on their own: Regla and Guanabacoa in the east and Marianao in the west. The urbanisation process of Havana engulfed them only in the second half of the 20th Century. In 1939 Marianao was still considered the second largest city of Cuba and Guanabacoa was fifth in

[7] Schmid and Peña Díaz, "Deep Havana."
[8] Chateloin Santiesteban, "El patrimonio cultural urbano y el criterio de centro histórico caso de estudio ciudad de la habana."
[9] Coyula and Rigol, "La calzada del cerro esplendor y ocaso de la habana neoclásica."
[10] Llanes, *1898-1921: La Transformación De La Habana a Través De La Arquitectura.*
[11] Coyula and Rigol, "La calzada del cerro esplendor y ocaso de la habana neoclásica."

the list. Presently both areas are deeply embedded in the understanding of the identity of Havana with very specific blends such as the coined image of African-origin religiosity and both cultivated and popular dancing music being generated within the remnants of the former colonial structure. Both parts of this configuration have made room for spontaneous settlements in their edges.

The western section of this two-pieces configuration defines the identity of the west-south section of Havana. It goes beyond the current limits of the municipality of Marianao and includes westwards parts of La Lisa. It stretches eastwards beyond the margins of the Quibú River including its precarious settlements with sonorous names _such as Los Pocitos_ to Street 44 in the Buena Vista neighbourhood and connects with the areas of the Parque Metropolitano de La Habana and the East-West Highway. 19th Street marks the northern limit with the back of the Blue strip . This limit continues along Ciudad Libertad and the margins of the Quibú River and the southern end of La Coronela. A conglomeration of Industrial facilities flanks its southern border including the former Oriental Park presently turned into a large storage and large retail zone. The dumping site and the large space-needed connection of the east -west highway and 114 street close to the only sugar mill of the city territory definitely marks this frontier which extends with a similar character to the west.

The territory in the west contains the nucleus of an area that developed since colonial times in the western side of the Almendares River in connection to summer recreational facilities. It obtained the category of independent municipality only in 1878. The 51st avenue constituted the backbone of the urbanisation process in the area. Nevertheless the area north of this street towards the coast remained almost empty until the very end of the XIX Century. The periods after the first and second World Wars witnessed an accelerated process of urbanisation under different models defining the current shape of the territory.

This piece of Hidden Havana used to be part of a larger space that reached the northern coast of Havana where the notorious Clubs and Nightlife hotspot of the 30's and the 40's of the 20th Century were located. Nevertheless it presents itself today as a separated piece that lost its connection to these branded areas on the north. In spite of the fact that the territory is crossed by important streets that presently connect for example the international airport (114-25th-190) with the protocol area close to the sea in the west and the former Headquarters with Vedado towards the east there is no connection between Marianao and the beaches that keep the same name of the former town and present municipality: Playas de Marianao even though they are now in Playa. The partly empty surface of the military airport at former Columbia Headquarters, which was built by the American Army during the 1898-1902 occupation of the island, constitutes today a major border that definitively separated this configuration from the adjacent coastal development. Paradoxically the urban transformations made around it constitute icons of this part of the city: the obelisk dedicated to Dr. Carlos. J. Finlay and the 31st avenue containing a concentration of medical facilities. .

Morphologically this configuration contains a gridiron structure with different sizes in specific areas. Shared walls buildings concentrate in the oldest areas along the 51st street. An assemblage of different urbanisations resulting from private initiatives during the first half of the 20th Century make the most of it. The presence of the Quibú River imposed derelict space_ leftovers of the frantic speculative urbanisation process that shaped the territory, which has been occupied by small slums. Hence, In spite of the weight of the area in the collective memory of the citizens this it is perceived today as one of the most deteriorated ones and stands for low quality living.

The eastern piece of this configuration embraces two former cities: The ultra maritime town of Regla and the city of Guanabacoa, capital of the Cuban Music. They define the second and complementary segment of this configuration. The relation to the harbour and the sea coin the character of these areas even though the storage and shipyard facilities belonging to the harbour do block the direct access towards the opening of the bay. The identity of this area makes also reference to the strength of religion_ particularly that of african origin_ and the cultural elements that surround it as well as the omnipresence of popular music. The presence of babalawoes for example is an important reference in the collective memory when referred to this place. The connection with the sea has also an influence in this fact since the shoreline is used in the religious rites. Other areas such as the Colina Lenin offer space for these practices due to its open air and hilly character. The procession of the Virgin that takes places every December 4th agglutinates Catholic church followers and Yoruba religion practitioners adoring simultaneously The Virgen of Regla and Yemaya each one group. On the other hand this was the area where personalities of the Cuban popular and classical music were born and developed such as Rita Montaner, Bola de Nieve, y Ernesto Lecuona among others.

The historical nucleus of Guanabacoa was declared National Monument in 1990, which defines a protective framework. It has started a promising process of rehabilitation. This area has been however surrounded by several "repartos" (urbanisations) such as Chibás, La Jata, Nueva Habana and others. These repartos do not make reference to the morphological composition of this colonial core. They are in general references to the international architecture movement that so much impact had in housing models all over Latin American in the late 40's and 50's. Notwithstanding the conservation process is very weak even though there have ben several studies. These results have not been implemented and the attempts to create a municipal group to take care of the heritage components have been unsuccessful. As a result " the conservation of this

historical centre is severely threatened since several of the most singular buildings are close to be lost" [12]. There is growing concern because in the absence of a quick reaction the beauty and value of this exceptional part of the heritage can be definitely lost by the "fickleness of oblivion"[13]. This concern can be extended to the neighbouring Regla. Although there are signs of a better understanding of the value of its heritage the absence of a comprehensive program of intervention is also part of the situation.

Final words

In summary it has been possible to show the singular situation of urban heritage through three different cases. The example of Habana Vieja (Old Havana) shows the implementation of a successful model in dealing with heritage conservation in a holistic manner. The connection between tourism and local development strategies has achieved a synergetic interaction. Besides the singular economic setting defined for this historical centre these programmes have been supported by a specialised planning office whose role has been directly related to the regulation and fostering of sectorial and individual initiatives while safeguarding the heritage of the territory under its control. Nevertheless this successful model has not been extended to other areas of the city where Heritage also plays a significant role. Hidden Havana and Havana Central show it in a clear way. The lack of further development of such initiatives could be associated to the particularities of the urbanisation culture and model put in place since 1960, which favoured the creation of new areas instead of the maintenance of the already built ones. In a context of little expansion and a concentration of historical zones a more thorough approach is demanded.

Moreover studies and proposals such as that of Rey[14] and the studies conducted by several local institutions have created the conceptual and methodological basis for the consolidation of a policy to deal with the heritage of this kind of areas. While these lines are typed the National Congress of the Cuban intellectuals Association (UNEAC) has just closed its final session. A commission of this congress addressed specifically issues related to the city as an intrinsic component of Cuban culture. Its report calls for the definition of comprehensive policy framework to safe the city as a whole from deterioration and oblivion. It is a relevant contribution to the intensive debate that the update of the economic model of Island Nation has recently opened. It has put the cities as a protagonist of such a crucial process. These lines are a modest contribution to this debate.

[12] Cárdenas, "GUANABACOA: ¿AÑORAR EL PASADO?".
[13] Cárdenas, "Guanabacoa, ¿la Bella?".
[14] Rey Rodriguez, Peña Díaz, and Sánchez, *Centro Habana. Un Futuro Sustentable*.

Bibliography

Cárdenas, Eliana. “Guanabacoa, ¿la Bella?” *El Caimán Barbudo*, no. 267 (February 1990).

———. “Guanabacoa: ¿añorar el pasado?” *Arquitectura y Urbanismo* Vol. XXII,, no. No. 4 (2001).

Cazanave Macías, Joiselen. “Pautas Metodológicas Para El Diseño De Espacios De Intercambio Social Accesibles Por Adultos Mayores. Caso La Habana Vieja”. ISPJAE, 2007.

Chateloin Santiesteban, Felicia. “El patrimonio cultural urbano y el criterio de centro histórico caso de estudio ciudad de la habana”. ISPJAE, 2008.

Coyula, Mario, and Isabel Rigol. “La calzada del cerro esplendor y ocaso de la habana neoclásica.” *Arquitectura y Urbanismo*, no. 2 (2005).

Llanes, Llilian. *1898-1921: La Transformación De La Habana a Través De La Arquitectura.* La Habana: Letras Cubanas, 1993.

Rey Rodriguez, Georgina (Gina), Jorge Peña Díaz, and Kiovet Sánchez. *Centro Habana. Un Futuro Sustentable*. La Habana: Instituto Superior Politécnico José Antonio Echeverría, 2009.

Scarpacci, Joseph L., Roberto Segre, and Mario Coyula. *Havana, Two Faces of the Antillean Metropolis*. The University of North Carolina Press, 2002.

Schmid, Christian, and Jorge Peña Díaz. “Deep Havana.” In *Havana Lessons: Teaching and Research in Architecture*. Lausanne: EPFL, 2008.

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The memory of change

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Abstract
"As far as we know, the construction of the world starts from the worlds that we already have; the construction is a reconstruction. However, how the real worlds that we recognize as such really are, is an entirely different matter? Even under very restrictive assumptions, it is possible to find innumerable interpretations, all equally legitimate". In Nelson Goodman's definition, relativism appears as a theoretical concept, in which a single object can be viewed from different perspectives, all resulting from the cognitive orientation of the individual yet considered equally valid. The activity of analysis or the project of urban architecture is influenced by both a myriad of aspects of life of spatial, political and socioeconomic nature, as also by their impact on the perception that the individual has of the constructed environment.
As a subject of study, Naples can be related through an indefinite number of perceptions that are evidently equal in the level of volatility and conflictuality of the city, ever changing. Often alternative visions of the urban environment and its elements are the starting point for analysis, survey and representation of the space: from many points of view the city relates, represents and subdivides.
The continuing transformation represented by the collective structure of the city to which is entrusted the vision of urban form and an invariant design primarily connected to strategic locations, capable of providing the framework on which to prefigure images of themes and actions at all scales.

Keywords: Urban environment, multicentric vision, disclosure.

1. The reading of the city
The activity of analysis or the project of urban architecture is conditioned by both a myriad of aspects of the living of spatial, political and socioeconomic nature, as also by their impact on the perception that the individual has of the constructed environment. Like that of the anthropologist, an architect's description, which starts from relativistic assumptions, can contribute to define many-sided perceptions in order to better understand certain aspects of the human spatial experience and their unique characteristics. Moreover, it is here that the architect must differentiate himself from the typical limitations of the definitions of anthropological relativism, to formulate judgments, evaluations and priority of the perceptions in order to establish a productive dialectic that can give shape to the future urban built environment.
Naples provides a unique opportunity to study the way the architect can use the vast opinions and perceptions that define a city and how they can in many ways determine the route, which, in the spirit of Goodman's relativism, are all true: the frequency and range of the past, present and future of its space.
As a subject of study, Naples is a place that can be related through an indefinite number of perceptions that are evidently equal to the level of volatility and conflictuality of the city. Often alternative visions of the urban environment and its elements are the starting point for the analysis, the survey and the representation of the space: from many points of view the city is related, is

represented, is fragmented; the urban area, analyzed small parts at a time, is characterized by a plurality of urbanized nuclei of which settlement identities differ.
Large and small residential areas, historic centers, mixed areas punctuate a territory in which prevails a polycentric structure, where solids and voids alternate in their variable role of forming the positive and negative space of the urban fabric. The “solid” intended as that part of the city composed of districts and of the social and housing multiplicity that design the scene, on which to apply actions of analysis, projects and survey; the “void” represented by the structure of the collective city to which is entrusted the urban form of vision and an invariant design above all connected to strategic locations, capable of constituting the framework on which to prefigure images of themes and actions at all scales.
Solid and void define space, the humanistic space of the classic culture, the one enriched by time and defined and limited by objects.
Significant component of the very identity of the city, it is the added value, the aggregative, collective value, of socialization and wealth; it is the flexible space, able to continually redefine itself and to be immediately related to the physical structure of the city; it is the system of voids, in their more diverse extensive and intensive declensions, to constitute the irremissible invariant of each city, the structural backbone of urban space: the texture of open spaces, together with pedestrian walkways, squares, cloisters and mobility networks, establishes as the essential form and fundamental point of view of territory and city. There are numerous structures of relationship between solid/void that contribute to emphasize the specificity of contexts and Neapolitan districts and to make the identity of the urban structure be recognizable; Naples appears as an extraordinary kaleidoscope, dense of ideas, criticisms, opportunities in which to succeed in recognizing a multiple partition in the urban structure that allows to read the city through a more attentive point of view. Especially in recent years, the urban voids have been mostly considered as breaks or remains to be conquered from amongst the solids and not as material capable of generating the necessary quality of urban space. If the void structure of any planimetry of the city is extruded and volumetrically moulded as if it was solid architecture, an original figure will emerge from each void, a figure completely new, which allows to highlight the criticisms and opportunities that are connected.
Observing then the urban form of the void, appears clearly the necessity to put at the centre of each presupposition, analytical, descriptive, projective, the character of permeability that each urban space assumes like a material capable of strengthening the network structure of the city; it is the void, in this sense, that must ensures the continuity between the different systems - historical, formal, morphological and configurative - and, together with the services and infrastructures, that must construct the netlike structure of the city.
Recognizing a system of centrality in this sense means detecting concentrations of urban monuments which express the multiple vocations of the city both past and present, invariable in the challenge proposed by the changeability of the contemporary city and its constant metamorphosis.
The reading and interpretation of the complex Neapolitan area have requested the use of several survey instruments, the comparison with different scales of reference, the contribution of various disciplines, above all survey, privileged instrument of knowledge that enables to explicitate a method of approach to space and an expressive language, of which the critical and cultural foundation is Descriptive Geometry.
This discipline helps the eye of the observer to get used to grasping, from the space in which from time to time it is inserted, configurative characteristics and morphological aspects, to understand the volumes and surfaces which compose the space, disarranging them in the mind and rearranging them in the representation; to distinguish the intersections between the planes and surfaces that border the space; to identify geometric genesis and to critically describe the significant elements.
For this the equipped-eye of the observer, the eye of the one who practices the art of drawing, the eye of the one who knows the Methods and Principles of the Representation, discomposes the space of the architecture and fragments the architecture in representation often simultaneous or overlying, which help its analysis and comprehension; once the observer has taken possession of the space and its intrinsic characteristics, he becomes a designer and reassembles the fragments of architecture in one or more images that summarize the space and express its forms and contents according to the logic and rigorous language of Descriptive Geometry.
The representation that results from the survey permits, through the powerful synthesis of which it is capable and the visual immediacy of communication that it generates, to obtain the image of “within eye sight” city: nothing is more difficult than to try and reconstruct an image of Naples, which is full of images, being inside it. Myopia prevents, hinders the vision.
The complexity of the urban experience and its continuous changes, direct function of the evolution of the reality and of the temporal context, requires an adequate and always up to date representation; the latter, never setting aside the methods of representation of Descriptive Geometry, must make a conscious and unscrupulous use of each method, and, at the same time, update them with the aim of producing images more suitable to the current visions. In fact the current process, of sudden and

continual transformation of the reality in which we live, no longer requires a static observer, rigidly linked to the flat surface on which to project the image, but requires rather a dynamic and interactive observation capable of adapting the graphic image to the laws of development, fruition and expansion of space.
The contemporary urban setting accustoms us, and more often, obliges us to uses and views of the reality that surrounds us which shift the interest of the observer from the strictly metrical and typological to the projective and topological, undoubtedly more complex to code and decode. If, from one point of view it is true that cultural, conceptual and imaginative enrichment of the modern world offers as ultimate limit a qualitatively differentiated product, it is also true that it involves a loss of comprehensibility in relation to the ever increasing level of information that it contains. Obviously the representation is also affected by this duality growing richer with new ideas, researches and reflections; history, geography, sociology, anthropology, economics, statistics, archaeology, architecture and engineering, the accompany the analysis at different scales of reference and in respect to a vast range of points of view and themes: different morphological characteristics, variable speeds of movement, different ways of living emerge from the analysis carried out in that way on the city, or better, they become the privileged reading keys. In particular living, anthropological constant of every territory, specializes in so much diversified forms and dimensions and the home becomes the preferable area of discovery, for technique and for art; when the man lives, builds and transforms a territory, in accordance with needs connected to living, the invariables which underlie each centrality and each nucleus inside the urban space.
There are different types of connections between the individual urban centralities of the City of Naples and among these and the major environmental systems composed by the suburbs, the coast, the area of the Vesuvius and the Phlegraean zone: from the pedestrian routes, to those in buses, trams or underground which connect each part of the city center, to the crossings designed by the new underground line, to Cumana and Circumphlegrea lines, from the Vesuvius areas to the coast, each portion of the territory is connected by a network which proposes to strengthen exchanges trade, developments and interactions.
“It is possible to arrive in a city from the sea as from the sky, from the land or even from underground, but once inside, you are captured. Naples is a prism and reflects all descriptions, returning them multiplied” [1], developing a critical analysis of the city that allows to explore a complex reality, consisting of heterogeneous parts, characterized by numerous typologies and morphologies, experienced and crossed in different ways according to the various places. The methodological approach and the resultant reading and interpretation, make evident the compulsory course that urban reality and life that it contains have crossed, that from unity to fragment: in the route from unique to multiple, contemporary reality has intensely transformed; today the fragment seems to prevail over unity, as a matter of fact, it has become the symbolic form of reality, the most immediate expression of the chaotic essence of urban living, the image of local diversity. Each fragment of Naples contains in itself the complexity and entirety of the unity, but at the same time each fragment differs so evidently one from another, in form and colors, noise and silence, lights and contrasts, dimensions and life, history and society, to form a unity of its own, a cell of the strong architectural, artistic, social and cultural connotation, extremely full of positive values, expression of the identity of one of the historically richest Italian cities.
The many stories, ideas, perceptions that have passed through Naples during the course of time, the numerous voices and identities that come from within as well as from outside the city, provide the material from which intellectual concepts, visions and descriptions can be generated.
Naples provokes, stimulates, scares and excites. Naples promotes debate with its own existence because it belongs at the same time to a recognizable world and to another world.
It is impossible to wander through this city without remaining fascinated by every detail of history, art, architecture, tradition; it is impossible to wander through the city without being struck by the neglect of large and small urban fragments.
Both positive and negative images of Naples have always been, such as in recent times, widespread, attracting national and international attention; like in the rounds of a boxing match, today more than ever, eyes of the spectators are glued on the city, waiting to see the outcome: some expect a dramatic knockout whilst others would prefer the old champion in difficulty to win once again.
Many recent representations of the city turn the eye on the probidly sublime, the city as an allegory of failures, very often caricature of the failure of the urban. Even if these representations can partially reflect reality, it is too easily forgotten that cities are the most complex of all human cultural enterprises; cities evolve more or less slowly with the participation of thousands of individuals and the reasons of their transformations over time are almost infinite and sedimented in the historical process.
Naples is not a simple metaphor.
If you are willing to look, there are many visions of the city, serious visions, unusual visions...



Fig. 1: Whitin eye sight (photo by Claudia Iacomino).

We watch Naples from above and hope, always hope, that the design would be recomposed, become legible, whilst all around, tourists and passersby, from the balustrade of the Largo della Certosa play the same game: they try to recognize where is a certain square, a certain church, their home. They all search for the line, the route, the form.



Fig. 2: An unusual vision of the city (photo by Claudia Iacomino).

2. The method: Naples in fragments

In a reticular and multicentric vision of the city, where the single identities constitute an extraordinary resource of knowledge of the territory, the survey and representation permit us to describe an urban landscape which has no solution of continuity between solid and void and, often, between internal and external, but which is constellated by fragments which, like stars, dot the infinite space of the sky allowing the observer to be find his way and be able to recognize his relative position; in the same way, the fragments of architecture define and connote an urban scenario permitting the observer to recognize it and himself. This is the most important aspect of the fragments, to constitute a true constellation, made of architectures, squares, streets and urban fronts, a constellation, the absence of which is perceived as a dis-astrum.

Rational thought, foundation of every research of scientific type and, in particular foundation of architecture, is capable of unifying what is separate, by means of diversified disciplinary operations, method and applications; but only the representation can reach the extraordinary spatial construction capable of expressing, from space, contents and structures of thought: the image. It reveals itself as much in the relations between the objects of representation, separate and distinct from one another, as in the relationship between these and the observer; the represented space finds, or rather, is focused on the observing subject, that situated alone in the center of the visual experience, gathers its unity and comprehends its geometrical configurative structure.

The space of representation, however, always and in any way an artificial space which conceals but does not entirely embrace reality; points, lines and planes are abstract entities of the space which through the geometric language, are transferred in formal units commonly known by the name of images. But in the space stopped at the moment of the representation, points, lines and planes are released from their positional value in order to acquire relational value and, surveyed in their mutual relationships, appraised in their dynamic equilibrium and used in the proper level of belonging to the visual system, turn out to be reorganized in a new and inedited image.

From the reading of the urban area emerge differences in the habitat, in the ways of living the territory, various ecologies that form a network of urban and social geographies with specific identities at the macro and micro scale: there is a consolidated city, that is the historic city with its permanences in the layouts, in the architectures, in the forms; there is the city of the sea, the linear city made of crossing pathways, connecting lines, borders, profiles and margins.
The reading of the Neapolitan territory, as a whole of specific identities, has involved in these works the micro scale, intended as the local scale of the district, place of life and expression of the society that solicits the reshaping of urban livability, as a scale of the small architecture, of the architectural detail, that makes the difference in the identification of quality. The collection of the data, the study and survey data was aimed at the perception of the city, and the design of the cultural and social identities that it consists of, according to a logic of belonging to the place and to the recognition of a determined urban centrality.
The complexity of Naples appears in the multiplicity of the parts which constitute and describe its essence, a city, constituted internally by distinct and multiple potentialities: this approach which tries to unite the concrete experience, that is reality, with vision, finds its synthesis in the realizations of a possible observation of the city, in the translation of what, *in fieri*, our city should be, or we would like it to be. This vision has as preferential object architecture and represents it through images and designs that express the essence of the city without the pretension of designing each time, in every fragment, the whole; from the design it is possible to understand the context and to communicate situations, to achieve a critical reflection on the things that came before us, through survey we can compare ourselves to the things *cum modo*: what emerges of this is a way of being in reality with moderation expressing the need to give form to a complex spatiality according to a linguistic code that pursues the substance of architecture.
“Places have a meaning for us as they are tied to a stratification of and images that bring them to life, and that it not necessarily ours. The soul of places, the sense of their being is independent from us. But this soul is determined by their temporal fragility. Time modifies them and gives them an enchanted aura. Nostalgia, as a founding sentiment, takes control of it. Places that are not necessarily noble, puddles, ruins, fragments of the world are the sense of being” [2].
Everyone can identify himself in a place, retracing in the archive of memory events of distant times, only for having recognized in an architectural object the practical and emotional meaning of its function within the “existential space” [3].
In this way, is established a structure in terms of elementary organizational patterns which helps to face the reading and the rereading of some spaces of reference according to the concept of figurability. Everything that is objectively concrete has that property, determined by “shape, colour or dispositions that facilitates the formation of vividly identified, powerfully structured and highly functional environmental images. It could be called readability or perhaps visibility in a broader sense where, not only can objects be seen but are also acutely and intensely presented to the senses” [4].
The city therefore becomes the appointed place of this sensory experience, making tangible its own legibility in the architectural space as a representation of its memories, its history and its daily events; the symbolic-formal and evocative place that guarantees individuality and recognition of those meanings potentially present in the structure of the urban environment. The streets, squares, urban voids, recognizable by the wealth of their symbolic values, activities or functions, relate qualitatively with the constructed in a one to one manner although they have autonomous constructive and formal characters, independent from the shape, typology and characteristics of the buildings that define them.
The square, which by its spatial connotation meets the needs of the community to have a place in which to carry out public and private activities, is the place where events and meet in a very strong way. The void-square describes itself as a place for excellence, more than any other urban space, because it relates to the whole through a representative image in which the monuments, the civil and religious buildings have determined its image “soaked with memories and meanings” [4]. Unfortunately and ruthlessly, the time variable modifies the signs of the shape: the squares, building and streets become fragments of different tales, it is as if this relationship between the space of architecture and the space of existence that the city has had since the act of its foundation fades away [5]. The matrix of the ancient city with its geometric centers of gravity, its and symbolic key points as archetypal and psychological references fundamental to man fades with the passing of the eras, eliminating those elements that render this place recognizable.
The perception of the existential space, intended as sequence of images from the a narrative, is on the other hand, independent from the time variable. Its memory cannot be lost because even the critical reading of urban shreds, like a public fountain, a façade, and section of street make its souvenir reemerge in our mind. It is possible to seize its configurative complexity through the interpretation of the fact itself, going beyond the material limit of the very object to build a conceptual grid of reference in which to insert each characteristic element of the place.

Operations which, only through the observation of the phenomenon and “the places where the conflict hides” [6] is able to reconstruct the system that helps to understand the architectural object. Measure and design are necessary aspects in the re-appropriation of the meaning of place as a space of stratifications of time that flow ruthlessly determining the fragility of things. Withdrawing time from the representation, recovering the corresponding image of the historic memory through the passage of lines and surfaces in the dimension of the drawing, is not the nostalgic vision of the reality of the past, but the true perception of the sense of being part of time.

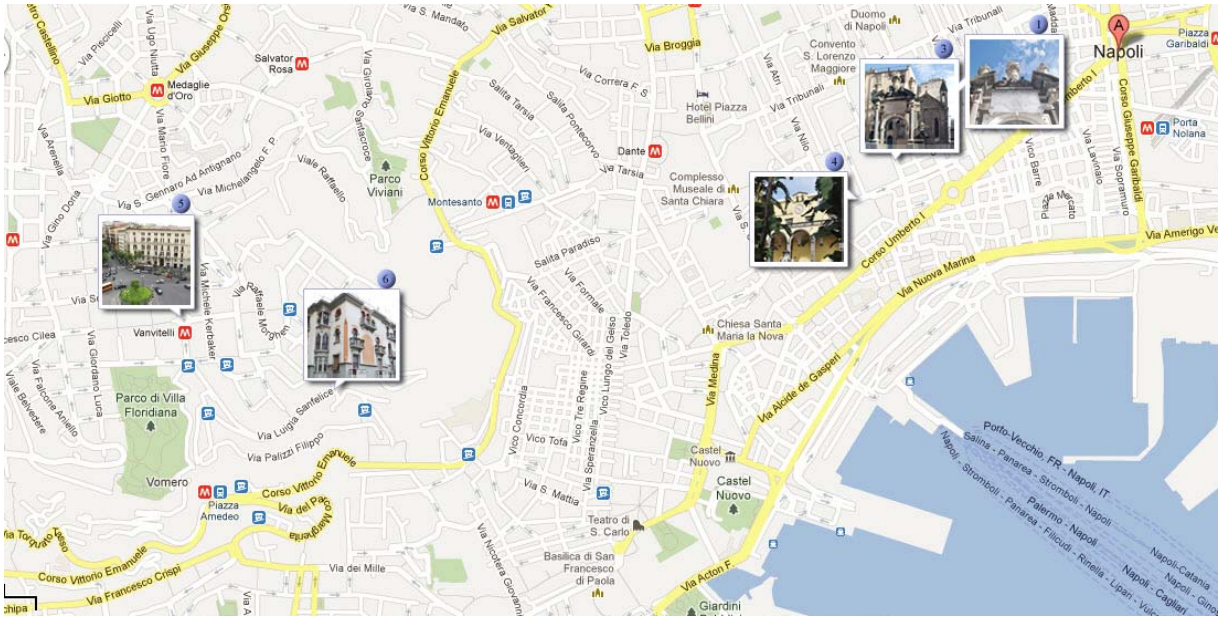

Fig. 3: The interactive map of the “city per fragments” is a graphic and app for pc or tablet. If the users install this software and have to query information about a fragment, they are able to see on the screen an interactive sheet with photos, historical and geographic details, drawings, etc. For example, in the next pictures, some photos and drawing about fragment n° 5.



Fig. 4: Some pictures in the interactive sheet for fragment of Naples n° 5 (piazza Vanvitelli, photos by Carolina Graziani).



Fig. 5: Some drawings in the interactive sheet for fragment of Naples n° 5 (piazza Vanvitelli, survey and drawings by Carolina Graziani).

Such an appropriation of the city is possible by exploring it in the dimensions of the drawing through theological consequence of geometric-descriptive methods, the ability to recall perceptual relationships that settle between the observer and the observed is attributed to the image of this space. The graphical representation becomes the dialogue between the parts of this relationship, which, through the symbolic code of graphic signs, builds the concrete structure of the architectural spaces; so the design will no longer be understood as intellectual opportunity, but as an opportunity of conservation of the memory of places with hypothetical forms which develop the ability to distinguish these spatial configurations, erased by time and transformed into fragments. Each fragment implies a strong urban identification and, forming complex relationships (one fragment with another and each with the whole) is declined and analyzed in the sign of the mixture: this re-proposes typical modalities of the city's historical evolution, at times covering the idea of "city in the city" in which each fragment expresses visual and physical relationships with the geographical morphology of the areas.
Even ballad singers, who are fascinated by the positive examples that emerge from the cities, need a synthesis in order to create an engaging story. Once again, the eye of the observer must settle on a simple vision to articulate the theme and complete the allegory.
This type of narrative gives multiple roles to the city, but that which prevails over all others is the role of place, of special identity, rich and varied like that which determines the complexity of the (eco) system. This type of narrative is a representation in which Naples designs an arch inside of which are important issues, containing attempts to answer the issues of the historic city, inside of which lies a rope, an efforts aimed at understanding, shaping and representing, therefore, the identity of the city as a system (either ecosystem or ecological system), bound to the place, context, history and culture.
In carefully reading the urban design, outlined in the fragmentation of the design and unavoidably more partial, summarized in the representation of the elements that, in various degrees, characterize the urban form, the city becomes the site of multiple narrations that compete against one another to emphasize a model, that, in this case is a tapestry and as such is built piece by piece rather than expressing itself a priori and gathers and recomposes the fragments that bit by bit are added.

Research derives from these assumptions, like the common whole of a grammar.
To study is to discover identities, represent them, give form to inedited urban centralities that cross the city and define areas capable of offering connecting spaces, useable and perceptible, linear and continuous, articulated and fragmented, made of courtyards, squares, facades, volumes, from the most variable geometry, dimensions, physical and perceptive, the most diverse at all levels, that follow one another, intertwining and opposing one another to the point of becoming a sequence of visual plans, suspended or subtending, that look out upon the image of the city and its territory.
Together with the fragments of architecture which they contain, the urban pieces, which are analyzed here, constitute the results of the collective work, and at the same time, the sum of the individual researches and experiences of a group of architects who investigated different urban episodes following an unambiguous approach beyond the scale and dimension of the object of study, with the aim of representing the punctual qualities of the single fragment and, operating in perceptive relativism, give life to a composite story of architecture and city.

Bibliographical References

[1] CILENTO, Antonella. *Napoli sul mare luccica*. 1ª ed. Bari: Editori Laterza, 2006. 150 p. ISBN 8842079006.

[2] PEREGALLI, Roberto. *I luoghi e la polvere. Sulla bellezza dell'imperfezione*, Milano: Saggi Bompiani, 2010. 153 p. ISBN 9788845264115.

[3] NORBERG-SCHULZ, Christian. *Existence, Space and Architecture*. London: Praeger Publishers, 1971. 120 p. ISBN 9780289700228.

[4] LYNCH, Kevin. *L'immagine della città*. (Translated by GUARDA, Giulio Carlo). 16ª ed. Venezia: Marsilio, 2001. 200 p. ISBN 9788831772679.

[5] STARACE, Francesco. *L'esempio di Zeusi. Principi architettonici nell'età antica*, Napoli: CUSL, 1984. 210 p. SBN CFI0080570.

[6] TORSELLO, Benito Paolo. *Figure di pietra*. Venezia: Marsilio, 2006. 170 p. ISBN 8831790889.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Grand Tour, Rome, and the representation of architectural heritage

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Abstract
European culture acknowledges that the Italian peninsula rules supreme as regards the representation of beauty. In the collective imagination of cultured men of learning, modern Italy is a source of powerful and centuries-old religious tradition and renewed humanist culture. The fact that in the fifteenth and sixteenth centuries the main towns in Italy were crucibles of an international artistic revolution are all elements contributing to the country's fame and fortune.
This is why knowledge about Italy plays an important role in the education and training of any "cultured person" and from the sixteenth century onwards, thanks to the journeys made by diplomats and the religious, a sojourn in Italy became crucial if they wanted to complete their studies.
Actually, these journeys did not influence only these 'tourists', they also played a crucial role in changing the taste and preferences of people in their native countries. In fact, there was an 'outward bound' effect on the person who made the trip, and an 'inward bound' effect which spread thanks to the souvenirs the travellers brought home with them. The final result was also influenced by the travel diaries and art collections which were gradually put together.
The study will analyse these objects of desire from a new perspective, focusing more at length on technical objects testifying to the state-of-the-art of the architectural artefacts.

Keywords: Gran Tour, souvenir, drawing, engraving, model

1. An educational journey to Italy
At a certain point in history, just before the Renaissance, the cultural "migration" to Italy - which had always been a prerogative of the religious - began to fascinate and include seculars, albeit in small numbers. When this desire became overwhelming, and the journey could no loner be postponed, it was spontaneously embarked upon in solitude, even at the expense of one's personal safety.
Albrecht Dürer was one such traveller. In fact the artist from Nuremberg arrived in Italy in 1495 and remained for almost a year; he moved from one place to another in the north-east of the peninsula in an attempt to revive the golden age, or, paraphrasing Edwin Panofsky, to make it "regrow". Around the first half of the sixteenth century and for the next two and a half centuries until the beginning of Napoleon's campaigns which wrecked havoc in Europe, this educational journey changed from being an intellectual experience to being a sine qua non intellectual journey, one which gradually became part of the education of a European gentleman.
Historical chronicles report that it was Elizabeth I who launched and institutionalised this cultural adventure. She was probably convinced that genuine knowledge and experience in the field would make her subjects better people, whether they were part of the future ruling class or the offspring of the Anglo-Saxon aristocracy. They were advised to stay for a period of time in Austria, Belgium, France, Germany, Italy, the Netherlands, Switzerland and Hungry. Italy was the preferred country and its major cities were depicted as being the high point of this long journey. In fact, in the mind of the British sovereign they represented the 'crucible' of an absolutely crucial artistic revolution and, as suggested by Attilio Brilli, it was here that "young people came into contact with Europe". Rome in particular was considered a universal city, Caput mundi, "a mother to all, rather than a lady", an

expression attributed to Giambattista Piranesi. This acknowledgement was primarily due to the undisputed supremacy that it held over all other nations, as well as the extraordinary mix of pagan and Christian aspects which were one with its myth, a myth which involved the whole country.
The English were by far the most numerous to undertake the journey. What began like a torrent with small tributaries soon became a river. However, the river was soon flooded with travellers from France, Flanders, the Netherlands, Germany, Sweden, Russia, Poland and other European countries. Nevertheless, it was the British who wrote the first code of the Tour; in fact, apart from establishing the most important regions, they also determined which sites had to be visited during the journey, the right itineraries and educational goals. This meticulously drafted work was very successful in the eighteenth century when the community of grand tourists became the biggest, free and itinerant academy that western civilisation has ever known.
Obviously such a well-organised plan made their study programme more gripping and intriguing. In some cases it had much broader contents and they had much more to learn, for example, the history, building techniques and materials used in architecture. Furthermore, the innovative input of this 'academy' did not fade when the goal had been reached, instead it spread its beneficial effects to other fields such as diplomacy where it helped reinforce the role of ambassadors and triggered a change in the political rapport between the courts of the old continent. One consequence of this change was that a new foreign army crossed the natural border of the Alps undisturbed.
This time, however, it involved a very special army, totally different to previous armies. In fact, this army didn't come to fight, but small groups silently exploited all available paths to reach the Italian peninsula; it politely communicated with the local inhabitants in a variety of different-sounding languages. Moreover, one of the main characteristics of this army was that it was made up of representatives of the European aristocracy, well-to-do members of the middle class, intellectuals, students with grants, antique dealers and painters, or rather a new group of painters which Lord Elgin, the Abbot of Sant-Non, Lord Ponsonby, etc., considered reporters who documented the sites as well as their own emotional reactions. We will be impressed and fascinated by this army only if we are ready to use our imagination and see it for what it was: an army which for many years gave its members the feeling they could self-generate endlessly and, stimulated by the overriding desire to "see better", travelled in search of an idealised and mourned paradise, oblivious of the hardships they had to endure.
They patiently and tenaciously faced the long journeys either in a carriage, postal vehicle, on horseback or by ship - all 'expensive' in more ways then one and often adventurous. Nevertheless, for those who undertook these journeys they were a source of exciting experiences which the travellers related in minute detail, mainly verbally, but in some cases summarised in letters or on the pages of travel diaries, and as such have survived to the present day. In one way or another these experiences have passed into history and today when we talk about them we consider they are experiences acquired during the Grand Tour, an term invented to describe only this particular intellectual adventure which, after the end of the Seven Years' War and the advent of a period of peace, saw the sun set on this golden age.
Travelling through the countryside described in the texts of classical authors, this army of the most brilliant intellectuals in Europe looked for practical evidence of the education they had received at home; they visited the cities which were the symbol of culture and, prompted by the same enthusiasm, also went to small but important towns in the north, archaeological sites in central and southern Italy; they improved their Italian while some individuals with a more humanist spirit brushed up their Latin and Greek, whilst all of them tried to have novel aesthetic experiences.
The continental Tour was defined by a recent research as "a real institution which rolled into one a journey (as a prize), initiation into society, a further education course, the baptism of the senses, a managerial training programme, and devoted pilgrimage". In practice it is a sort of transversal culture class which is important to understand how people saw the historical and archaeological sites in Bella Italia, but also assess the way in which these landscapes were interpreted.
Obviously the indifference and hostility displayed by Erasmus of Rotterdam for the cult of beauty - which led him to say "Rome no longer exists, it is nothing but ruins and rubble, traces and remains of its ancient misfortune" – can be considered an exception probably due to his lack of artistic education which made him visually insensitive, like many learned and erudite men of letters before and after him. In fact, starting in the fifteenth century many illustrious men and artists from countries beyond the Alps travelled to Italy to "drink" at this spring: apart from Albrecht Dürer and Erasmus of Rotterdam, we can cite Philibert De l'Orme, Miguel de Cervantes Saavedra, Michel Eyquem de Montagne, Jean-Louis Guez de Balzac, George Berkeley, Johann Joachim Winckelmann, Johann Wolfgang Goethe, Gaspard Monge and later John Ruskin, and many more. Some were so enthralled by the art and life in Italian cities they crossed the Alps several times, others becomes residents, still others Italianise their name and never returned to their native country, for example Gaspar Adriaensz van Wittel, father of the architect Luigi Vanvitelli, a talented artist who left numerous pictorial images including many paintings of the Roman countryside, Rome, and the banks of the Tiber in the city.

The Grand Tour didn't affect only to those who actually did it; it became a key factor in changing the tastes and preferences of people back home. In fact, this cultural phenomenon has an 'outward bound' effect on the person who made the trip, and an 'inward bound' effect that spread like wildfire thanks to the objects the travellers brought home with them. The final result was also influenced by the travel diaries and art collections which were gradually put together. In fact, the diaries allowed people who didn't personally make the journey to experience this adventure, while the collections were a sort of status symbol for the European upper class and a way to portray Italy to anyone who saw them.
As mentioned earlier, educational journeys stopped for a while with the advent of Napoleon's campaigns; they started again with renewed vigour after the Congress of Vienna when the European continent could once again be travelled by civilians, especially the British who really wanted to travel abroad to develop and improve their minds.
However, the trauma of the Napoleonic wars not only interrupted the list of illustrious individuals who participated in this cultural institution, it also marked its demise, or rather the demise of the Grand Tour as an aristocratic institution. In fact, journeys in the nineteenth-century were radically different: the habits and ways in which they were conducted are more similar to modern journeys rather than journeys in the eighteenth century. The first locomotives and the fact tourists travelled in groups was irrefutable proof of this change. The continental travels of European nobles confirmed that luxury was an adjective used for the Grand Tour and its participants when, as we know, Italy was the star attraction of their educational itinerary, the last leg of their return journey home. The impatience that marked their outbound journey to the "land of the classics" was replaced by the haste of those who felt they had completed their pilgrimage and therefore rapidly passed through the Swiss, Austrian, German and Flemish cities on their route. However, whatever their nationality, and notwithstanding the city in which they ended their educational experience, their travel notes were always full of long and vivid memories of Italy. At this point please indulge me if I use a rhetorical phrase since one example says it all: the words by the English writer William Beckford in his letter dated Ostend 21 June 1780, in which the warning voice of the Bear-leader echoes ironically: "Ghent is not the most likely place to recall his attention; and I know nothing more about it, than that it is a large, ill-paved, plethoric, pompous-looking city, with a decent proportion of convents and chapels, monuments, brazen gates, and gilded marbles. In the great church were several pictures by Rubens, so striking, so masterly, as to hold me broad awake; though, I must own, there are moments when I could contentedly fall asleep in a Flemish cathedral, for the mere chance of beholding in vision the temple of Olympian Jupiter.
But I think I hear, at this moment, some grave and respectable personage chiding my enthusiasm – "Really, sir, you had better stay at home, and dream in your great chair, than give yourself the trouble of going post through Europe, in search of places where to fall asleep. If Flanders and Holland are to be dreamed over at this rate, you had better take ship at once, and doze all the way to Italy." Upon my word, I should not have much objection to that scheme; and, if some enchanter would but transport me in an instant to the summit of Ætna, anybody might slop through the Low Countries that pleased".

2. *The industry of memory: souvenirs*

During this 250 year period the European elite considered the tour– which towards the end coincides with the age of Enlightenment – as a journey of discovery and curiosity; it satisfied their desire to escape fuelled by the appeal of classical culture and boosted by the spirit of observation of Bacon's "new science", or sometimes the historiographic mentality of the French or Germans.
As mentioned earlier, the members of the "itinerant cosmopolitan academy" considered Rome and Italy as much more than the one of the obligatory 'stops' on the Grand Tour; they were considered the communis patria, the magical circle in which to be reborn to new life, or rather, the place where you could find your real self or change "to the very bone", in the words of Goethe - perhaps the most representative member of this academy. So for these individuals, Rome and its hinterland were places of unique incomparable beauty full of mirabilia which conveyed "a sense of peace", to use Goethe's words; they were places where if you stopped while walking you would see "all sorts of panoramas, buildings and ruins, gardens and scrubs, broad horizons and gorges, small hovels, stalls, triumphal arches and columns […] which would require a thousand etchings to describe them all"; again citing Goethe, these are places "in which you learn to take pleasure, learn and do".
This sense of inner peace, absolute well-being and rebirth described by the German poet prompted several enterprising travellers to launch expensive excavation campaigns. After many thrilling and exhilarating finds, and aware of the fact that the best journey in Italy is actually to live there permanently, they began to want to own some of the excavated objects as a memento of the endeavour they had accomplished. In practice, this is initial spark that led to the collections of archaeological artefacts put together by the grand tourists. This kind of activity was originally carried out by learned individuals well introduced into the top ranks of the Roman ecclesiastical hierarchy: in fact, when asked by the individuals in question, these priests used to ask the pope for permission to collect historical artefacts. However it very quickly became a passion that griped an increasing number of tourists, we could even call it a "sickness", a fever which infected everyone, including Italian nobles

and the middle class. Even poorer travellers succumbed to this temptation and bought historical artefacts for themselves and/or on behalf of their patrons of the arts.
Eighteenth-century Rome was also the city in which the popes started their own archaeological collections and created others open to the public. But that's not all. In keeping with the legacy of the great renaissance popes concerning the protection and safeguard of historical heritage – which began with the bull "Etsi de Cunctarum" by Pope Martin V in 1425 – the edict by the camerlengo, Cardinal Annibale Albani, dated 10 September 1733, forcefully reiterated the rules which in Rome regulated the trade and export of archaeological artefacts, and in some cases the right of first refusal and ensuing purchase by the papal collections. In his act Cardinal Albani writes "the conservation of which [artworks] not only inputs considerably into sacred and profane knowledge, but also encourages foreigners to visit, see and admire the city […] creating great advantage to the public and private good". Reading it today this excerpt is very moving and exciting because it is the first real written acknowledgement of the importance of artistic heritage as a way to publicise the city and increment its economy; an awareness which, more than any repressive action, has left a mark on the consciences of the Romans, I'd even go so far as to say, on the most humble who are only either marginally or not involved at all, but above all do not understand its importance. The words of the camerlengo are not, therefore, a coincidence but a lucid consideration. This approach was reiterated by the next cardinal Silvio Valenti Gonzaga on 5 January 1750; it was a bull which was to remain the legal tool on this issue for roughly a hundred years.
In short, the Eternal City was not ready to be plundered and reacted strongly. This strong reaction, based on traditional government deeds, was boosted by the long-sighted vision of several representatives of the "Republic of transnational Arts and Sciences" located in the capital, for example the archaeologist Antoine Chrysostome Quatremère de Quincy, who dared – even though he was a Frenchman – to fight against the plundering perpetrated by the Armée française in Italy; he illustrated his position in his "Lettres à Miranda" (1796) containing of the most moving and eloquent pages about the "Museo Italia".
In the above-mentioned situation, very few people could legally trade ancient Roman artefacts. Then new ideas began to flourish: historical artefacts were no longer seen as a saleable common heritage and as a result sales began to drop. Tourists with the right contacts were able to continue for some time due to the enormous sums of money they were willing to spend to obtain the authorisation they needed to export these archaeological artefacts. The Holy Father only granted these authorisations to famous people who asked for them, especially if they followed the doctrine of the Roman Catholic Church. Obviously this 'closing down' of exports and the ensuing transitory phase caused the market prices of these archaeological artefacts to shoot through the roof, forcing most enthusiasts and collectors to look elsewhere.
It was in this scenario that coins, books, Etruscan vases, musical scores, maps, urban plans, marble and bronze replicas of statues, and the images of beautiful views of the city and its hinterland became the objects of desire, the souvenirs in the collections. Furthermore, plaster-of-Paris replicas of architectural ornaments were also popular because, as Quincy put it, they "faithfully reproduced the work of the chiseller". These unique low-cost objects captured the attention of scholars of architecture and building techniques more focused and sensitive towards the human and manual execution of these works.
Etchings became increasingly popular thanks to the remarkable communication skills of their graphic artists who produced extremely elegant images which, since this was the century of enlightenment, were considered modern. In fact the etching techniques, already used when Giogio Vasari was alive, was revived and reused specifically for this purpose. The men and women of the Grand Tour eagerly bought up these works, these "views", these illustrated stories which unlike picturesque images faithfully reproduced the landscape as it was, with all its historical, social and formal features. Etchings were very different to the picturesque genre because the artists who used it focused mainly on architectural subjects and created graphic images which provided intense aesthetic pleasure.
Obviously we too find pleasure in the architectural features of these subjects and the ability of their authors, but a lot of our pleasure is due to the graphic moderation with which they were made. This was achieved by using simple layouts and well-studied narrative registers which nearly always provided a perspective view of the architectural object in the centre, either drawn or represented in the foreground or immediate foreground. Furthermore, the image was sometimes embellished with an exceptional scenographic depth emphasised by the wise use of light and shadow, as well as outlines, while the rest of the space in the image is full of movement and life. The latter, perceived through the lens of the "scale" effect, tends to make human figures smaller compared to natural and architectural objects so that the latter appear more majestic than they really are.
It's important at this point to recall that, compared to all other artists who used this expressive medium, Gianbattista Piranesi was the one gifted with the most exceptional graphic talent and absolute control over the etching procedure. The maestro from Mojano di Mestre was accorded this accolade due to his unconventional etching technique (he considered the copper plate a "sketchbook") and, of course,

the many artistic works he produced during his lifetime. In fact he is universally famous as one of the greatest interpreters of the city of Rome. His works and favourite subjects - archaeological sites, historical monuments, buildings and urban landscapes, as well as the hinterland around the Eternal City - are still very popular. However there are other things which make this artist unique.
When you look closely at his prints you realise that Piranesi's Rome is different to the one depicted by other master burin etchers. In fact, his Rome seems to be portrayed using the eyes of the poorer classes, a city where everything is alive and aggressive: vegetation attacks the walls, the walls attack the heavens, and men, minute human beings, live their miserable lives or merely survive in the shadows of huge architectural objects while (one example suffices) in the Rome narrated by his teacher Giuseppe Vasi the viewer has the impression that everything is immobile, that everything represented in the scene is there as if it were a static object. In the words of Maurizio Praz: "His [Piranesi's] burin etching speaks the language of Rome, while Vasi's speaks an international language, the Esperanto of landscape painting". In other words, we can say that Piranesi's Rome is the city of the centre of the Catholic world as it appeared in the eighteenth century to someone from out of town; the one depicted by his teacher is a eighteenth-century city, any eighteenth-century city, only later did it become Rome.
Apart from the rather obvious difference between the modus operandi of the two artists, the teacher and the pupil, the most important thing that emerges from this comparison is that the two artists each embody a different role. As an engraver Vasi bent his intellectual energy to meticulously applying the operational methods inherited from the past and was only fleetingly interested in developing new etching rules; Piranesi, instead, was fascinated by experimentation and exploited this new approach. In order to achieve the final image he developed an unusual method based on a technical device which involved superimposing several etching veils, each of which with a different visual importance. It was a conceptual rather than practical choice that Piranesi experimented with and adapted tirelessly every day to try and make graphic representations reflect what his mind saw, i.e., he simultaneously considered the subject from several points of view: as an architectural, spatial, ideal, passionate, cultural, documentary, and functional topic, as well as anything else that passed across the visual radar of his versatile mental observatory, an observatory that was so unusual his contemporaries considered it impossible.
Earlier on we learnt that copies, plaster casts, terracotta and etchings were turned into the objects of desire required to satisfy the demand of grand tourists for souvenirs. However another expressive medium was used to satisfy their demands: the model, a three-dimensional scale representation which, amongst other things, could not compete with the "mechanical" traits of other systems. This communicative tool is based on reconstruction - objects made by craftsmen. But that's not all. Since these objects are separate from the real object and all the details are well-defined, they are unique pieces, real works of art. Of course, this aspect didn't escape observant tourists, so models became one of the unique traits of the souvenir industry.
Chronicles tell us that it was Augusto Rosa who had the idea of making models of Roman monuments and selling them. We can date the invention of models to 1772 when the craftsman made cork models of the temple of Jupiter Tonans and the Flavian amphitheatre.
Naturally, the fact that the supply of original antique pieces finally ran out cannot explain the advent of cork architecture, known as "folloplastica", because a huge repertoire of etchings existed and could still satisfy the demands of both scholars and enthusiasts. Moreover, preliminary research and the actual making of the models was very lengthy, which made these physical representations so expensive not everyone could afford them. So obviously there were other reasons why models became popular. For example, at a certain point clients preferred to have a smaller reproduction of the real object, an expert reproduction of the real thing. This heralded a change of taste compared to Romanticism: education appears to have taken over from interest in picturesque renderings. Furthermore, producing physical models was an implicit criticism of traditional representation models. Enthusiasts have trouble interpreting plans, sections and elevations, while a perspective view provides surprising proportions and even the perspective itself. Whatever the case may be, the fact remains that as soon as the model appeared on the market it became the souvenir which, more than any other, attracted the attention of onlookers, even those who were not culturally erudite; it became the most sought-after object by tourists, especially tourists with lots of money in their pockets.
Giovanni Altieri, Carlo Lucangeli and Antonio Chichi were the most famous of Rosa's successors. Giuseppe Tambroni names these craftsmen in his publication "Rapporto sullo stato delle Belle Arti in Roma nel 1814", a goldmine of information about the antique industry and souvenirs. Unfortunately, although these artisans were very prolific, only very few models remain to bear witness to their skills and all, or nearly all of them, belong to European museums and institutes. However, the archival documents regarding these material representations are not always complete. In fact, apart from objective data, we know the whole story of some models, but are unaware of the history of others, while for yet other models we only know the names of the private collections where they came from.

The works of these three Italians belong to this last group. For example, we are familiar with the works by Giovanni Alteri thanks to the models of the Temple of Vesta in Tivoli, housed in Soane's Museum in London, and the Temple of Concordia displayed in the Musée des antiquités nationales in Sant-Germain-en-Laye, while the models of the Flavian amphitheatre are housed in the École des beaux-arts in Paris. We can pleasantly appreciate Antonio Chichi's works thanks to the models of the Temple of Fortuna Virilis, housed in the Musée des antiquités nationales in Saint-Germainen-Laye, the Temple of Vesta in Tivoli, the Pantheon, the Temple of Castor and Pollux and the Basilica of Massentius, all housed in the halls of the Museumslandschaft Hessen Kassel, in Germany.
In his book Tambroni writes: "a traveller who loves Antiquity is sometimes quite happy to take with him a smaller version but exact copy of the monuments he has admired". The fact that cork was very lightweight and easy to work with made it the material of choice to make faithful and easy to transport models. However Tambroni also explains" nothing more than cork resembles the stones and bricks corroded and broken by Time"; this was certainly not a secondary consideration when the craftsmen chose their material. Chichi was an expert in taking advantage of these characteristics. The way he exploited the irregular perforated surface of the cork to replicate the worn marbles, bricks and travertine, is quite exceptional and breathtaking. So it's not surprising that individuals such as the landgrave of Hessen Kassel or that of Hessen-Darmstadt spent any amount of money to get their hands on the whole series of thirty-six models Chichi was able to produce.
Rosa's idea was remarkably successful and continued to be popular until the early nineteenth century, first in Rome and then in France, at least as regards antiquities. In fact, in Stendhal's book, Memoirs of a Tourist, the French author writes: "Night had almost fallen when we arrived at the studio of Mister Pelet. It's beautiful. Mister Pelet, a tireless scholar, had made cork models of the Roman monuments in the south of France. One could not see a more skilful or exact imitation. These models, all executed to the same scale, enabled me to have an idea the comparative size of those monuments for the first time; the scale of Mister Pelet's beautiful buildings is one centimetre to a metre. I saw with astonishment that the Arch of Triumph at Orange, a gigantic work, would easily pass under one of the lower arches of the Pont du Gard".

3. *Conclusions*

We all know that figurative narrative and literary narrative are represented in a very different way, but the synchronism created between visual and verbal images coagulates in the mind of those who see an image or read a text. Like a game of mirrors, the two works confront each other along a common axis of balance: the draughtsman looks and describes what he sees using graphic images, the man of letters describes it by juxtaposing the letters of the alphabet using grammatical rules; pen and pencil are probes to provide us with knowledge and remind us either of our material surroundings or of an imaginary image which becomes real the moment it is drawn or narrated. In actual fact, if we once again turn to the graphic image we feel that the above-mentioned consideration could be improved or at least I perceive this state of consciousness more in this kind of narrative. But let's get back to the case in point.
In graphic reality an image multiples its values and becomes a mnemonic footprint, a documentary artefact prior to a work of art and, finally, a completed work of art. It mediates between tangible experience and the vagueness of a recollection. Obviously this role is activated automatically, whether the image is understood by those who emotionally experienced it in person, or whether it is but a graphic, real life interpretation by a professional draughtsman rather than one's own work. Actually when I come to think of it this consideration reminds us that the relationship between the tourist with a first-hand perception of the landscape and its graphic image is based on a purely temporal movement which requires a before and after, direct experience and its memory. It also contains another mostly spatial possibility that turns the drawing into a mediator between here and there - a distance that can only be virtually overcome.
Continuing along these lines we also discover that another relationship is created between the observer and the mediated landscape; in fact we realise this because we've talked about it in this paper. I'm referring to those who weren't able to see the real views. Obviously the relationship between the souvenir and the observer is based on new elements: in fact, it is not linked either to the direct visual experience or to the practical action of drawing, in other words, it does not involve the temporal movement linking the two previous combinations. This is rather unique because not only does it make the relationship special, it safeguards the graphic works against the persuasive, if not coercive action of the emotional component of direct experience. This complete freedom to express a critical opinion is something tourists also do, especially the ones who are not experts in interpreting graphic works and just want a souvenir. Since the cultural background of the art of drawing is still only based on its realism, this allows individuals with a smattering of culture to express their opinion with "solid judgement" (paraphrasing Goethe), bearing in mind only the appeal of the works and, as a result, the expressive skills of the authors.

The etchings to which Goethe refers in his conversations with Johann Peter Eckermann, and before that in his famous book Italian Journey – the ones his father Johann Caspar had displayed in the hallway of his home after returning from Italy – are works which belong to this category of drawings, executed to please a learned public, but also able to make people, especially more sensitive individuals, reflect on the transitory nature of human life. However, given their technical features they are also highly cultural drawings and therefore valuable communication tools for architectural scholars, both then and now. In fact, they bear witness not only to the continued existence of the ancient structures (illustrating their state after the repeated ravages of time and the plundering performed by man), but also to new artistic architectures. These two aspects are the main culprits responsible for the "traumatic" state in which "seeing" tourists – the ones with an artistic education - find themselves in when they are in Italy. A state of intellectual frustration because they realise they lack knowledge, a state that prompted Goethe to write one of his most meaningful passages in which he declares his love for the Eternal City: "Now I am here at my ease and, as it would seem, shall be tranquillised for my whole life. For we may almost say that a new life begins when a man once sees with his own eyes all that before he has but partially heard or read of".

Multiple factors are responsible for the popularity of the other souvenir illustrated in this paper - the model - amongst the European gentry who undertook their educational journey. Apart from being a handmade object acknowledged as a work of art and a tool that satisfied the tastes of tourists because it allowed them to embrace a complex ensemble "at a glance", this expressive medium caught their eye because it was particularly effective as an educational tool.

Its importance in this fundamental role is due to the fact that the final result was easier to make than any graphic representation since the latter are much less intuitive and require greater specific knowledge in order to be interpreted; an education that tourists almost always lack. This is due to a basic trait of the model coupled with its material three dimensions which remain the most important: simplification of its elements. When this process is implemented during the construction of the model it helps those who see it later to appreciate the characteristics of the architectural object, especially the characteristics which are emphasised and which in the real object are jumbled together with its countless other attributes. In other words, the model is very abstract and this abstraction involves many of the traits of the real object such as: size, materials, colour, and ratio between the parts. A sectioned model allows us to examine the interior and exterior, elevation and foundations, and appreciate the ratio between the elements - something that in real life is very difficult to perceive. The less an observer has to understand, the easier his task: so the greater intuitiveness of this expressive medium is counterbalanced by a totally different characteristic: abstraction. A game of balance which tourists apparently appreciated.

I'd like to end this paper by remarking on the effect that this cultural institution had on Italy and especially on the spirit of its inhabitants.

The Renaissance gave birth to the country we call Italy: it became a real nation with its good and bad parts, contradictory ambitions and magnificent artefacts. Although we cannot say we have got past the stage of indicative evidence, I believe that there's a hidden path that runs between the concept that Italy is a modern nation and this itinerant cosmopolitan academy. In fact, the more research I do, the more I'm convinced that every European nation had contributed to the awareness that Italy can be a "real country", and that an important contribution has come from the tourists who arrived in Italy to "get a better view". Cesare de Seta remains us that during the eighteenth century the country called "Las Italias", described by Miguel de Cervantes with authoritative talent, developed into a country, Italy, with a spiritual unity and common conscience, considered as the motherland of the spirit, a place of the mind, and a source of imaginative creativity.

Bibliographical References

[1] AA.VV., Le arti di Piranesi. Architetto, incisore, antiquario, vedutista, designer, 1ª ed. Venezia: Marsilio editore, 2010. ISBN 978-88-317-0753-4

[2] BECKFORD, William, Italy; with Sketches of Spain and Portugal, Richard Bentley, London: New Burlington Street, 1835

[3] BRILLI, Aantonio, Quando viaggiare era un'arte. Il romanzo del Grand Tour, 1a ed. Bologna: il Mulino, 2008. ISBN 978-88-15-04848-6

[4] CHASTEL, André., Il Sacco di Roma 1527. (tr. it. ZINI, Marisa) 6ª ed. it. Torino: Giulio Einaudi editore, 2010. ISBN 978-88-06-20461-7

[5] CORTI, Laura, MARCON, Giuseppe, I beni culturali e la loro catalogazione, Milano: Mondadori 2003. ISBN 88-424-9130-6

[6] de SETA, Cesare, Il fascino dell'Italia nell'età moderna. Dal Rinascimento al Grand Tour, 1ª ed. Milano: Raffaello Cortina Editore,2011. ISBN 978-88-6030-382-0

[7] de SETA, Cesare, Il Grand Tour: storia di un'avventura alla ricerca dell'Italia, in: FORMICA, Marina, (a cura di), Roma e la Campagna romana nel Grand Tour, 1ª ed. Roma-Bari: Laterza, 2009, pp. 5-27. ISBN 978-88-420-8979-7

[8] de QUINCY, Quatremère Chrysostôme Antoine, Lettere a Miranda, (tr. it. SCOLARO, Michela) Bologna: Minerva, 2002.

[9] ECKERMANN, Johann Peter, Conversazioni con Goethe negli ultimi anni della sua vita, (a cura di) GANNI, Enrico, (tr. it. VIGLIANI, Ada) 1ª ed. it. Torino: Einaudi, 2008. ISBN 978-88-06-16866-7

[10] FORMICA, Marina, (a cura di), Roma e la Campagna romana nel Grand Tour, 1ª ed. Roma-Bari: Laterza 2009. ISBN 978-88-420-8979-7

[11] GOETHE, Johann Wolfgang, Viaggio in Italia, (tr. it. CASTELLANI, Emilio), 3ª ed. it. Milano: Arnoldo Mondadori Editore 1997. ISBN 88-04-368177-9

[12] KOCKEL, Valentin, OLAUSSON, Magnus, Phelloplastica: modelli in sughero dell'architettura antica nel XVIII secolo nella collezione di Gustavo III di Svezia, Istituto Svedese di Studi Classici a Roma, Roma 1998.

[13] MARENCO, Franco, La colonna e la rovina: Roma nell'immaginario britannico fra Sette e Ottocento, in de SETA Cesare (a cura di), Imago Urbis Romae, l'immagine di Roma in età moderna, (tr. it. Da RE, Maria Silvia), 1ª ed. Milano: Mondadori-Electa, 2005. ISBN 88-370-3556-X

[14] OTTANI CAVINA, Anna, I paesaggi della ragione, 1ª ed. Torino: Giulio Einaudi, 1994. ISBN 88-06-13510-4

[15] PANOFSKY, Erwin, Il significato delle arti visive, (tr. It. FEDERICI Enzo),1ª ed. it. Torino: Giulio Einaudi, 1962. ISBN 88-06-22087-X

[16] PETRUCCI, Alfredo, Le Magnificenze di Roma di Giuseppe Vasi, 1ª ed. Roma: Fratelli Palombi, 1946.

[17] PINELLI, Antonio, Souvenir. L'industria dell'Antico e il Grand Tour a Roma, 1ª ed. Roma-Bari: Laterza, 2010. ISBN 978-88-420-9417-3

[18] PRAZ, Mario, Piranesi vedute di Roma, 1ª ed. Milano: Arnoldo Mondadori, 2000. ISBN 88-04-48006-8

[19] ROMANI, Mario, Pellegrini e viaggiatori nell'economia di Roma dal XIV al XVII secolo, 1ª ed., Milano: Società editrice "Vita e pensiero", 1948, vol. XXV.

[20] RUDOLPH, Stella (a cura di), Giuseppe Tambroni. Lo stato delle belle arti in Roma nel 1814, Roma: Istituto Nazionale di Studi Romani, 1982

[21] STENDHAL, Memorie di un turista, (a cura di), CENTO, Alberto, Einaudi, Torino, 1977.

[22] SZAMBIEN, Werner, Il museo di architettura, (tr. It. SERRA, Antonio), Bologna: CLUEB, 1996. ISBN 88-8091-384-0

[23] VASARI, Giorgio, Le Vite de' più eccellenti architetti, pittori et scultori italiani, da Cimabue, insino a' tempi nostri, (a cura di) Bollosi, Luciano e Rossi, Aldo, 1ª ed. Torino: Giulio Einaudi, 1986.

[24] VIVANI, Corrado, ROMANO, Ruggero, (a cura di), Storia d'Italia. Dalla caduta dell'Impero romano al secolo XVIII, Torino: Einaudi 1974.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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COLLECTIVE IDENTITY: HATS CARTAGO HERITAGE AS - IF PROBORDADOS: HANDMADE EMBROIDERY CARTAGO VALLE COLOMBIA.

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Summary: These papers begins with a reflection on the importance of handmade embroidery as Colombian cultural heritage and centralize Cartago as a site of cultural interest and recognize hand embroidery and shaft collective identity to the world. This way of thinking is reflected in the embroidery of Cartago Valle del Cauca Colombia: the methodology of this paper is divided into four (4) areas: Property heritage, cultural tourism and employment opportunity to native families in the region, heritage Cultural function of craftsmanship and hand embroidery on this native of learning a new craft in ancestral generations and local collective identity as a strategy of cultural manifesto of the town to the world.

Cartago on the national scene is displayed as a collective identity in the work of Cartago embroidery; this because it is a collective construction is definitely a cultural sign that urges a recognition, preservation, dissemination and state protection in the case of Colombia by the ministry culture. As seen above, it does project applicant based on the enhancement of the case in question, some results are reflected in invitations to present at national embroidery samples events. This paper develops through me one ideographic presentation.

Key issues: Heritage
Tangible and intangible dimensions, history, culture, collective identity, memory, Documentation, Management, Communication for Cultural Heritage.

Introduction: San Jorge de Cartago also known by the village of Robledo is a city founded in sixteen (XVI) century by the Spanish forward Jorge Robledo , a distance of one hundred

and eighty- system (187) kilometers from Santiago de Cali 's capital department of Valle de Cauca, with an average temperature of thirty (30) degrees Celsius and approximately one hundred twenty thousand (120,000) inhabitants seizure history of San Jorge de Cartago starts as second foundation in year 1540 , where is your current location, (is moved from the site where today is Pereira) due to the constant attacks of the natives of the region, as a colonial city inhabited by illustrious descendants of conquerors , here a palace constructs for the Viceroy of the time however this character never visited the mansion at the time of emancipation Colombian Republic eighteenth to the nineteenth century this small town plays an important role as its strategic location will make it vulnerable to constant visits of Republicans fighting for independence from Spain as the realistic who are in favor of the Spanish crown, in the first half of the twentieth century along with other nearby cities are home to violent attacks by political rivals birds were illegal armed civilian supporters of the Conservative Party fighting for the power asent Laureano Gomez after the death of liberal leader Jorge Eliecer Gaitán, in the 60's , 70's and 80 's is Cartago is prey to all guerrilla attacks from groups like the M19 , or Farc Ep and in the nineties the city suffers violent social corruption by drug trafficking, conflicts still affect socially San Jorge de Cartago , but a group of women heads of households struggling to preserve, protect , and exploit economically difundralir as a source of work, hand embroidery , thanks to this handmade craft dating back approximately one hundred (100) years ago in the region, Carthage , is recognized in the country for this job the called : embroidery Carthage by its delicacy , beauty and fine finish , in spite of having in his district six (6) well known in the region goods and three (3) of these also declared national heritage of the historic center , this historical importance is not known or reported in the country.

The city contains a group of buildings with building characteristics of republican architecture in Colombia , with an urban history dating from the sixteenth century , (3) three of them declared as National Cultural Property Interest by the Ministry of Culture House of the Viceroy or Sebastian Marisancena House or Casa de La Cadena, Guadalupe Church , the railway station and the historic center protected under Law No. 163 of 30 December 1959 containing beautiful buildings such as the Church of Santa Ana, St. Jerome Church, Cathedral of Our Lady of Mount Carmel Patron of Cartago , San Francisco church , the house of culture, among others, unfortunately by the abrupt introduction of misunderstood modern movement architecture of the city of 1957 when it is protected by law 163 are few traces of native storey houses with traditional building systems such as rammed earth and adobe, covered with straw and clay tile are today very few streets with these features that are in the vicinity of the Cathedral of the villa.

The ancestral activity of hand embroidery which passed by several generations of leading the Probordados association has national recognition , the main intention of this group is to implement the chair of Hand Embroidery area schools for free and opportunity to narrow to Cartago as a cultural tourism site of international interest.

The methodology of this paper is divided into four (4) areas:

1. Heritage property:

Cartago is located 117 Km from the capital of Cali Valle del Cauca department , with a warm dry climate , the foundation and first performed in 1540[1] by Jorge Robledo today Pereira and the Second in 1691 by the architect Juan Mendoza priest where today located beside the Old river, a Town with an important role in the history of Colombia since the arrival of the conquerors; Within the Schedule of

National Cultural interest Cartago has a significant representative sample BIC are 6 properties held by the Ministry Culture of Colombia , as well :

Name	Image	Declaración	Style
Name Image Style Declaration House of the Viceroy or House Sebastian Marisancena House .	 	Resolution 792 Chain 31 July 1998. Resolution 1640 of 24 November 2004.	. XVII Century. with neoclassical ornaments in Colombia . The Viceroy never came
St. Jerome Church	 	Act of July 26, 1049 2006	Style Architecture in Colombia transition . Rationalists and cover details in brick semicircle . Church of Guadalupe Resolution 789 of 31 S.XVII July 1998 . Romanesque style , a ship tripartite facade with bell tower , 3 access . San Francisco Church Law 1049 of July 26, 2006. Republican neoclassical style in Colombia, access a bell tower , a rosette , a ship tripartite facade .
Church of Guadalupe .	 	Resolution 789 of 31 S.XVII July 1998	XVIII Century Romanesque style, a ship tripartite facade with bell tower , 3 access . San Francisco Church Law 1049 of July 26, 2006. Republican neoclassical style in Colombia, access a bell tower , a rosette , a ship tripartite facade .
San Francisco Church	 	Law 1049 of July 26, 2006.	Republican neoclassical style in Colombia, access a bell tower, a rosette, a ship tripartite facade.

Church of Santa Ana		Law 1049 of July 26, 2006.	Republican style One access.
Railway station		Decree 746 of 24 April 1996.	Republican style
Historic Downtown Cartago		The old sector encompasses "the streets, plazas, squares, properties, including homes and historic buildings in ejidos, furniture etc.., included in the perimeter these populations had during the sixteenth, seventeenth centuries, XVIII. "163 Act 30-XII-1959	
Cathedral of Our Lady of Mount Carmen patroness of Cartago.[1]	 	Protected by. "163 Act 30-XII-1959.	Separate body 20 meters from the cathedral tower dates neoclassical late nineteenth century and early twentieth century.

Municipality		Protected by. "163 Act 30-XII-1959.	Republican Architecture.
House of Culture	 [11]	Protected by. "163 Act 30-XII-1959.	Republican Architecture.

2. The cultural heritage in terms of craftsmanship and hand embroidery on this native of learning an ancient craft in the new local generations:

Hand embroidery in Cartago Valle basically in workshops where the workforce are women heads of households* and people who work for the workshops but can not leave their homes 98 % and 2 % male, the teaching the various techniques such as kickstand, rococo, broken blade (among others) is fundamentally grounded in trust, is an office of entire families from generation to generation, in some cases close friends who can dive into the world embroidery , each piece is conceived , designed, implemented by hand.



Fig.1:Artisans Workshop Ma. Patricia Ramirez. [10]

The Bordado technique comes with the conquerors and settled in the Indian labor in the recent history of Cartago its roots back 100 years in religious communities with embroidery arts classes taught in the city with the highest number of workshops known commonly called the street of embroidery located in

between the fifth and seventh 8tva and second in tiny little shops on 4th Street between the first and second race.



Fig.2:Street embroidery.

Some of these stores like Hats or Patricia Ramirez y Emma Ramirez Icontec have the stamp in Colombia is a recognition for quality in their work.



[10]

Fig.3:Street embroidery



[10]



Fig 4: Stores in advertisements Street embroidery.

In this query, we visited two workshops on various proposals, but the essence of the work in hand embroidery, embroidery workshop Emma with a more classic air shows his gallantry in this classic style clothing shop with a 60-year tradition casts its quality management is a solid proposal with

standard techniques of embroidery, the owner is Mrs. Emma Ramirez dedicated his life to the family business is one of the pioneers in the city at this craft show of wealth.


[11]

Fig 5: Hand embroidered detail Embroidery Emma pieces.

Embroidery Workshop Ma Patricia Ramirez venture into a new proposal in terms of art, colors and designs, bold proposals shown in accessories, clothes, bags, cultural handicrafts while renewed spirit based samples with your proposal has been exhibited in several national events handicraft exhibition as entrepreneurs in export craft fair FEREX, expotejidos, fashion circle in Bogotá, flower fair in Medellin, among others, this workshop has won awards for best artisan silver needle 2011, 2012 and 2013 with needle Gold issued by Probordados.



[10]

Fig.6: Hand embroidered garments Workshop Ma Patricia Ramirez.

In order to establish itself as a guild workshop some of Cartago Probordados join the association with an experience of 20 years * this association has three objectives: 1 - The organization of Cartago expobordados held every year at Easter, 2- Ensure the quality of craftsmanship of its members and 3.- coordinate the selling point for those who do not have their own local allies.


[10]

Fig.7: Celmira Velásquez y Patricia Ramírez Probordados Association representatives .

Probordados detects a phenomenon that threatens in question, which is the decline of the labor involved in learning, practice and embroidery that these techniques work in this regard, the association aims to lead in the department the chair of Cartago embroidery in private and public schools Probordados invites researchers and professors at the University of Ibague to promote embroidery heritage of Cartago of as Colombians, in particular an interesting dialogue between the community, the university / research and state .

Raises the following curriculum is based on the Department of Embroidery in the last 4 years of high school:

Technique	**Course**	**Heritage**	**Course**	**Practica**	**Course**	**Practice paid**	**Course**	**Practice paid**
Knowledge and appreciation of embroidery as equity. Apprehension of various embroidery techniques	Eighth secondary Semester A	Historical research techniques.	Ninth secondary semester A	Practice in small clothes	Tenth secondary semester A	workshop	Once semestre A	workshop
Past, rococó, bite tip, chain stitch, lace, shadow, French knot, kickstand.	Eighth secondary Semester B	Investigación del los bordados de Cartago como patrimonio.	Ninth secondary semester B	Internships in workshops	Tenth secondary semester B	workshop	Once semestre B.	workshop

3. Cultural Tourism employability as native families in the region and Cartago as a cultural tourism site of international interest:

Cartago suffered a serious story on behalf of drug trafficking, where I filter many areas of society today because of the resistance of the craft, embroidery, translates as the basis of the economy of the municipality where native families in the region working in the activity; the city contains the necessary ingredients to make it a place of cultural interest:

Attractions	**Cultural places**	**Heritage Property**	**Heritage Intangible**	**Tangible heritage**
Mayoralty Cathedral of Our Lady of Carmen. Island Park The Old River. Landscape and biodiversity in the region	House of Culture Viceroy's House and Historical Archive of Cartago.	Viceroy's House Churches of San Francisco, Santa Ana and San Jeronimo. Historic Center. Railway station	The craft of embroidery. the typical meals	Embroidery and techniques.

↔↕ Cultural Tourism:

Intangible Heritage	Exibicion	Place	Education	Accommodation
The craft, embroidery techniques	Art exhibition with hand-embroidered garments.	Visits to artisan workshops	Teaching and learning the techniques of hand embroidery.	Workshops or affiliates probordados offer hosting visitors.

According to Decree 763 of the Ministry of Culture Cartago embroidery is part of: Symbolic and aesthetic value to the value criteria of representativeness and socio cultural context and forms part of

the integrity and authenticity primarily on the traditions, techniques and management systems. The Convention for the Safeguarding of the Intangible Heritage of Cartago embroidery falls in Article 2, c) social practices and [3]e) traditional craftsmanship. [4].

4. Collective identity as a strategy of cultural manifesto of the town to the world:

What strategies proposed [9] to expand Probordados as a revenue source of Cartago, in order to promote the city as a place of cultural interest?

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First day:	Day Two :	Third Day:
Santa Ana Airport Arrival The tourist meets his young host lookouts heritage are graduates of the class of embroidery.	Tour Workshops	Teaching technique embroidery.
Among patties day of Cambray	Desamargados midmorning.[5]	Macetas midmorning. [6]
Lunch with an affiliated probordados with typical Sancocho de Gallina Valluno food.	Lunch with an affiliated probordados with typical food Tamal Valluno	Lunch with founding affiliate probordados
Walking tour of the city sights	Walking tour of the streets of embroidery	Visit exibe schools where academic work from the Cathedral Embroidery .
Champús valluno midmorning.	Pan de bono midmorning.	Aborrajado o manjar blanco midmorning.
Visit the culture house exibicion typical dance : El pasillo de Cartago.	Visit the culture house exibicion typical dance: salsa de Cali Valle del Cauca	Visit the culture house exibicion typical dance:Currulao de la zona pacifica del Valle del Cauca.
Nights accommodation in an embroidery shop in town	Nights accommodation in an embroidery shop in town	Departure airport santa Ana.

Conclusions:

Embroidery Cartago underpin the identity of San Jorge de Cartago today, ie today Cartago is known for her masterful sample; embroidery means the identity of the place, the previous discussion shows that the embroidery Cartago must be designated as intangible heritage Colombia.

The embroidery of Cartago Valle del Cauca Colombia is a "culture of resistance" based on a trusted network based on the family relationship.

Cartago Valle has the characteristics to become a site of international cultural interest, to achieve this you must create, manage, train and reporting structure for tourism from government tourism offices to the people involved visitor personally.

Thanks to all the people who made this presentation.

In memory of my nanny Luz Angélica Playonera, thanks for the companionship and unwavering loyalty. Maria Fernanda Garcia B.

Bibliography:

[1]April-Gniset, Jaques., La forma espacial colonial indiana,La Ciudad Colombiana. 1era. ed.City:Bogotá. Editorial: de Banco Popular,1990, Vol 1p.298-567.

[2]Arango, Silvia., Arquitectura republicana. Historia de la Arquitectura en Colombia.2da ed. City:Bogotá. Editorial Universidad Nacional de Colombia. 1993.vol 1.p127-171

[3]BURKE, Peter, Historia y Teoria Social. 1era ed. City:México.Editorial Instituto Mora.1992.

[4]QUEROL, Maria., (2010) Manual de la Gestión Patrimonial.Edición de Tikal.Barcelona, Tikal.

[5] Referring Web Pages Web: http://protocolocomentarios.blogspot.com/2008/03/comida-tpica- the-valley-of-view cauca.html 08/10/13 ***Desamargados**: Put for several weeks, copper vessel in water: orange peel and lemon pepper and then put other jig with azucar

[6] Referring Web Pages Web: http://protocolocomentarios.blogspot.com/2008/03/comida-tpica- the-valley-of-view cauca.html 08/10/13*. **Macetas**: figurines are made in sugar that give the godparents to their godchildren at the feast of St. Peter and St. Paul. in consultation

***[8]*VIII Encuentro Internacional Ciudad Imagen y Mememoria**. El patrimonio y sus retos del siglo XXI.City: Santiago de Cuba 22 - 24 de mayo de 2013.

[9]Primer Congreso del Mercosur. Patrimonio del siglo XX:Presente y Futuro. City: Mar del Plata del 6 al 8 de junio de 2013 organizado por Centro Internacional para la Conservación del Patrimonio Cicop- Argentina, Universidad del Mar del Plata, Gobierno del Mar del Plata MGO-Mar del Plata Batan. Memorias ISSN 2314-3746 Cicop Ar.

[10]Photos de M.F.G.B.2013.

[11]Photos de Luis Eduardo Ramírez año 2013.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Lands of Taste. 'Still-life' ways in Southern Italy from the Antiquity to the XVII Century

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Abstract
The purpose of this paper is to analyze the cultural phenomena that led to the birth of the genre of still life painting in the modern era, focusing the attention on the dynamics that developed in Southern Italy from Antiquity to the XVII Century. Starting from the first evidence in the Pompeian painting, through a series of iconographic comparisons, it is possible to guess that this figurative tradition has been transposed and then extensively reworked by the modern Neapolitan painters of still life, with an outcome of such thickness as to give a particular prestige to the genre.
The historical continuity and the success tied to these themes is undoubtedly to be traced in the traditions and customs, the knowledge, the symbolic, magic and religious rituals which the people of this region has elaborated over time in relation to food, its ways of consumption, and to the seasonal works in agriculture, fishing and hunting related to it. This cultural process has undoubtedly contributed to define and strengthen the "place identity" of those people, who, since ancient times, used the visual representation of the riches of the sea, the earth and the sky not only, with a propitiatory value - as an expression of the divine grace and of the abundance bestowed upon them - but also, even though unconsciously, as an affirmation of the identifying characters of a specific environment, of its typical food and its cultural traditions.

Keywords: Still-life, Pompeii, Naples, Intangible Heritage, Collective Identity

1. Section

Food is an essential part of an heterogeneus system of symbols through which man represents himself. By transforming the shape of food and by giving it a value, the human being goes beyond the mere need for nutrition, that he has in common with other animals, and expresses his inner nature and the relationship with the outside world. Food is also at the origin of the cultural diversity, that characterizes us as a species.
Each ethnic group establishes its own identity not only through that food which represent its primary edible source, but also through special food that periodically interrupts the rhythm of the daily living, in a ritual manner and with a cadence that recalls the natural cycle of the seasons. Social relationships are formed and reinforced around these rituals.



Fig. 1: *Fish and shellfish* (MNN 8635), from Pompeii



Fig. 2: Giuseppe Recco, *Squid, sea bass and other fish, buckets of copper, a basket of oysters and two fish on a stone*, Private Collection

As a tangible sign of cultural diversity, food is a means to identify the habits and customs of a society and to distinguish the communities who live by hunting and harvest from those who practice agriculture, between town and country, or social groups.
At the origins of civilization, food was also a means to build a relationship with the afterlife: periodically offered to the Gods in order to obtain their benevolence, or placed in tombs to accompany the journey of deads. With reference to this symbolic system, it has been assumed that the birth of still life representation hails from the use to equip the tomb with a set of objects and food for the life hereafter.
From the V Century B.C., in the tombs of the Greek and *Magna Graecia* area, the real food, for its perishable nature, was replaced by its representation, in painting or pottery, and, perhaps, in wood and wax, too. This substitution mechanism was extended to other ritual spheres in which the offering occurred, especially that of the worship of the deity [1].
Furthermore, great significance had, in Greek culture, the dining and the rituals associated with eating and drinking, which constituted one of the most important forms of socialization. Since the archaic age, the practices of the *symposium* and the banquet, the hospitality, the feasts, both civil and religious, were ritualized to the point that participation in them was a way to manifest the sense of belonging to the same community group. From ancient sources we learn that the people of Magna Grecia, even more than the Greeks of the mother country, had a particular fondness for the culinary arts, also for the abundance of food enjoyed by the region.
Indeed, we know that one of the main causes of the colonization of *Magna Graecia* by the Greeks was the finding of fertile lands, that were scarce in *Hellas*. The economy of the *Magna Graecia* cities was based mainly on agriculture, especially on the cultivation of wheat, olives and grapes, as demonstrated by the large spread of the agrarian cults of Demeter and Kore, of Athena and Dionysus.



Fig. 3: Giuseppe Recco, *Fish, squid and copper basins*, Private Collection



Fig. 4: Giuseppe Recco, *Fish and shellfish*, Musée Fesch Ajaccio

The most popular products in *Magna Graecia* were cereals, vegetables and fruits, which were eaten along with the fish and shellfish. The presence of meat in the daily meal was poor, while it was greatly used in religious ceremonies. More prevalent was, in the *Magna Graecia* society, the consumption of fish, which was,in some cities, the main base of nutrition, as we learn from the poet Ennius *Hedyphagetica* [2]. Finally, large quantities of sweets and dried fruit, such as figs, dates, almonds and pistachios, were consumed. As will be seen, these will be taken as the main subjects of the Pompeian still life [3]. With the political, social and cultural transformation that characterized the transition from the Classical to the Hellenistic period, the ritual practices connected to the banquet became ever more lavish and a distinctive sign of class. It is at this time that the still life representation, so far limited to the ritual use of food and objects during the sacred offering to the dead and Gods, acquires its autonomy. In addition to their relationship with man, things start to be evaluated for their aesthetic quality. The legitimacy of the birth of a new artistic genre, based on the representation of humble things, is even theorized by Aristotéles, who, in his *Poetica*, claims to have pleasure in contemplating the reproduction of inferior and natural beings because, through the fidelity of the representation and the realism which is able to deceive, one can appreciate the talent of the artist. This cultural attitude became deeply rooted if Pliny the Elder, yet at in Roman time, in his *Naturalis Historia*, still told the story of the Greek painter Zeuxis, whose grapes were so well depicted to deceive birds, who used to peck the painted berries being them extremely realistic [4].
The absorption of the Hellenistic culture by the Roman world dates back to the end of the Second Punic War. The victory over Hannibal led to a radical change of manners, even in the eating habits of the ruling class. A sophisticated lifestyle was imposed, also in the use of the foods. The Campania region was evidently the land of the meeting between the two cultures, the Roman and that of *Magna Graecia*. Here, more than elsewhere, it was easy to find the basic elements for the artistic elaboration of the ‘still life’ genre, like foods, vegetables and fruits. Although the subject had already been introduced in Pompeii, at the end of the II Century B.C., in the I Style mosaics, the emergence of the genre in the wall painting dates back to the II Pompeian Style, in the first half of the I Century B.C.. In these still lifes, the illusive and realistic representation of the objects, clearly of Hellenistic origin, is the dominant theme. At the same time, the richness with which food and the furnishings are juxtaposed, in addition to perpetuate the tradition of the ritual offering, is a synonym for abundance, wealth, ostentation of a high rank for which the rite of the banquet has become a sign of social distinction [4].
One can recognise this double meaning both on the frescoed walls of the rooms of the Roman villas, in which the opulent dinners were placed, and in the small paintings on table called *xenia*, that is ‘welcoming gifts‘ in the Greek language, which the hosts gave to their guests as an offering of hospitality and a wish for abundance. Most of the still lifes painted on the walls of the Vesuvian villas or of other sites consists of reworkings of Hellenistic originals, also known through literary sources. Thus, the theme of grapes pecked by birds in the painting of Zeuxis, narrated by Pliny, became, at that time, so famous that it had already a lot of variants in the ancient Roman still life painting. So, it began to be defined a figurative repertory of a serial nature, which was widespread and that can be grouped into specific subject categories. The still lifes from the Vesuvian cities represent the entire repertory.
As has been noted by De Caro, the subjects are linked by the concept of *utilitas* rather than the pure aesthetic value, as seems to indicate, for example, the lack of any representation of flowers. The subjects, singularly or in various combinations, can be divided into the following categories: edible elements, i.e. animals, living and dead, of the earth, the sea and the sky; the edible plants, especially fruits, vegetables and mushrooms; other edible derivatives from the previous ones, as bread, cheese and eggs; objects for the banquet and the pantry and those for the sacrifice; *negotium* instruments such as money and the tools to write.



Fig.5: *Eggs, poultry, fruit and crockery* (MNN 8598C), from Pompeii



Fig.6: Giovan Battista Recco, *Still-Life with a head of a Ram,* Museo di Capodimonte, Naples

Finally, more related to the concept of *ludus* that to the one of *utilitas* are the subjects with the theatrical or Dionysian masks and those with the themes of the gym and victory. The success of the still life genre in the Roman art arises from the same reasons which had earlier taken to the birth of the same genre, that are the votive offering to the sanctuaries like the lay gift of food to the guest. In the I Century A.D., the even more imaginative way to serve food to own guests became a habit, and it reached, in the Imperial Age, such outcomes to make fine food offered at banquets, not only an expression of status, but also the symbol of the culture of *luxuria* and *otium* drawn up by the ruling class of the Roman imperial society. In the Vesuvian villas, the manifestation of these excesses is confirmed by the fact that the scenes of still life come out from the rooms devoted to dinners to conquer other rooms of the house, so that the whole can inspire an atmosphere of well-being and prosperity in the host. An example is the spread, next to the small fish scene, of the paintings of fish farms, to testify to the fashion, estabilished in the villas of the Gulf of Naples, to own private farms of fish. With the disappearance of the Vesuvian cities, following the eruption of Vesuvius occurred in 79 A.D., the documentary evidence of still life in the Ostia and Rome examples is more modest, but testify to the enduring popularity of the genre until the end of the ancient world. We learn that still life genre was still thriving after the end of the Vesuvian cities from a passage of the *Imagines* by Philostratus the Elder, who, in the late II - early III Century A.D., while visiting a gallery of paintings in Naples, describes a pair of *xenia*: one with figs, walnuts, pears, cherries, grapes, honey, cheese and milk in pots; the other with a living and a dead hare, a duck plucked, different types of bread, fresh fruit, chestnuts and figs. It is therefore clear that the genre had quite a few changes, while there was the reinforcement of the attempt of mimetic reproduction of reality and illusion of space, much appreciated by the same Philostratus [1].
The repertory of still life models, encoded in ancient times, and of whom the paintings in the Vesuvian villas represent the most comprehensive picture, must be long-lived thanks to its serial reproduction and outreach diffusion, to the point that they constitute a figurative tradition that we can find, with amazing coincidences, in the iconographic representation of still life in the Mediterranean area, during the modern age.



Fig.7: Filippo Napoletano, *Fruits in a glass jar,* Palazzo Pitti, Florence



Fig.8: *Fruits in a glass jar* (MNN 8611B), from Pompeii



Fig.9: *Grapes, figs and pomegranates* (MNN 8623), from Pompeii



Fig. 10: Giacomo Coppola, *Fruits, a flower vase, a bottle and a glass of wine and salami*, Civic Museum of Gallipoli

Charles Sterling was the first to identify the link between the Italian still life with antiquity and with the humanistic interest for the ancient world. In his exhibition of 1952, the historian considered some figurative episodes from ancient times, until to come, through the Italian Renaissance, to the specific situation of still life, as historical birth of the genre, which began at the end of the XVI Century [5].The privileged relationship of the Italian figurative art with the classical antiquity, even for his humanistic component, was later reiterated by Mina Gregori. According to this view, the humanistic culture and the discovery through the ancient literature of the late Hellenistic interest for nature and its products, together with the environmental conditions, have undoubtely had effects on the birth and on the features of the Italian still life [6]. Especially in Italy, during the XVI Century, the interest for the imitation of nature through empirical research and scientific observation of the nature was accompanied by the reading and translation of ancient texts. The Greek and Roman sources provided evocative descriptions of the Classical art and the ancient painting mainly dispersed. If in Aristotle, as already mentioned, it could be traced the legitimization to the emergence of new genres depicting "low things", in other sources one could be recover even the models. This is the case, for example, of the already mentioned Pliny's *Naturalis Historia* or of Philostratus *Imagines*, or of the descriptions of *Naturalia* in the *Antologia Palatina*.

However, the timely recovery of figurative solutions derived from the ancient painting seems to testify unequivocally to that, in addition to the literary sources, the artists of the XVI and XVII Centuries and their employers knew some examples from antiquity, including remnants of wall paintings and mosaics, given directly or graphically reproduced, in Rome and in the other territories occupied by the Romans, according to a procedure similar to what happened with the admirable example of the *Domus Aurea* at the end of the XV Century. A significant coincidence in the iconography is apparent in particolar by making a comparison between the still lifes of Pompeii and the still life paintings of the XVII Century in the Mediterranean area, especially in Naples. This identity of composition is to be found not only in the quality of mimetic representation, obtained through measures such as the refraction of light, the shadows on the laying surface, the transparency of the glass, the reflections on the objects, but also in the way in which food and objects are combined, unchanged from the classical antiquity, and first of all, in the representation of an illusory space, which, architecturally set, acts as an organizer of volumes and presences.



Fig. 11: *Silver furnishings on a table*, Tomb of *Vestorio Prisco*, Pompeii



Fig. 12: Giuseppe Recco, *Composition of crystals, ceramics and flowers with a page,* Fundación Casa Ducal de Medinaceli, Sevilla

In the Pompeian paintings we can find already the compositional models, that are more widely illustrated in the representation of the XVII Century still life. They range from simple structures, in which the objects are placed on a single support surface, to those with two levels, with the inclusion of a step or a shelf. In this case, it is possible to observe compositions trying to keep distinct the two plans, or to unify the whole, slanting of the elements from the upper level to the lower one. Sometimes, in the solutions with two planes of depth, there is placed a box, now to the side, now to the center of the scene, likely a simulation of an altar. Sometimes, the levels of exposure become three, recalling the ladder-shaped structure which was used in *thermopolia* for the presentation of food. With particular frequency, then, it can be found the device to open a window beyond, to illuminate the scene: in this case, the objects are all arranged on the window sill or are in part, while others are arranged laterally or on the shelf below [1].

As has been pointed out also by Gregori, the knowledge of ancient representations of fish appears indisputable for the Neapolitan painters of the XVII Century, who made it one of the favorite subjects of still lifes [7]. Thus, by comparing the fresco with *Fish and shellfish*, from Pompeii (MNN 8635) (Fig. 1), with a painting by Giuseppe Recco with a *Squid, sea bass and other fish, buckets of copper, a basket of oysters and two fish on a stone*, which appeared on the antiquarian market in Naples in 2010 (Fig. 2), or with another painting by the same artist with *Fish, squid and copper basins*, in a private collection (Fig. 3), it is possible to observe a clear alignment of themes, such as the particular of the pair of fish hung by the gills with a fishing line attached to a nail, or the detail of the fish arranged with their tails dangling on the edge of the table top. It almost seems that Recco redials on his canvases models encoded by the ancient painting of still life. Similar examples can be found, in fact, variously composed, in several paintings by the artist, such as the Musée Fesch in Ajaccio (Fig. 4) or in the D'Aziò collection in Naples.



Fig. 13: Sanchéz Cotan, *Still Life with Game Fowl*, Art Institute of Chicago



Fig. 14: *Rabbit, grapes, an apple and a dove* (MNN 8644C), from Herculaneum

Thus, passing to another subject, is enough to compare the fresco from the house of *Julia Felix* in Pompeii (MNN 8598C) (Fig. 5), with *Eggs, poultry, fruit and crockery*, and the painting by Giovan Battista Recco of the Museum of Capodimonte (inv. Q1776) (Fig. 6), to realize that the two scenes show the same compositional balance between hanging items, food laid out on the counter and the construction of the space around a central pivot, represented by a silver pitcher in the'Pompeian fresco and by a large copper '*rinfrescatoio*' in the painting by the Neapolitan artist. Furthermore, if we observe, in the painting by Giovan Battista Recco, it is possible to find, variously composed, the motif of the birds attached by their heads, there hanging, here arranged in a tray.
Again, the painting by Filippo Napoletano with *Fruits in a glass jar*, kept in the Palazzo Pitti in Florence (Inv. 1890 n.4804) (Fig. 7), is so comparable to the fresco of the same subject from the house of Julia Felix in Pompeii (MNN 8611B) (Fig. 8), which is impossible not to consider, as already noted by De Vito, that we are faced with the timely recovery of a model of the ancient wall painting, if not directly seen, at least known through figurative sources not yet known [8]. The detail of grapes hanging from the glass jar or even more the ripe fruit fallen on the floor to the left of the vase are a clue to support this hypothesis.
Then, the way to combine the fruit in the still life seems unchanged in ancient as in modern times, as we have now way to verify by comparing the still life with *Grapes, figs and pomegranates* on a black ground, from Pompeii (MNN 8623) (Fig. 9) and a painting by Giacomo Coppola from the Civic Museum of Gallipoli (Fig. 10), with *Fruits, a flower vase ,a bottle and a glass of wine and salami*.
Interestingly, the recovery of the models of antiquity is not just about edible, but also about inanimate objects. In fact, we can certainly estabilish a parallel between the fresco of the tomb of *Vestorio Prisco* at Pompeii (Fig. 11) and the painting by Giuseppe Recco portraying a *Composition of crystals, ceramics and flowers with a page*, from the Fundación Casa Ducal de Medinaceli (Fig. 12), not only for the way in which services are exposed on the table as a sign of the high condition and prosperity of the client, but also for the singular presence of the suspended cloth in both the compositions. The presence in the background of specimens of Italiot pottery of the IV Century B.C. also testifies to the keen interest in the antiquities in Naples during the XVII Century.
As a singular theme for the Neapolitan context, the representation of objects was rather more refined and established in Spain, particularly in the Castile area. Just in this region one can trace, in rather early dates, some compositional schemes, that elaborate models from the ancient Roman painting. This is evident when comparing the paintings by Sánchez Cotan, such as the one of Art Institute of Chicago (Fig. 13) with some frescoes from Herculaneum (Fig. 14), in particular the fresco of the *House of the Stags* with *Rabbit, grapes, an apple and a dove* (MNN 8644C). There is, in fact, a similar system to give depth to the scene, entering a window sill, on which the objects are arranged; similarly, we can find the same detail of the bird hanging by a hook to the beak [9].The presence on the Spanish soil of similar subjects suggests a circulation of models across the Mediterranean, especially in the areas culturally and politically tied to the Spanish Viceroyalty. We do not know how these models are circulated, according to which paths or in what form. We know, however, that during the Spanish viceregal period, Naples was a vital cultural center also in the antiquarian field. The collecting of antiquities, already present at the Aragonese court during the Renaissance, became by the Viceroys a widespread phenomenon, especially among the robed class, to the point of becoming a social *status,* as a sign of loyalty to the crown and a symbol of ascent to the ranks of the nobility [10]. Recent studies, supported by a lot of documentary sources, have also shown that the ancient city of Pompeii was not entirely disappeared. Its historical memory , as well as the man-made attendance of the area, can be detected before the XVIII Century Bourbon discoveries [11].



Fig. 15: Luca Giordano - Giovan Battista Ruoppolo, *Autumn*, Private Collection



Fig. 16: *Dionysus – Bunch,* from Pompeii

Not currently having the tools to define the mechanisms of transmission of the models of the ancient still life painting, the success of the genre in Naples can also be explained by other reasons. Surely, next to a clientele of aristocratic extraction, it began to establish a bourgeois one, with mercantile interests. However, rather than being an expression of these interests, the nature of the Neapolitan still life, since from its beginnings in the early XVII Century, seems to transfer on canvas a popular culture that refers to the real traditions and habits of the daylife. The choice of foods, fish, fruit, vegetables, is representative of a typical Mediterranean style, shared with the Spanish paintings of the early XVII Century, but alien to the rich compositions of meats and cheeses from across the Alps, the latter being different not only for the subjects, but also for the analytical criteria of representation, extraneous from the logical construction of the space, made in the Mediterranean area. The flower theme, with its moralistic implication, seems instead to have been imported from across the Alps.
The Neapolitan still life, with the depiction of the riches of heaven, earth and sea, seems to want to recover, with propitiatory intent, the hope of abundance that, in a still agrarian and seafaring society, is strongly linked to the issue of seasonality, of the annual cycle of birth, life and death of the nature, of pagan tradition, but recovered by the Christian liturgical calendar. In this sense it can be interpreted the representation of the grapes, of classical inspiration and Dionysian meaning, in Naples, as in other places such as Rome and Spain. One example is the painting with the *Autumn*, a collaboration between Luca Giordano and Giovan Battista Ruoppolo, on the occasion of the Feast for the *Corpus Domini* in 1684 (Fig. 15). In this painting the classic reference to the myth of the seasons is reinterpreted as a religious expression of the divine grace, that bestows the variety of the world's wealth [12]. In the context of the religious feast is, thus, recovered the peasant popular culture of the Dionysian feast with a propitiatory significance and a thanksgiving that is similar to that of the ancient world, as evidenced by a comparison with a fresco depicting a *Dionysus – Bunch* at the foot of a mountain covered with vines (probably Vesuvius) (Fig.16), from the *House of the Centenary* at Pompeii.
Finally, the emotional, affective approach, that shines through the Napolitan still life paintings is undoubtedly an expression of a familiarity with the extraordinary opportunities offered by nature in those places. An amusing description of the abundance of food that could be found in the Bay of Naples is offered, in the XVII Century, by a storyteller from Palermo, who, become a soldier for necessity and landed in Naples, when going to the market, finds there "*all the four elements*": all kinds of meat, eggs, poultry, pies and wine, cod, macaroni and cheese, figs, fennel and apples, chestnuts and dried fruits, lemons and oranges [13]. Thus, about the marine species, that were the Neapolitan favorite theme of still life, they are praised in the *Ecloghe Piscatorie* by Cesare Capaccio [14], to come, even in the XVIII Century, to provide inspiration for popular songs, such as *Lo Guarracino*, in which the wealth of fish in the Gulf of Naples is evidenced by a list of more than seventy species of fish.
The Neapolitan still-life is therefore a figurative testimony of the whole of knowledge, customs and traditions related to food practice, built up over centuries by the people of the Mediterranean. They have led to the emergence of a culture of food and dining, of a style of life which is the synthesis

between the environment, the social organization, and the religious and mythical universe built around eating. This lifestyle is not just about eating habits, but also promotes social interaction, since the common meal is the basis of social customs and festivities shared by the community and, therefore, contributes to building and strengthening the collective identity. For this reason, the Mediterranean Diet, the expression that defines this style of life, has been included in the UNESCO list for the Safeguarding of the Intangible Cultural Heritage.

Bibliographical References

[1] DE CARO, Stefano. *La natura morta nelle pitture e nei mosaic delle città vesuviane.* Naples: Electa Napoli, 2001

[2] QUINTUS ENNIUS, *Hedyphagetica* (vv. 34-44 Vahlen)

[3] STEFANI, Grete (ed. by), *Cibi e sapori a Pompei e dintorni*, Cava de' Tirreni, 2005

[4] LA ROCCA, Eugenio; ENSOLI, Serena; TORTORELLA, Stefano; PAPINI, Massimiliano (ed. by), Roma. *La pittura di un Impero*, Editore Skira, 2009; ARISTOTELES, *Poetica,* 1448b, 10 ss.; C. PLINIUS SECUNDUS, *Naturalis Historia*, XXXV, 64; PHILOSTRATUS, *Imagines*, II, 26; LEONIDA DI TARANTO, *Antologia Palatina*, VI, 13

[5] STERLING, Charles, *La nature morte de l'antiquité à nos jours*, Paris 1952 (I Ed.); 1959 (II Ed.)

[6] GREGORI, Mina, *Riflessioni sulle origini della natura morta da Leonardo al Caravaggio*, in *La natura morta al tempo di Caravaggio*, Naples, 1995, pp. 15-25

[7] GREGORI, Mina (ed. by), *Natura morta italiana tra Cinquecento e Settecento*, Electa, 2003

[8] DE VITO, Giuseppe, *Un diverso avvio per il primo tempo della Natura Morta a Napoli*, in *Ricerche sul '600 napoletano, Saggi e documenti per la Storia dell'Arte*, Milan, 1990, pp. 115-159

[9] ACANFORA, Elisa, *Le origini della natura morta*, in *Natura morta italiana tra Cinquecento e Settecento*, Electa, 2003, pp. 54-60

[10] IASIELLO, Italo M., *Il Collezionismo di antichità nella Napoli dei Viceré*, Naples: Liguori, 2003

[11] JACAZZI, Danila, *Pompei e la "valle diruta". Tracce e memorie della città antica nelle fonti medievali e moderne*, in *Atlante di Pompei*, Naples, La scuola di Pitagora, 2012, pp. 65-80

[12] LATTUADA, Riccardo, *Luca Giordano e i maestri napoletani della natura morta per la festa del Corpus Domini del 1684*, in *Capolavori in festa. Effimero barocco a Largo di Palazzo (1683-1759)*, Naples: Electa Napoli: 1997, pp. 150-161; 166

[13] CAMPORESI, Paolo, *Il Paese della Fame*, Garzanti, 2000

[14] CAPACCIO Giulio Cesare, *Mergellina. Ecloghe Piscatorie di Giulio Cesare Capaccio Napolitano*, 1598

Iconographical References

[1] DE CARO, Stefano. *La natura morta nelle pitture e nei mosaic delle città vesuviane.* Naples: Electa Napoli, 2001

[4] LA ROCCA, Eugenio; ENSOLI, Serena; TORTORELLA, Stefano; PAPINI, Massimiliano (ed. by), *Roma. La pittura di un Impero*, Editore Skira, 2009

[7] GREGORI, Mina (ed. by), *Natura morta italiana tra Cinquecento e Settecento*, Electa, 2003

[12] LATTUADA, Riccardo, *Luca Giordano e i maestri napoletani della natura morta per la festa del Corpus Domini del 1684*, in *Capolavori in festa. Effimero barocco a Largo di Palazzo (1683-1759)*, Naples: Electa Napoli: 1997, pp. 150-161; 166

[15] SPINOSA, Nicola (ed. by), *Ritorno al Barocco, da Caravaggio a Vanvitelli*, Naples: Arte'm- Electa Napoli, 2009, vol I

[16] The Art Institute of Chicago – www.artic.edu

[17] Palais Fesch. Musée des beaux arts, Ajaccio – www.musee-fesch.com

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Classification of the graphic legacy of Disappeared Earl of Oliva's Palace

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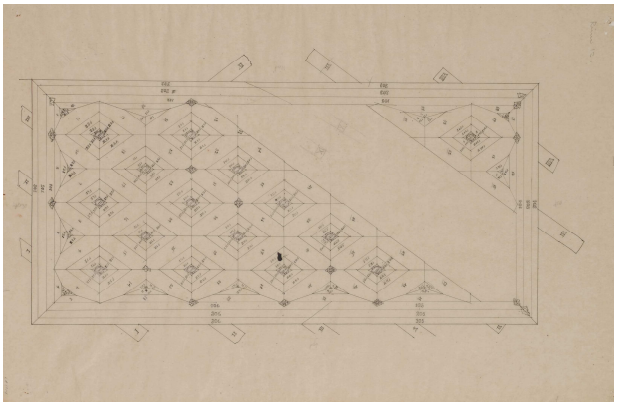
Abstract
Between 1917 and 1920 the Danish architect Egil Fischer and his assistant Vilhem Lauritzen, carried out an important graphic survey of the Earl of Oliva's Palace with the aim of later removing its most exceptional elements and shipping them to Denmark. In 1920 the Palace was declared a National Monument in order to preserve it from the devastation it was predestined to suffer. This official statement, however, did little to prevent the Palace from almost completely disappearing during the first half of the twentieth century. Paradoxically, thanks to the huge amount of graphic documentation compiled by those two architects (notebooks, sketches, plans and photographs), it is now possible to know and study this exclusive late-Gothic and Renaissance-style Palace and his architectonic elements which are an important graphic legacy of the Valencian heritage and allows us to have a better understanding of the civil architecture of its time.
In this article we'll classify all the graphic documentation that has come down to us based on its structural elements (portals, windows, coffered ceilings, vaults, arches, etc.) as a first step for further study and analysis of this unique graphic legacy that has allowed to return to Oliva this important piece of its heritage after a long trip to Denmark and New York.



Exploded plane of coffered. Room 12. Palau Comtal d'Óliva.
Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen LA1114.

Keywords: Oliva's Palace, graphic legacy, late-Gothic, Renaissance-style, heritage,

1. Introduction

The Earl of Oliva's Palace is an example of the late Gothic-Mudejar style that flourished in some parts of Spain in the mid-14th century [1], but which also includes some decorative elements from the early Spanish Renaissance.

Work on the construction of the Palace was probably started in the second half of the 14th century by the Centelles de Oliva y Nules family and was not finished until the mid-16th century. In 1449 Francesc Gilabert de Centelles Riu-Sec (1408?-1480?) was created Earl of Oliva by Alfonso V "the Magnanimous" in return for his support in the campaigns in southern Italy. Thus began the golden age of the Palace, which was to continue with his son, Serafí de Centelles Riu-Sec (†1536), who is attributed with having embellished the Palace. It was later fortified to turn it into an *Alcazar* [1].

In the 19th century, the Palace was sold by its last owners, the Osuna family. The purchasers stripped the Palace of everything that could be removed easily and, so as to be able to divide the estate up into parcels, they opened up a street that ran through the middle of the Palace.

In 1917, Egil Fischer (1878-1963), a Danish architect who was very interested in Spanish art, arrived in Oliva and bought seven sectors of the old Palace with the aim of dismantling any pieces that could be saved and incorporating them in a Spanish museum to be built in Denmark [2].

In 1919 he returned to Oliva with a team of three people, one of whom was the young student of architecture, Vilhem Lauritzen (1894-1984). Together they began working to produce the graphic documentary material on the Palace with the aim of classifying and arranging all of its "useable" elements [2].

As a result of the complaints lodged by other owners, a provincial architect sent a report to the Ministry asking for the demolition work to be stopped [2] and the Palace was finally declared a national monument in 1920 [4].

From that moment on a ban was placed on the exportation of the pieces that had been dismantled and, after many attempts to take the material back to his own country, Fischer was eventually forced to give up [2].

Both the weather and the Civil War had serious detrimental effects on the Palace. In 1950, the little that was still standing was declared to be in ruins and was demolished [2].

In 1980, in an auction in London, the Hispanic Society of America (HSA) acquired two sections of the frieze from the Hall of Arms, together with other pieces from the Palace of Oliva. This prompted a great amount of research work, carried out under the leadership of Priscilla E. Muller, who was then curator of the HSA Museum. With the help of Lauritzen, Muller managed to trace all the graphic material from the surveys carried out by Lauritzen and Fischer years before and which was now the property of his widow, Olga Fischer, who finally donated all the documents to the HSA [3].

This documentary material was finally handed over to the Municipality of Oliva by the HSA and is now stored in the Municipal Archaeological Museum.

The graphic material that has been recovered basically consists of three types of documents: plans, notebooks and photo albums.

The Archaeological Museum of Oliva has invested a great deal of time and work in ordering, encoding and scanning these documents in order to create a digital version that can be used to develop a research methodology that draws on the latest technological resources.

The aim of this paper is to classify all this graphic documentation as a first step for further study and contribute to the preservation and dissemination of this important graphic legacy.

2. Notebooks

Notebooks I and II are two 11 x 17 cm notepads, the binding is made with cardboard hardcover and navy blue cloth spine. The inner sheets have a Microdrilling in its left margin to allow to be cut out of the notebooks. They contain handwritten comments made in pencil with sketches of different architectural elements, such as portals, arches, vaults, beams, coffered ceilings, stairways, flooring, woodwork, mouldings, and so on. The sketches include annotations in Danish. There are also sheets showing measurements, lists of materials, addresses, bibliographical references and even a receipt for payment of the rent on one of the houses.

We will make a first classification of the contents of each of the notebooks depending on whether predominate graphic or written documentation. Within the graphic documentation we will make a classification by the building elements that are described graphically and within the texts we will make a classification by the content.

2.1 Notebook I

Its numbering code is MMO. APD. PC. Egil Fischer. Notebook I. LA1104. On the front cover it's glued a circle of white paper where it is hand written "I FISCHER OLIVA". The inside pages are manually numbered by pencil in the upper left corner with number 1 to 77. Pages 18, 19, 40, 56, 57, 69, 70, 72 and 75 don't exist physically in the notebook. There are also two loose sheets which are within the

notebook, a 9.3 x 16 cm one and another of 12.6 x 19 cm. On the back cover there are handwritten notes also.

2.1.1. Graphic Documentation

Most notes in this notebook are graphs, sketches made quickly in some cases and with more detail elsewhere. Mostly contain dimensions and descriptive texts in Danish, in many cases difficult to transcribe. We will make a classification of them in terms of the architectural elements that represent and in the same order in which the first element of each type appears in the notebook:

-Carpentry and locksmith: within this subgroup we include the two loose sheets attached to notebook containing elevations and sections of two steel grids, as well as pages 20 and 21 containing the elevation and details of a wooden door.

-The Upper Gallery: correspond to these subgroup pages 1 and 2 containing a gallery section with details: inclined wooden covering slab, roof tiles, gutter section and a pillar with molded base respectively.

-Wooden slabs and coffered ceilings: this typology correspond pages 3, 4, 5, 16, 34, 53,54 and 55. There are sketches of zenith plants, some of them are dimensioned and contain wooden beams, some building sections with the form of beams and plaster infill, details of perimeter wood trim details and plaster infill ornamentation elements.

-The Ceramic Materials: This type include page 6 where a flat roof tile and bonding system is drawn, and pages 10,11,35,36 and 37 which are drawn and dimensioned ceramic tiles and its placement design included.

-The Fireplaces: there are 4 pages with graphic documentation of existing chimneys in the Palace that correspond to pages 7, 12,14 and 49.

-The Halls: Correspond to this subgroup the pages 13 and 17. They contain sketches of room plants with the dimensions and situation of door and window hollows.

-The Lower Gallery: this is the arcaded Gallery of the first or main floor. Extensive documentation of this unique architectural element exists on pages 15, 22 to 33 and 42 to 47. There are details of

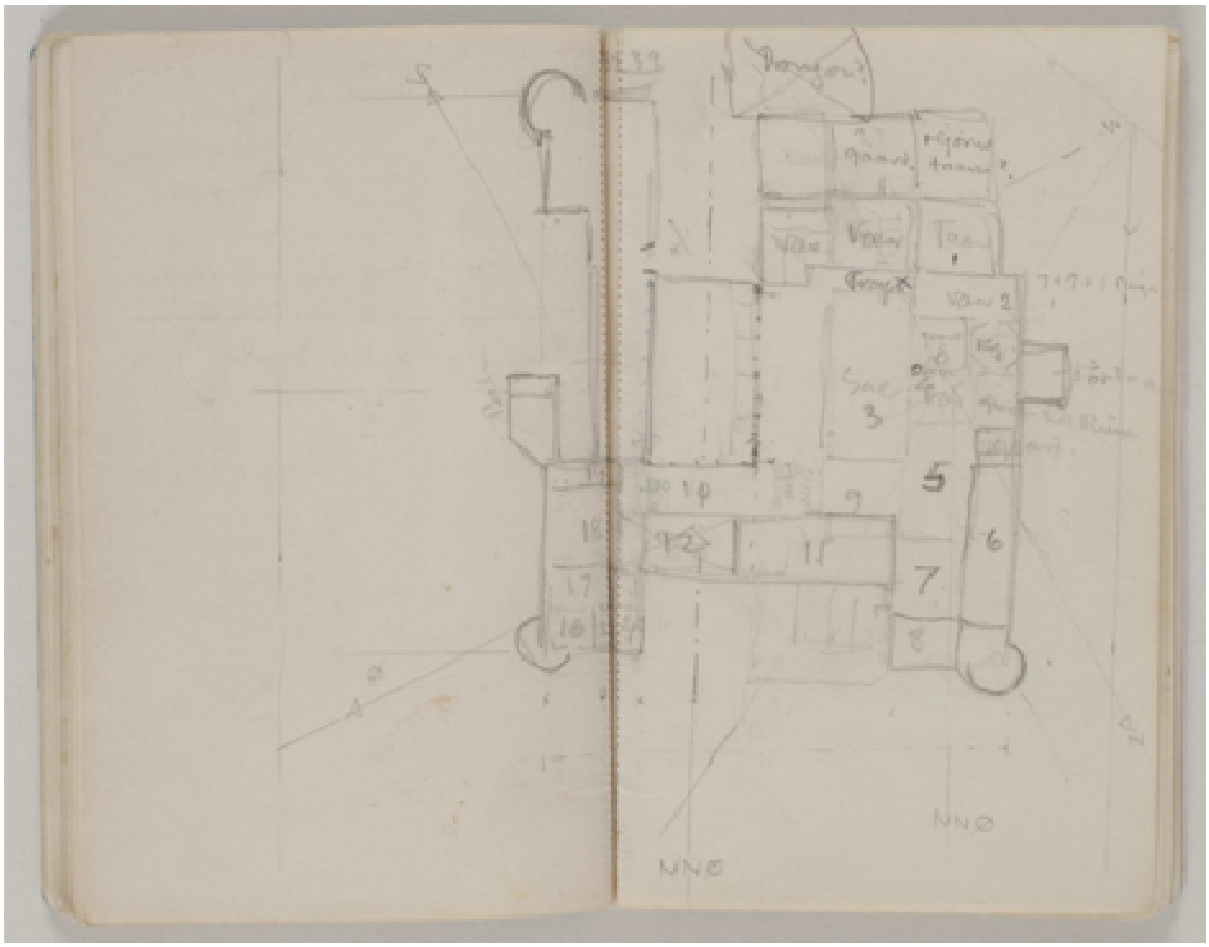


Fig. 1: Main floor plan sketch**.** Earl of Oliva's Palace.
Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen Notebook I LA1104. Page 39.

columns, arches, parapet, upper frieze and pilasters. The columns, the voussoirs of the arches and severies between them are numbered.
-The General Plans: this type will include pages 39, 61 and 74. The first corresponds to a general plan of the 1st floor of the Palace with the numbering of the rooms and its orientation, the second corresponds to a partial plan of the first floor with the name of some rooms, the third corresponds to a volumetric freehand viewed of The Palace from the north-northeast. Both the general plans, as the volumetry are certainly the most value graphic material within the Notebooks as they give us an overview of the Palace and convey to us their magnificence through a single tracing.

2.1.2 Texts
We will make a classification of pages of this notebook where the texts predominate based on its main content:
-Data on the Palace: Pages 8 and 9 contain a list of the various rooms of the Palace. Page 38 contains the heights of the various structural elements of the "Gothic Room". This room corresponds to the Hall of Arms. Page 41 contains the size of a portal.
-Inventory: page 48 and 50 contain the wooden windows inventory of the Gallery. Pages 58-60 contain a numbered inventory of doors "to sell" and other windows and grills of the Palace.
-Price of materials: page 51 contains the purchase price of the new cankerworm. Page 62 contains a price list of different types of bricks.
- The Bibliographic Dating: The 52 page contains a citation of Monsignor Baudrillart´s book, "Letters of the Duke of Burgundy to King Felipe V".

2.2 Notebook II
Its code numbering is MMO. APD. PC. Egil Fischer. Notebook II. LA1105. As in the previous book a circle of white paper is glued on the cover on which is hand written "II FISCHER OLIVA". In this book the pages are not physically numbered, so the numbering used is the one of the page order. It consists of 35 pages plus covers: 17 of them are for text and 18 of graphic documentation (one of them has a construction detail on the main page and a text on the opposite page), so we can say that this notebook is composed of texts and graphic documentation equally.

2.2.1. Graphic Documentation
As in the Notebook I, we will make a classification based on the graphic documentation of the architectural elements that represent and in the same order:
-Stairway: pages 11 and 12 contain the plan, elevation and details of guardrail and handrail of the starting of the first flight of a stairway.
-Portals: the most unique characteristic architectural elements in this notebook are certainly their portals. In this typology we will include page 7, detail of a doorpost and pages 13 and 14 to 22 corresponding to the covers 1 to 9. They contain portal elevation views with Gothic arches and doorposts in section view in most of them and based section view in some of them. Most of them are dimensioned. Though they are simple sketches, they provide us essential information to document these first 9 portals, except for number 8 don't exist plans of them and only in some cases there're photographs thereof (3, 4, 5, 7 and 8).
-The Kitchen: page 23 contains the plan and section of the kitchen chimney formed by a truncated pyramid shaped octagonal base that occupies the entire floor of the room. The transition from the square floor of the kitchen to the octagonal chimney starter is done through four lunettes at the corners.
-The Domes: Pages 26, 27 and 28 contain documentation of rooms 15, 13 and 17 covered with groin vault, cross vault and tube vault respectively drawn in plan and section views and bounded. Coupled with the portals is one of the most valuable documents of this notebook, allowing us to be able to reconstruct graphically these unique architectural elements of The Palace.
-The Halls: pages 30 and 31 have dimension drawings of the halls 16 and 18 (Hall of Arms) with doors and window situation. In the room 16 is shown the distribution of floor beams. Page 25 represents a scheme of the wooden structure that forms the roof of the Hall of Arms.

2.2.2 Texts
We will make the following classification of texts that appear on this notebook depending on their type:
-Citation: Pages 1-10 and facing pages except the one facing page 8 which is blank and page 7 which contain the sketch already described, containing a manuscript copy of Teodoro Llorente's book chapter, "Valencia. Volume II." about Oliva.
-Palace data: on page 14 there is a notation about the situation of windows 1 and 2 and 24 notes with general measures of the roofs of several rooms.

-Inventory: page 29 contains an inventory of wooden beams according their situation and position. The back cover contains a long list of height and width dimensions and the addition of the total volume, in the text indicates "Tarragona. Chapiters".



Fig. 2: Portals 1 to 9 sketches**.** Elevations and sections. Earl of Oliva's Palace.
Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen Notebook I LA1104. Pages13 and 15 to 22.

-Contacts and price lists annotations: pages 32-35 contain various contacts with their addresses, a prices list of building materials and an inventory of antiques and other annotations, some of them crossed out.

3. Photographic Albums

Within the graphical documentation recovered of the palace there are two photo albums: The Large Photo Album and The Small Photo Album. They contain general photographs of Oliva and the Palace, photographs of unique architectural elements of the Palace, photographs of other reference buildings and even photographs of the land in Denmark where Egil Ficher wanted to build its Museum of Spanish Art where incorporate the dismantled parts of the Palace [1]. These photographs are accompanied by Danish texts which we consider important to transcribe and translate in the future. This photographic documentation is invaluable for understanding the building and to be able to analyze it.

We will classify the photo albums based on the content of the photographs on both of them.

3.1. The Large Photo Album.

Its code numbering is MMO. APD. PC. Egil Fischer. Large Photo Album. It is a landscape album dimensions 30 x 38 cm hardcover and binding by two threaded screws. The color of the covers is light brown. The inner leaves are dark gray cardstock; they are reinforced with a strip of light brown cardstock glued on the back, in the bindery. Contains a total of 24 pages, on these sheets are physically attached photos, which are numbered from 1 to 108 by pen on the cardboard. There are also figure captions written by pen and text notes on some pages. We will establish the following groups based on the elements they represent:

-Pictures of Oliva: these are general photographs of Oliva and the surrounding area. There are a total of 8 pictures: 1-4 and 90-93, the latter are photographs taken from The Oliva's Palace.

-Outside Palace's pictures: in this group we include both the general photographs as the partial views of exterior facades of the Palace, consists of 10 photographs: 5-9, 11, 13, 81, 85 and 89.



Fig. 3: Diferent views of Portal 27 (*Dör 27*). Photos 33, 34 and 35. Earl of Oliva's Palace.
Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen Large Photo Album. Sheet 9 Reverse.

-Portal pictures: the largest group is formed by a total of 24 pictures: 28-35, 39, 40, 52, 53, 61, 63-69, 72, 73, 75 and 77 which show us the most unique Gothic portals and some of them with Renaissance decoration.
-Roofing pictures: this group of pictures represents timber ceilings, coffered ceilings and vaults. There are 12 pictures with the following numbers: 25, 26, 43, 45, 46, 48-51, 54, 56 and 57.
-Photography of the galleries: in this group we include all pictures of both the main gallery as the upper gallery of the Main Courtyard. It is composed by 7 pictures: 10, 12 and 14 to 18.
-Pictures of windows: in this group we include both partial indoor photographs of the windows as outdoor pictures of them. Three of these photographs are repeated at the portal group because they contain graphic documentation of both architectural elements. There are 10 pictures with the following numbers: 71, 74 to 77, 79, 80, 82, 84 and 94.
-Frieze Hall of Arms: due to its great ornamental importance and the large number of photographs of this unique building element we have considered appropriate to make an specific group that include these 7 photos taken from this element at its original location. They correspond to the numbers 19 to 24 and 27.
-Dismantled pieces: in this group we include all the parts that have been removed from their original position: frieze, capitals, infill elements, tiles etc. There are a total of 20 photographs: 26-38, 41, 42, 44, 47, 55, 58-60, 62, and 70.
-Other buildings: the latter group are the last 8 photographs (101-108) representing buildings and other elements that keep some formal similarities with the Earl of Oliva's Palace.

3.1. The Small Photo Album.

Its numbering code is MMO. APD. PC. Egil Fischer. Small Photo Album. This is an album of dimensions 22 x 26 cm. brown hardcover and binding by two threaded screws. The inner sheets are hard, made of the same material and color than the covers; they are top with a black sheet of paper attached to each of their faces. Contains a total of 12 pages plus front and back covers. On these pages are physically attached pictures. There are also two loose photographs inside this album. On the margins of the photographs themselves there are explanatory texts in Danish. Most photographs are repeated compared to Large Photo Album and retain that numbering. In other cases they are not numbered. The numbering is pen written on the photographs themselves or on a small circular paper glued on them. There are a total of 15 photographs that are not repeated in the Large Album plus two photographs of two plans of the Palace. We only will proceed to classify these 17 photographs based on the elements they represent:

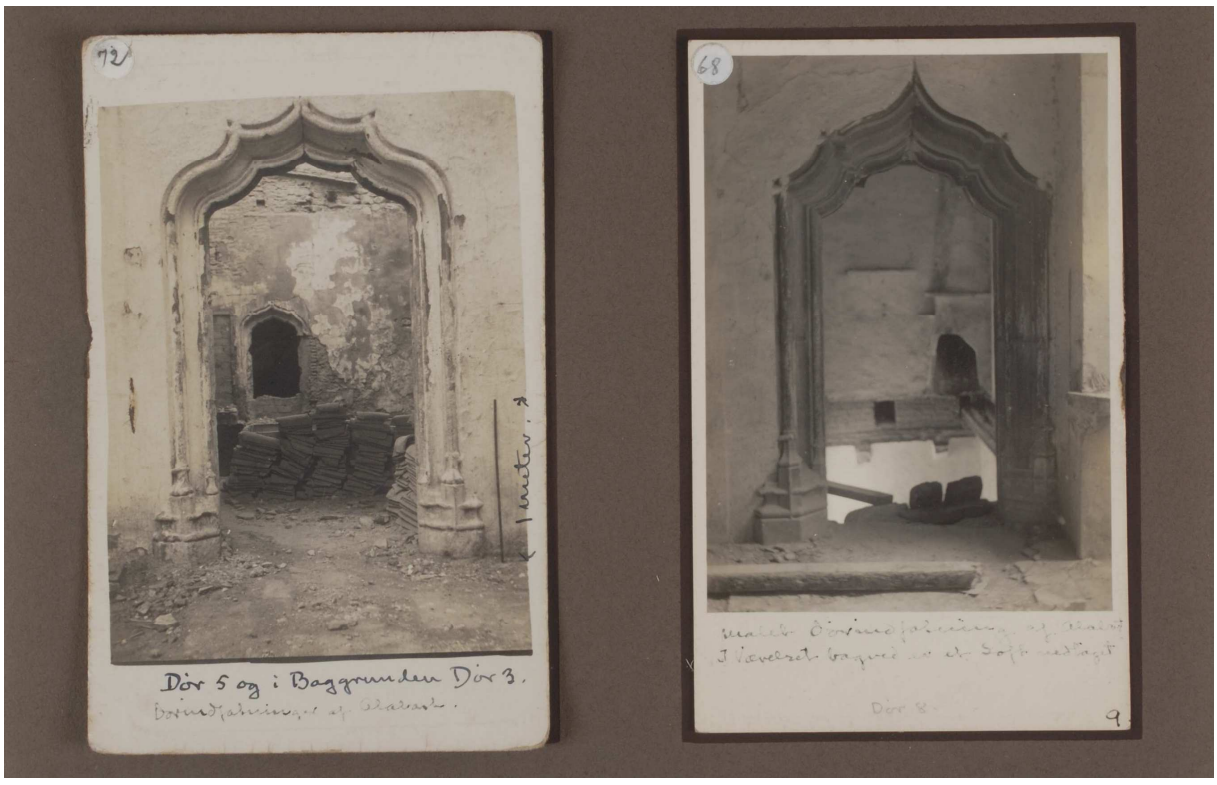


Fig. 4: Frontal views of Portal 5 (*Dör 5*) and Portal 8 (*Dör 8*). Photos 72 and 68. Earl of Oliva's Palace. Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen Small Photo Album. Sheet 11 Anverse.

-Oliva's Photographs: Photography F, page 3R.
-Outside Palace's pictures: photo unnumbered page 3A, photo 6.1 page 4A, photo 3.1 page 5A and photo unnumbered page 13A.
-Portal pictures: photo 29.1 page 6A and photo 28.1 page 7A.
-Photographs Frieze of Hall of Arms: photo 23.2 page 6R and photo unnumbered page 7A.
-Pictures of Roofing: Photography 45.1 page 8R.
-Pictures of Windows: Photography ? page 12A.
-Pictures dismantled elements: photo unnumbered, page 4R and photo 23.2, page 6R, both correspond to pieces of the frieze of Hall of Arms. In the second one the pieces are mounted in a house as decoration.
-Pictures Denmark: photo unnumbered page14A and photo unnumbered page 14R. The two photos match a soil in Pille Allé, Frederiksberg, where Fischer wanted to build his building with the pieces of the Palace [1].
-Photo not rated: photo A page 3R, decorative element without apparent relation to the Palace.

4. Drawings

There are 112 sheets pencil drawings of different elements of The Palace and 8 ink drawings of the construction projects for the Spanish art museum in Denmark. Each one is numbered by code: MMO. APD. PC. Egil Fischer. Notebook I. LAXXXX. The plans represent the main floor, the deck plan of the Palace, coffered ceilings, domes, arches, portals, windows, and other unique architectural elements of the main floors of the Palace. The deck plan incorporates graphical scale and in the rest of the sheets we can find some with dimensions and other ones than lack thereof. In most of the planes of the portals, windows and arches, we found a main sheet with more detail and a tracing paper that appears to be a copy of the first and where is drawn the cutting provisions for disassembly and reassembly of these architectural elements.
The classification was made according to the type of construction elements in the following blocks, ordered according to the total number of plans containing: Portals, Windows, Ceilings, Miscellaneous, Pile Allé Project Plans and Floors.

4.1. Portals. They represent the largest block of plans. Include a total of 45 plans: LA1122-bis, LA1124, LA1136 to LA1177 (except LA1172 and LA1174 that do not exist), LA1182, LA 1191 and LA1192. They represent the *Dör* 8 and from the *Dör* 10 to *Dör* 28 portals, one of them shows a detail of the portal Dör 7 (LA1182) and LA1176, LA1177, LA1191 and LA1192 sheets represent four other portals unnumbered and no identified. Inside the portals we can also establish different classifications depending on the decoration, arch type, number of columns that form the doorposts, etc.

4.2. Windows. This set of plans consists of 29 sheets: LA1179, LA1187 and LA1183 to LA1193 to LA1213 (except LA1200 that doesn't exist). They define 8 numbered windows: *vindue* 3 to 10 and 5 more windows unnumbered. The dimensions of the voids and their architectural ornamentation (arcs, doorposts, moldings, benches etc.) are defined on them.

4.3. Ceilings. This group encompasses sheets LA1110A, LA1110R, LA1111 to LA1119, LA1123 LA1121 to, LA1124-bis, LA1125 and LA1126, they are 17 sheets in total. All of them have identified the room number the ceiling belongs, excluding LA1110A and LA1110R. Within this group we can set 3 subgroups according to their type: Forged beamed, coffered ceilings and vaults.

4.3. Miscellaneous. In this heterogeneous group have englobed all those sheets that did not fit into the other groups. It is also made up of 17 sheets: LA1110-bis, LA 1135 LA1127, LA1178, LA1180, LA1181, LA1188 to LA1190 and LA1214. Within this group we can set three distinct subgroups: Large Tower Gallery, Arches Gallery and Misc.

4.4. Pile Allé Project Plans. There has 8 scale plans drawn ink containing the floor plans, elevations and sections of two proposals for the Spanish Museum of Copenhagen.

4.5. Plants. This group consists of a total of 4 sheets penciled (LA1106, LA1108, LA1109 and LA 1109-bis) representing the main floor of the Palace with the numbering of many of its rooms, portals and windows, two deck floors of the Palace and a last one that has drawn two floors of the distribution of a building that incorporates many of the portals and windows of the palace. It seems to be another proposal to the Spanish Museum of Copenhagen.

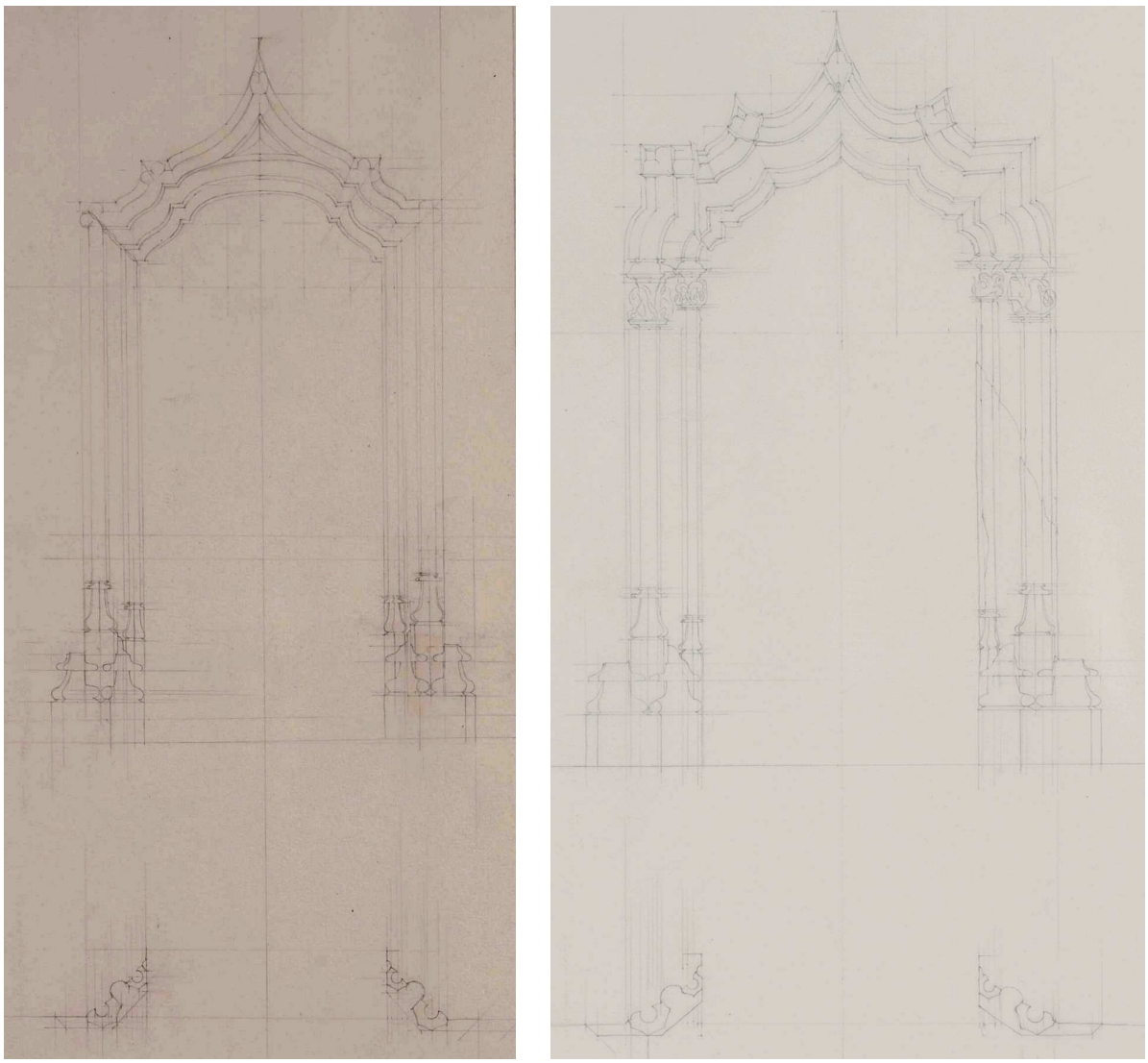


Fig. 5: Portal12 (*Dör 12*) and Portal 15 (*Dör15*). Elevation and section plans. Earl of Oliva's Palace.
Source: MMO. APD. PC. Egil Fischer/Vilhem Lauritzen LA1139-R / LA1150

5. Conclusions

The classification of all graphic legacy of Earl of Oliva's Palace has allowed us to depth in a best knowledge of it, while it has helped us to identify most of the parts represented as well as its location in the Palace. The fact of not being able to transcribe and translate all the texts in Danish so far, for economic reasons, makes us think that we still have an important part to analyze of all the vast information available.

It has been carried out a table for each one of the groups of building elements based on the classification made for plans, picking on them all the information found in each one of the documents available: Plans, Notebook I, Notebook II, Large Photo Album and Small Photo Album. This crossing of information has been essential to know all the information that we have each element. Attached table 1 (see Tab. 1) corresponding to the portals as an example of the work done, where we've included depending on its coding, numbers and / or page number of each document all documentation relating to each one of the portals. These documents are also linked to this table using hyperlinks, which enables us to easily find them for any work of further study.

This same work has been done for other groups: Windows, Roofing, Miscellaneous, Project Plans and Pile Allé Plants, allowing us to have a data base organized and classified all the graphic documentation as written documentation, helping us in the future research of certain aspects of the Palace.

We believe that this paper has met its main objective: a thorough classification of the graphic documentation of the Earl of Oliva's Palace which may provide basis subsequent research studies that can be performed about this exclusive late-Gothic and Renaissance-style Palace and his architectonic elements.

Portal / *Dör*	Hall / *Rüm*	Plan	Note book II	Large Album	Small Album	Nr. Fotograph
Dör 1	1	NO	Pág.13			NO
Dör 2	Escalera	NO	Pág.15			NO
Dör 3	Torreón?	NO	Pág.16	Pág.16A	Pág.11A	72
Dör 4	4	NO	Pág.17	Pág.16A	Pág.12R	73
Dör 5	3	NO	Pág.18	Pág.16A	Pág.11A	72
Dör 6	3	NO	Pág.19			NO
Dör 7	7	LA 1182	Pág.20	Pág.15R	Pág.9R	61 69
Dör 8	7	LA 1136	Pág.21	Pág. 15A	Pág.11A	68
Dör 9	8	NO	Pág.22			NO
Dör 10	11	LA 1140 LA 1141 LA 1142	NO	Pág.15A	Pág.11R	66
Dör 11	11	LA 1137	NO	Pág.16R		75
Dör 12	12	LA 1138 LA 1139	NO	Pág.17A		77
Dör 13	12	LA 1145 LA 1146	NO	Pág 14R		63
Dör 14	13	LA 1147 LA 1148	NO	Pág.14A		61
Dör 15	13	LA 1149 LA 1150	NO	Pág 14R		65
Dör 16	14	LA 1151 LA 1152	NO			
Dör 17	15	LA 1153 La 1154	NO			
Dör 18	16	LA 1155 LA 1156	NO	Pág.15A	Pág. 11R	67
Dör 19	16	LA 1157 LA 1158	NO			
Dör 20	17	LA 1159 LA 1160	NO	Pág.9A		32
Dör 21	17	LA 1161 LA 1162	NO			
Dör 22	18	LA 1163 LA 1164	NO	Pág.8A	Pág.7A	28 28.1
Dör 23	18	LA 1165 LA 1166	NO	Pág.8R	Pág.7R	31
Dör 24	19	LA 1167 LA 1168	NO	Pág.8R	Pág.6A	29, 29.1
Dör 25	19	LA 1169 LA 1170 LA 1171	NO			
Dör 26	20	LA 1173 LA 1122 bis	NO	Pág.10R	Pág.4R Pág.8A	39 40
Dör 27	20	LA 1175 LA 1124	NO	Pág.9R	Pág.6A	33 34 35
Dör 28	12	LA 1143 LA 1144	NO	Pág.14R		64

Tab. 1: Graphic documentation of numbered Portals. Earl of Oliva's Palace.

Bibliographical References

[1] E. Muller, Priscilla. El Palau d'Oliva dels Centelles. Esteve i Blay, Antoni. *El Palau del Centelles d'Oliva. Recull Gráfic y Documental*. Oliva: Associació Cultural Centelles i Riu-Sech, 1997, p. 89-138. ISBN 978-84-605-6972-5.

[2] Lauritzen, Vilhelm.Relación sobre el Palacio, Esteve i Blay, Antoni. *El Palau del Centelles d'Oliva. Recull Gráfic y Documental*. Oliva: Associació Cultural Centelles i Riu-Sech, 1997, p. 139-144. ISBN 978-84-605-6972-5.

[3] E. Muller, Priscilla. A la recerca del Palau. Cabdells: revista d'investigació de l'Associació Cultural Centelles i Riusech. Núm. 1. Oliva 1999. ISSN paper 1577-7596.

[4] *Gaceta de Madrid*- Num. 215. 2 de agosto de 1920.

XII International Forum Le Vie dei Mercanti
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OFF-GRID::FARM. Multifuncional landscapes and sustainable systems for Mediterranean rural areas.

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Abstract
OFF-GRID::FARM is a procedural method to plan sustainable and self-sufficient farms. It has been developed starting from an investigation carried out in China, Argentina, and Italy, and characterized by creativity and innovation of different case studies. Nowadays, European policies look at the rural landscape as an idyllic space easily opened to solar energy, water stream, wind, and biomass. In this context, planners must control the transformation of rural territories through innovative strategies of development and preservations. With this aim, this research offers an outlook on the potential of Mediterranean rural areas and their management, introducing the concept of countryside built in multifunctional layers. The main goal is indeed to raise awareness of farmers about the small-scale energy production from agricultural waste, in order to effectively create "off-grid" systems. Focusing on constructions, the design of farm's buildings encloses climate principles, morphology of territory and the relationships amongst activities. New ways of living rural areas can preserve their identity and educate people on food culture and energy savings, as well as can foster organic agriculture, educational and advisory programmes. OFF-GRID::FARM as a series of rules to build the future of agricultural Mediterranean landscapes.

Keywords: sustainability, agriculture, multifuncionality, off-grid

1. Sustainable Rural Systems and Multifunctional Agriculture
This is the era of continued urbanization. The energy crisis that is afflicting our planet makes us reflect about the relationship city/country, as entities not in antithesis but as elements that can be blended to form a system with new trend: the *agro-city* [1]. This is the moment for planners to reconsider current patterns of countryside development and permit a painless cohesion of artificial and natural systems, the increase of local food production and the reduction of carbon footprint. Organisms characterized by an high alimentary sovereignty, where agriculture should determine the economical vitality, the well-being of population and new sources of energy, maybe the agrarian cities will swept away by green revolutions able to take care of environment and people's health.
We have already heard talking of “sustainability”, concept used to describe the possibility of a system to be maintained at a fixed level for an indeterminate amount of time. This term is usually used to describe an idyllic status of creation and maintenance for all the conditions that humanity and nature need for global harmony, and to satisfy the social, economic, and environmental needs of present and future generations. But actually, the environmental and social conditions of our planet show, with evidence, that the practiced models proposed by researchers and global institutions must have the ability to solve problems through sustainable actions: especially rules, programs and directives have to give the important solution to preserve and upgrade the environment, reduce waste and consumption of resources. In this sense, sustainability has become a fixed and binding component in political decisions because it is only in this way that it is possible to move from theory to practice. But what has been done towards the improvement of sustainability over the last years in agricultural fields?

The Common Agricultural Policy (CAP) has left its mark on the European countryside, setting development in a support role to the implementation of structural changes in the agricultural world. It has seen its structuring capacity lessened in favour of an increasingly independent policy with extended functions. In 2013 the new six-year budget and programming cycle have started as next stages in this fundamental change in the issues at stake. Rural development is gradually becoming a vector of geographical cohesion, driving the competitiveness of rural areas and supporting the sustainability of human activities and management of natural resources [2].

The process of modernization tended to replace traditional agriculture for a model of productive specialization for the market, centred on improved seeds and a technological package which included the strong incorporation of external consumables, mainly fertilizers and agricultural chemicals. Starting from the concept that the use of sustainable practices in agriculture could become the main value for a territory in terms of services for community, like management of the territory, conservation and landscape fruition, food safety and environmental control, the discipline of territorial planning could help to create sustainable systems with agricultural features, called "agro-ecosystem" [3]. They could be:

- **bioregion**: in a huge scale, it is an ecological community with characteristic flora, fauna, and environmental conditions, limited by natural boundaries;
- **eco-cities** and **eco-villages**: urban systems where it is possible minimize the use of conventional energy, promote organic food and waste reuse, preserve air and water from pollution and design a more sustainable urban element in rural areas;
- **agricultural park**: a combination of a working farm and a municipal park, located at the urban edge. It can serve as transition or buffer zones between urban and agricultural uses. It provides fresh food, and an educational, environmental and aesthetic amenity for nearby communities [4];
- **sustainable farm**: it is a self-sufficient unit located in rural areas able and close to cities, to produce its own energy and preserve the biodiversity of its territory;
- **urban farming**: it is an emerging process of growing and distributing food, as well as raising animals, in and around a city, to conceive new paradigms of health and life respect.

Multifunctional layers, that rules the land uses and practices, can change functions of ecosystems. In 2005, the Millennium Assessment defined four main categories of services provided by ecosystems [5], such as:

- Food and fibber, fuel and timber, genetic resources for crop improvement and medicine, natural chemicals and water are the material benefits that people gain from ecosystems;
- Regulating services are the benefits to sustain different components of human well-being: crop pollination, ecosystem resistance to invasion by exotic species, climate and atmospheric chemistry regulation, pest control, water purification and erosion control;
- Cultural services are intangible benefits from ecosystem through their contribution to such things as education (didactic farm) and science, spiritual fulfilment, aesthetic beauty and “sense of place”;
- Supporting services are necessary for the sustained provision of all the previously described services, like productivity, soil development, nutrient cycling and mineralization of organic matter (source of soil fertility for plant growth), water cycling and the production of the oxygen.

There are no doubt that a serious study on new functions for rural areas could improve its development and to converge toward the *20-20-20 Targets*, "an integrated approach to climate and energy policy that aims to combat climate change, increase the EU’s energy security and strengthen its competitiveness" [6].

2. Investigating on Farming: International Good Practices

I started to contribute to research activities on rural areas since I was a student, establishing the research unit *Imagine Lab of Architecture, City and Landscape* of the University of Calabria (UNICAL, Italy), where researchers and students can deal with territorial planning and sustainable design. In

particular, the laboratory focus on sustainable development of urban and rural areas and their interrelations, sustainable farms, use of natural resources in rural areas, eco-villages with biogas plants (located in Mediterranean Areas, Argentina and Kenya) and smart cities.
For my PhD studies, I visited China, Argentina, Indonesia and Turkey to analyse their own agricultural practices and look at best innovative processes. In all these Countries, a new consciousness on the important to preserve Earth's healthy has engaged many researches to understand the problems that are afflicting our rural lands: what is their future and what the academic world could do to sensitize people to build in a more sustainable way, to conceive good practices, to use free energies and establish a new rural/urban dialogue?
I deal with urban development planning for sustainable rural systems in the Mediterranean area, defined by new essential qualities as multifunctionality and *off-grid* prerogatives. Most of the studies I carry out fall within the purview of urban studies but inspired by agrarian urbanism. Within this field, my contributions are towards the understanding of the rational use of free energy and biomass from agricultural residues, to preserve natural resources, biodiversity, environment and local identity, and conceive systems more natural and healthy: a *green farm* as part of eco-villages and cities systems, testing ground of new policies for social and environmental sustainability, by means of implementations of urban agriculture and "zero kilometres food".
My investigation started from the idea that new strategies could be relevant only if concepts like biodiversity, sustainable agricultural practices and free energies are accepted in common life. For this, all the good practises and case studies reported have the intention of communicate the real possibility to plan from an ecological point of view, to make correct policy choices, respecting international protocols and rules, preserving the identity of rural areas and traditional resources.
In my period of research abroad, I joined the Department of Building Science School of Architecture of Tsinghua University (Beijing, P.R.C.) and the Faculty of Architecture of *Universidad Catolica de Cordoba* (Cordoba, Argentina). In very close contact with countryside realities, those experiences have enabled me to engage an eco-sustainable design for rural development, targeting rural and urban *off-grid* systems, eco-villages, sustainable communities and agro-cities. The outgoing of this research will aim at establishing a future model for developing methodologies on rational management of local resources, especially in Mediterranean rural areas, through a sustainable planning process.

2.1 Rural China and the Use of Agricultural Residues
In China, I had the opportunity to analyse the rural environment of Beijing and Shanxi provinces. I was looking for new design solutions for sustainable farms and rural villages, focusing on climate changes, renewable energy, water conservation, energy independent system, tourism, organic food and rural activities.
As the biggest agricultural countries, China's arable land is a precious resource for its development. All suitable to agriculture, mountains and dry grasslands give shape the country, but often they are covered by new cities and constructions. Also, natural disasters, soil erosion and pollution problems are changing the identity of these lands. Many factors influence the rural structure, such as economy, society, climate, culture and local energy sources: they are different for each region, due to the complexity of its geography and social economy. Local inhabitants are used to live in a very ancient way, using biomass to carry out all the common house activities, like heating and cooking. Energy consumptions depend mainly on straw, firewood and coal.
But China is also the nation with the highest percentage of worldwide urbanization, a process that is sharpening social and energy problems in rural areas. This big country is striving hard to develop a sustainable urbanization, improve a modern and efficient agriculture and promote energy saving.
As a matter of fact, a sustainable use of local resources should permit to protect the natural environment: ecological agriculture represents one of the potential alternatives to conventional agriculture and the biomass sector is identified as the main source of economic and social improvement [7].
All these prerogatives could be improve in agro-cities, already existing in China. At the moment, there are more than 500 eco-agricultural counties, with eco-agriculture demonstration zones. From 2005, the Chinese government has dispensed over 700 million Yuan to build dry farming and to plan water-saving agriculture demonstrations in arid territories, with the aid of agronomic and biological measures

Looking for new sustainable solutions for rural development, China intends to turn to all the abundant renewable energy sources and territories of unproductive lands; the attention would also emphasize the research of new promising technologies [8].
It should be said that China can not use the large amount of bio-energy storage, because of limited techniques for selection and cultivation of energy plants, low bio-energy use efficiency, difficulties in collection of bio-energy materials and so on. At the moment, China has been planning its bio-energy development strategy (2006–2015), emphasizing the desire to activate an advanced bio-energy facilities for a better use of local resources.

2.3 A Biodinamic Farm in Argentina: Sustainable Agricultural Practices

In Argentina, the modernization of agriculture gave way to a process of speculation, greater land concentration, an increase in the surface per productive unity. From 1988 to 2002, a strong decrease in the total amount of farm installations led to an increasing rural depopulation and socioeconomic desertification. The growing trend to monoculture generated negative external factors on the natural territory: exportation of nutrients, degradation of soil, and loss of biodiversity. But also in Argentina the idea of modernization is not the only possible path of action to increase productivity in rural areas; this has been showed by multiple experiences I visited.
In Santa Fe Province, Guadalupe Norte, for example, an alternative agro-ecological model has generated ecological income and employment, as well as environmental benefits. In a small area for commercial agriculture by Argentinean standards, in 1991 a family of farmers has created the *Granja Ecológica Naturaleza Viva*, an agricultural production system that use biodynamic, an alternative agricultural method developed by Rudolph Steiner in 1920s [9]. This is an holistic view of agricultural because it requests to see the Earth's environment in a more spiritual dimension and agro-chemicals are not used on the farm, to maintaining soil quality and fertility and to obtain organic food.
“Naturaleza Viva” produces more than 15 types of agricultural products on 220 ha, like yogurts, cheese, vegetable oils, flours, jams and meats, using modern industrial processes and sold at markets. The production system is based on the idea of a traditional agricultural system and it incorporates new scientific knowledge and know-how; also it has didactic scopes, to teach children and young people the importance to respect nature and human life. Starting as family business, now "Naturaleza Viva" employs 11 families that currently live on the farm and it is rapidly expanding. It is one of the most important experience of multifunctional uses of agricultural lands in a sustainable way.

2.1 Mediterranean Area: Sustainable Energy Productions in Calabria (Italy)

In every part of the civilised world, the current agricultural trend is towards more specialized actions, high input-output production systems based on modern technology. But this does not impede the use of sustainable systems in many Mediterranean areas, to preserve environment and natural resources, also producing free energies from residues.
For example, in Calabria there is the largest biogas energy plant existing in the central and south Italy, with a power of 625kW. It is part of the *Fattoria della Piana*, situated in Rosarno (RC) and it has build to cover the energy demand of the farm [10]. Livestock waste from stables and leftover from milk processing, joined with agricultural residues, are stored in two fermenters. Then they are mixed and heated thanks to an anaerobic digest process, producing biogas. The electrical energy produced is enough to cover efficiently the needs of 1.700 families, while the thermal one is used for all their internal needs. Through process of fermentation and combustion of biogas, wastes are transformed into energy and fertilizer, used for cultivation. A big farm as a self-sufficient ecosystem, able to produce energy from agricultural wastes deriving from: heads poultry, cows, sheep, 700 acres of citrus and 1000 hectares of olive tree, fruit and vegetables, green house and viticulture.

3. OFF-GRID::FARM, a process to plan in a more sustainable way

OFF-GRID::FARM starts form the concept that farms have to maintain the quality of countryside. This concept determines an approach that takes a holistic view of the whole farm as a system, focuses on the relationships between the various components under the control of the farm household and of the interactions of these components with physical, biological and socio-economic factors under the



Fig. 1: Naturaleza Viva, a sustainable farm in Argentina (Guadalupe, Santa Fe)

household's control, and aims at enhancing the efficiency of farming systems by focusing agricultural research to generate new developing planning programs for rural areas. This research proposes recommendations and farm development's program to form a sustainable agro-ecosystem research facility.

Generally, a sustainable farm has to follow criteria like: production of all energy needed for farm operations and processing of biofuels or fertilizers; requisition of carbon; production of all feeds needed for animal production; do not use chemical nutrients; to be economically viable.

A short procedure of control of the planning process permits to create systems where to put into practice sustainable agriculture, to be followed by both farmers and rural planning. But to meet these criteria, the farm must be analysed and designed as a whole agro-ecosystem. It is a system-oriented toward a holistic approach for advice, education and planning. The model covers ecological, economical and social aspects by defining indicators like energy, water, soil, biodiversity, emission potential, plant protection, waste and residues, cash flow, farm income, investments, local economy and social situation. Concisely, the OFF-GRID::FARM strategies involves different steps to conceive a sustainable farm system in Mediterranean area, considering all the factors above:

1. Identification of figures and users
2. Selection of location on rural territory

3. Planning and identification of agricultural settlements
4. Definition of the multifunctional degree
5. Size of the farm
6. Definition of farm boundaries
7. Accessibility
8. Type of Mediterranean productions
9. Identification of relations between users
10. Identification of the farm functions
11. Location of the activities' rooms with respect to the fund
12. Identification of the farm manufacture
13. Designing functional spaces
14. Water supply
15. Choice of agricultural practices
16. Energy technology installations
17. Use of biomass and typologies
18. System biogas plants
19. Production of "green" compost
20. Preparation of plant energy transformation
21. Distribution of electricity
22. Preparation of equipment for deep-freezing of products and fire protection
23. Sustainable mobility
24. Reintroduction nature and woods into the project area
25. Creation of short supply chain
26. Testing the level of business sustainability
27. Subsistence economy to business unit.

The basic concept is that anything is fritter away, but everything is reused to produce free energy and minimize the use of fuel, especially to create a self-sufficient *off-grid* organism, out of touch with the national electricity grid. Every single aspect has been engaged focusing on the main characteristics of the land, local productions and traditional dwellings. Especially the design of buildings encloses climate principles, morphology of territory and respects all the relationships amongst activities.
This way of living rural areas could preserve their identity and educate people on food culture and energy savings, as well as can foster organic agriculture, educational and advisory programmes.
The process is very complex and requires a detailed study of the background and current status. Respecting each point of the proposed program means starting a process of rational planning, in which the main actors are involved, also the main peculiarities of each local context.
The planner has the great task of grasping all main resources of places, as principal vectors of development. The methodological process will be applied in a Mediterranean farm to verify its real effectiveness, as well as the possible gaps.

4. Output and Future Perspectives Playing with Agriculture

Starting from the experience developed abroad and in Italy, I will show some outcomes with reference to different agricultural contexts.
In the *rural context*, a relevant use of agricultural residues to produce energy from biomass and create *off-grid* systems is expected, also the maintenance of biodiversity and local resources, the creation of multifunctional spaces able to improve economy and occupations in rural sector. An example of sustainability is offered in Fig. 5 that shows how to plan rural environment but also offer multifunctional layers of activities and attitude. A sustainable farm has composed by [11]: 1 - Electricity from little lakes or irrigation ditch; 2 - Forestry; 3 - Agricultural residues; 4 - Agricultural residues for heating; 5 - Collecting biomass; 6 - Photovoltaic panels; 7 - Production of natural gas; - Use of geothermic systems; 8 - Less fossil fuel; 9 - Use of biofuel.
In *Pheriurban areas,* laboratories for the experimentation of new sustainability practices could born, able to stop the phenomena of territorial disintegration, to produce processes of development and protection through improved environment.

Within cities, the *urban agriculture* could permit to product sustainable food and new green ecological tissues within cities, sensitizing communities to respect environment and practice agriculture.
As a planner, I envision a future research agenda that complements on ecological benefits for urban and rural ecosystems, by focusing on social and environmental benefits. I will try to pinpoint further significant solutions on development of sustainable villages and agro-cities in rural areas, with the hope that society will be persuaded for diverting resources from local territories to empower them, instead of impoverish. New strategies and visions for rural lands must minimize the impact of new technologies and practises on the open territory and make people aware about correct human behaviours which support Earth's life.

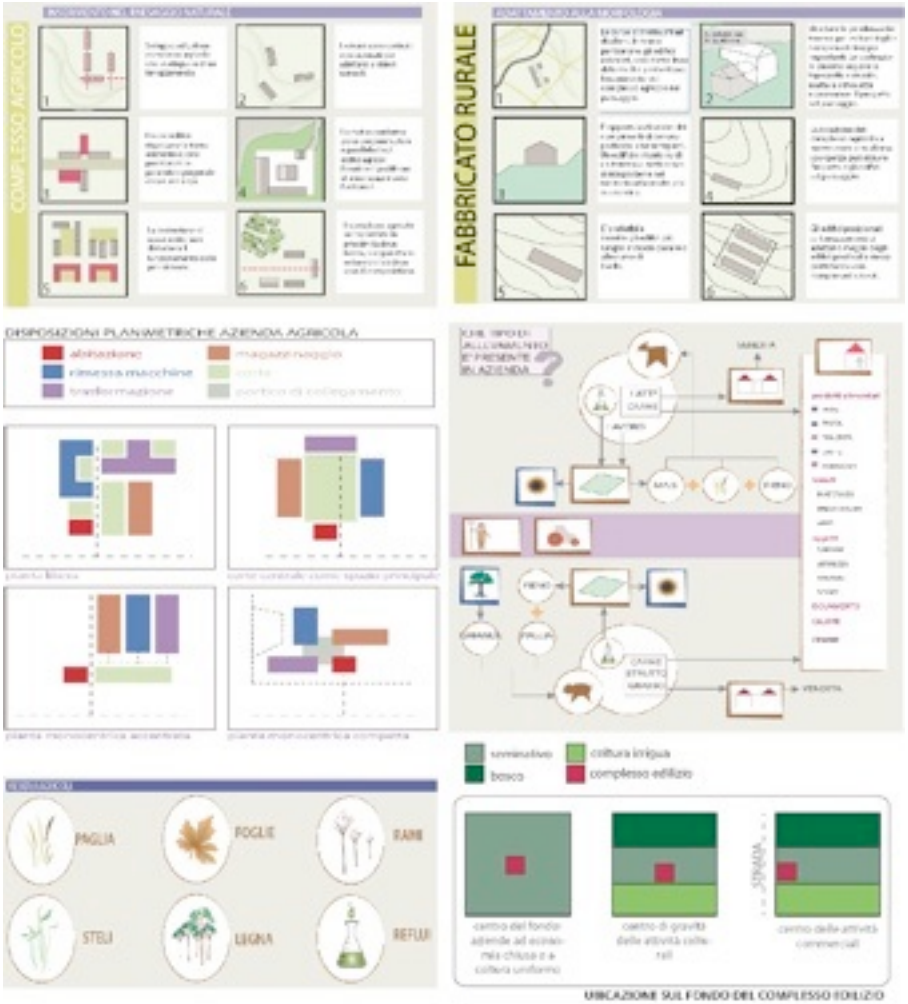

Fig. 2. Example of graphics and maps used inside the methodology OFF-GRID::FARM.

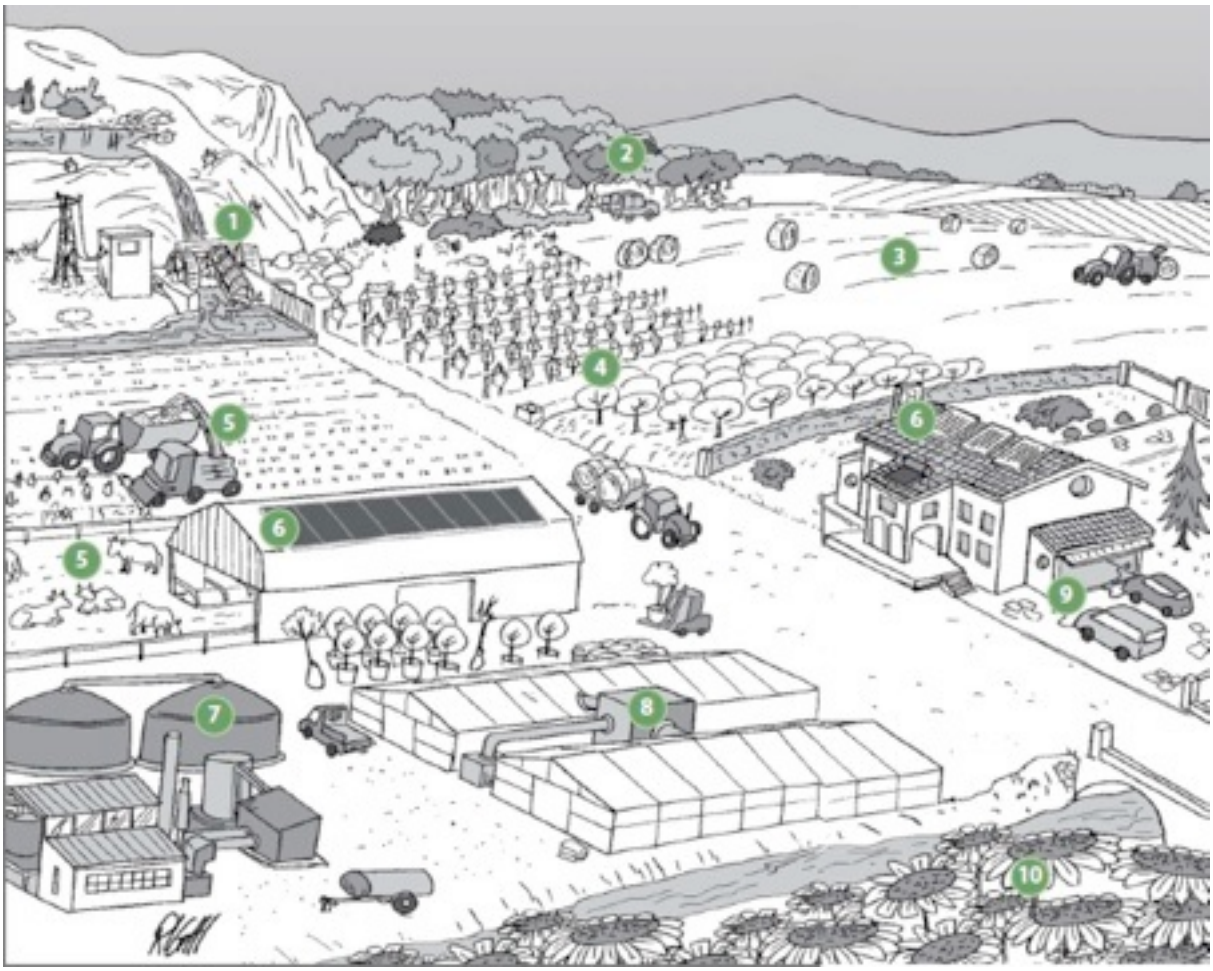

Fig. 3: A perfect example of sustainable farm and off-grid system (Source: www.regione,piemonte.it)

Bibliographical References

[1] Mougeut Luc J. A., Agropolis. The social, political and environmental dimensions of urban agriculture, Routledge, 2005.

[2] Medi.TERRA 2008. The Future of Agriculture and Food in the Mediterranean Countries, CIHEAM, Presses de Sciences Po, 2008.

[3] Pascucci S., Agricoltura periurbana e strategie di sviluppo rurale: una riflessione, in QA : la questione agraria, fasc. 2, p. 127-150, 2008.

[4] Agriculture Park Model for the Capital Region, CR-FAIR, Policy Discussion Paper Series CR-FAIR, Issue n°3, www.communitycouncil/crfair, 2013.

[5] Ecosystem and Human Well-being: Synthesis / Millennium Ecosystem Assessment, Island Press, Washington, DC, 2005.

[6] http://ec.europa.eu/clima/policies/package/

[7] Zhou Z., Wu W., Chen Q., Chen S., 2008, Study on sustainable development of rural household energy in northern China, Renewable and Sustainable Energy Reviews.

[8] Yang X., Jiang Y., Yang M., Shan M., Energy and environment in Chinese rural housing: Current status and future perspective, Front. Energy Power Eng., 2009, Beijing.

[9] http://naturalezavivaargentina.jimdo.com

[10] http://www.fattoriadellapiana.it

[11] La scommessa dell'energia. L'agricoltura e le fonti rinnovabili. Regione Piemonte, Supplemento a Agrisole n.19 del 14/05/2010, LEGO Spa Trento 2010.

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BETWEEN SIGN AND COLOR. THE RESTORATION SITE OF THE CHURCH OF THE VIRGIN MARY ASSUMED OF CARRU'

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Abstract
The paper critically examines the restoration of the Church of Maria V. Assunta at Carrù (Cuneo), executed in 2008, by the project and under the coordination of the author.
The conservative restoration (covered the structures, the decorations and the interior's technological upgrading) has involved different multidisciplinary expertises and skilled workers, which jointly have restored 'color and shine' to a building that has always represented the hub of religious and civil life in the Carrù's community.
The building, constructed from the 1703, is the work of Francesco Gallo (1672-1750), architect and engineer expert on military fortifications, engaged in those years in the construction of other religious buildings in Cuneo's Country.
The building was made on Greek cross plan with brick walls (exposed face to exterior, and plaster to interior), then completed with ceilings and roof in 1719. Within the various trades involved working for the decorations and furnishings. Particularly, the restored paintings was made from 1750 to 1752, then was restored from 1868 to 1900 (sails of the central dome).
The paper aims to illustrate the methodology applied in each restoration's phase (structural and technological for the roofs and the bell tower; fixing, consolidation and restoration for the frescoes's painted) by survey drawings and graphs for analysis and restoration, and still by numerous photographs taken before, during and after the work on site. During the restoration yard, is operated taking into account the best practices for the conservation of historic buildings, choosing the most appropriate solutions at every stage of the restoration.

Keywords: frescoes, parish Church, baroque, restoration.

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1. The historical events of the building
The church of the Virgin Mary Assumed is located in the historic center of town and was designed by architect Francesco Gallo.
In the eleventh and twelfth centuries in the municipal area there was a building of Christian worship dedicated to St. Peter the Apostle, the present church of St. Peter located along the road to Clavesana.
In the thirteenth century, inside the fortified city grew up near of the castle, is built on the current site, the Church of Santa Maria, new religious building that will take the time function of the primary site of worship. The building will undergo in the course of the centuries, several renovations. In the second

half of the seventeenth century, the church will be renewed on a design by ducal architect Giovenale Boetto, who arrived in Carrù through prestigious contacts and at the request of Conti Costa of the Trinity, lords of Carrù. The Boetto's yard realizes the arrangement of the bell tower, the choir and the facade of the church by calling workers from Lugano and Giuseppe Nuvolone for the painting.
Between the late seventeenth and early eighteenth century the frequent occasions of war causing damage to the building and lead to the thought of building a new building for worship.



Fig. 1: View interior and external of the Church

The parish seat is temporarily transferred in the church of San Giovanni decollato (or Battuti Neri) in the current Via Roma; the old church was demolished, as well as some houses and the old rectory, resulting in a much larger area on which to build the new church.
Director of this great work is the Archpriest Carlo Tommaso Badino which entrusts the project to the young architect-engineer Francesco Gallo (1672-1750), an expert on military fortifications and engaged, in those years, in the work of the church of Frabosa Soprana.
The opening of the construction site of the new religious building begins 20 August 1703 with the demolition of the existing church. In the construction are used bricks and stones reclaimed from old buildings demolished and the materials arising from the demolition of part of the walls of the country.
Francesco Gallo will oversee the work of the construction of the parish church from 1704 to 1708. After a short break in 1706 as a result of the war between the French and the Piedmontese, construction proceeded quickly in relation to the budget of the parish and the site was visited several times by Gallo. In 1708 he finished the tower, in 1715 the vault of the choir and a few months after the vault of the nave and the sacristy was built in the year following. In the summer of 1718 the masonry work had been completed and the pyramids crowning the pediment of the facade already positioned.
The facade of the parish church of Carrù is especially beautiful, perhaps the most noble and rigorous among those ascribed to Francesco Gallo. The primary geometric pattern - parastades, tympanum, hoof - is very obvious, the decorations are sketchy so as to blend in with the background, there are only a few elements emerging with force: the portal with the huge studded door, a rectangular window with a vigorous frame, the four monolithic stone obelisks. It is characterized of two superimposed orders of pilaster strips, has a considerable vertical development highlighted by its obelisks with ball.
Inside, the church has a Greek cross plan, prolonged in the central arm towards the choir, with a regular arrangement of the elements and the absolute absence of the curved line. The plant, with the presbytery covered by a vault at the basin, is formed by the succession of three rectangular spaces, each dilated by secondary chapels with a decoration of greater importance to center near the two side altars.
The decoration of the interior was entrusted, for the stucco, to Cipriano Beltramelli, active from 1725 to 1727 and, for the frescoes, to quadraturist D'Alemanni and to figurist Milocco which end the work in 1751.

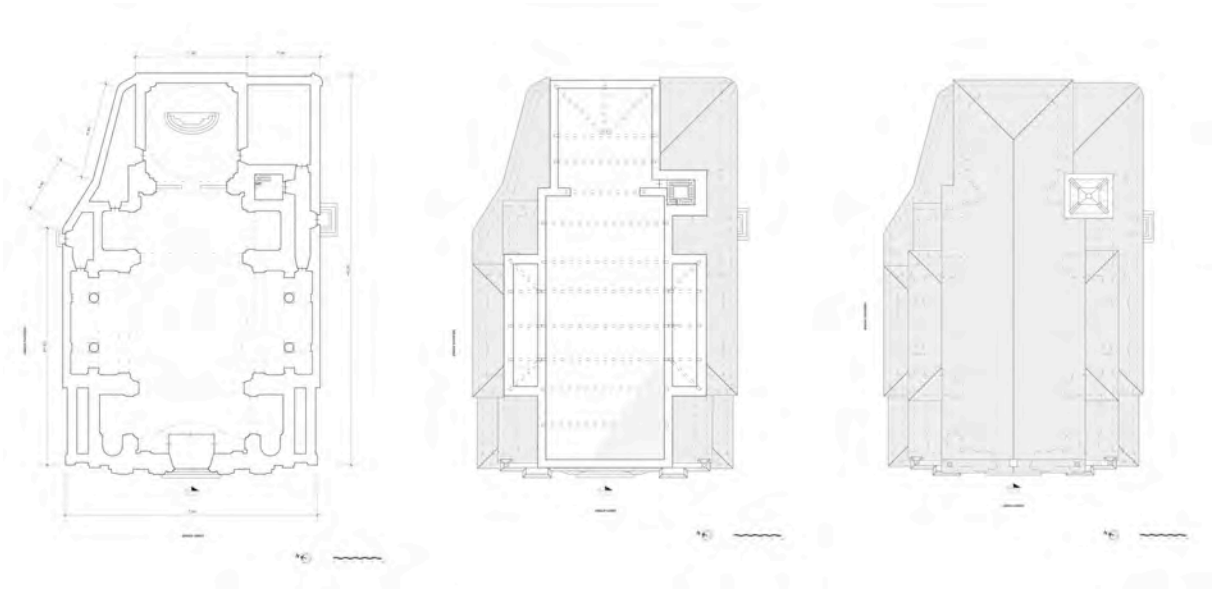

Fig. 2: Plant ground floor, plant of the attic and plant roof of the building. Survey drawings of the author

The first significant interventions of interior design relate to the two side chapels, to the right the altar of the Souls and left the altar of the Madonna of the Rosary. The task of the construction was given by the homonymous companies that have turned to Francesco Gallo for the design of the two twin altars and the marble worker Torre for execution. The work beginning in 1718 and ending in 1720. Between 1725 and 1727 the stucco worker Cipriano Beltramelli insert the elegant Corinthian capitals to crown of the various pilasters and columns, draws folders in stucco above the arches of the side chapels and painted faux marble the pilaster strips.
The archpriest Badino shall commission in 1729 at his own expense the scenographic major altar. It will be realized from the marble worker Giacomo Antonio Ponsanelli (1654-1735). The magnificent baroque canteen, enriched with angels and cherubs, is made with precious polychrome marbles that expand to form the geometric design of the floor in the presbytery.
The four altars of minor lateral chapels have been extensively reworked during the nineteenth and twentieth centuries, keeping only scattered fragments of the original work of the eighteenth century. The first altar on the left is dedicated to St. Catherine; facing to the right there is an altar dedicated to the Annunciation of the Virgin. Looking at the high altar, on either side of the presbytery are placed, left the chapel of St. Anthony Abate and to the right the chapel of St. Stephen.



Fig. 3: Vault of the presbytery and the first span.

The company of the SS. Sacramento has commissioned the magnificent fresco on the back wall of the presbytery and entrusts the execution to the prestigious quadraturist Giuseppe Dallamano who worked there from 1750 to 1751. During this time in the church was inaugurated the short season of the great baroque decoration, which culminated with speeches by Michael Antonio Milocco around the sixties of the century. The two important artists perform works of decided character, enriching the Church of quadratures and representations by the bright tones and explicit visual communication.
GiuseppeDallamano realizes the great stage machine of the back wall where columns, smoking censers and a sumptuous four-poster frame a spectacular triumph of the Eucharist, which was to stand out a lot more before inserting the big picture of the Assumption - a copy of the famous Assumption of Tiziano - which is covered in part (behind the canvas there was a large window which flooded the sanctuary).



Fig. 4: The bell before and after restoration.

Michael Antonio Milocco, aided by quadraturist Barelli in 1759 painted the dome of the presbytery: musical angels and joyful cherubs supporting floral garlands and glorify the name of Mary and the Eucharistic symbol. In the presbytery Milocco also works to the great fresco of the Last Supper, interesting version of a subject celebrated by many artists.
Other interventions of Milocco and Barelli are made in the 1761-62. Milocco realizes the four panels with joyful cherubs and floral inserts, painted on the serliane of the chapels of the Rosary and the Souls and grisaille scenes that narrate episodes from the life of the Virgin.
In the nineteenth century and then again in the twentieth century many surgeries are performed inside the church. The four smaller chapels are decorated with elements of minor tone with respect to the sign of the previous season Baroque. In 1839, on the back wall behind the altar is placed the large painting of the Assumption, the work performed by the carrucese Cesare Vicino, enlarged copy of the famous Assumption by Tiziano preserved in the church of the Frari in Venice.
In 1868 Turin painters Luigi Hartman, Paolo Emilio Morgari and Molineris involved in the large central dome: a starry mantle is in part raised on a vision of paradise where the Virgin on the throne, dominated by the SS. Trinity welcomes gifts of Carrù that, in female form, it offers products of the earth among a swirl of angels, saints and jubilant cherubs. In the four spandrels of the great vault the Turin painter Nicola Antonio Fava painted the Evangelists in 1900.
Above the walnut compass in the front door (carved by carrucese Giuliano Bernardo in the late nineteenth century), it was realized the balcony for the organ and choir, in carved and painted wood built around 1825 and decorated by renowned painter monregalese Francesco Toscano. In the twentieth century is also made in the presbytery of the Nativity, painted by Delle Coste, which covers a damaged painting of the same subject of Milocco.

The Count Filippo Nicolis Robilant, architect and designer of the Court, makes the design of refined walnut furniture that fully cover the walls of the sacristy, including the precious polychrome marble sink.



Fig. 5: Stone obelisks before and after restoration.

2. The restoration of the roof and bell tower

Work on the project of restoration and conservation have been divided into two phases: the first involved the roof of the building while the second phase focused on the paintings of the vault inside the church.

Externally, the building was in a state of preservation medium, but a thorough analysis of the parts that compose the structure noted a marked deterioration of the roof. During the years were not carried out the necessary maintenance work due to the considerable height of the building and the complex geometry of the roof; in addition the constant presence of birds, has increased the state of decay of the roof covering. The slope of the roof pitches, weathering and the incursions of birds have caused the displacement and disruption of brick tiles of the roof and then infiltration of rainwater that caused the exfoliation of the paintings and decorations of the vault internal church.

The surgery has restored the roof covering trying to remedy, most definitely possible to continued penetration of the roof which produced in substantial damage to the vault below. The works have provided for the insertion, between the small warping of the wooden roof and the mantle of roof tiles, a wooden plank on which were laid slabs sottocoppo waterproof. Bituminous sheets from natural fibers with corrugated profile for the accommodation of roof tiles to cover, have produced a ventilated and fully waterproof cover and protect the attic from the infiltration. It was later rearranged the roof covering in clay tiles and have been replaced gutters, downspouts and flashings.



Fig. 6: View of the roof from the attic before and during work.

The mounting of the external scaffolding has been extended to the summit of the tower and allowed the thorough inspection of the facade of the church beyond the walls and the roof of the tower. Have been restored cornices and pilaster strips of the facade as well as the stability of the monolithic stone obelisks. Work on the bell tower were: the restoration of the plaster of the walls that had serious problems of detachment, the maintenance the crown at the base of the clock and the accommodation of the cusp coverage.

3. The restoration of the internal vaults painted.

The second phase of the work - which began after the completion of the work outside - covered the interior ceiling of the building, that is, the painted surface of the entire vault of the nave. The area of the presbytery is surmounted by a dome lowered, supported by four corner pendentives interspersed with from one another by four arches paintings. The nave is divided into three bays: two smaller, the first and the third, defined on the side walls by small chapels with vault lower than the vault of the aisle; the central span, the greater is covered by another great lowered dome resting on four spandrels interspersed with arches paintings. These arcs define the two narrow and high vaulted ceilings of the chapels more; mid-wall of the chapel, through a series of columns in stucco, there is still another niche in the wall decorated with two beautiful marble altars.
The paintings that adorn the plastered surface of the vault are mainly decorative: swirls, spirals, smashed architectural, fake moldings and cartouches monochrome along with simple floral patterns made mainly in the eighteenth century by the painter Milocco assisted by quadraturist Barelli. They operate throughout the church with an impressive decorative project that began in 1759 in the dome of the presbytery and in the central nave continues in 1761-1762.



Fig. 7: The arches of the first and third span before restoration.

At the center of the vaults and domes, on portions of the side walls and the plumes are depicted holy personages, drawn from the Old and New Testament: in the spandrels above the presbytery can be recognized the four Prophets and in the spandrels of the dome are depicted the four Evangelists. At the center of the great dome is represented the Assumption of the Virgin Mary, to whom the church is dedicated, with the Trinity among a swirl of angels, saints and jubilant cherubs supporting a faux canopy decorated like a starry sky. On the side wall portions of the presbytery and nave, placed above the cornice, are depicted the Theological Virtues and the Cardinals, while on the back wall and on the arch that separates the presbytery from the first span are depicted four angels monochrome. These figures and fake architecture were much altered and repainted in the nineteenth century. In the vaults of the first and third span are depicted personifications of the Church with a cherubs that supports a scroll containing an inscription. In the dome of the presbytery are depicted numerous musical angels and jubilant cherubs that support floral garlands and glorify the name of Mary and the Eucharistic symbol.
The vault appears to be very lively and decorated, the colors are brilliant and rich overtones; there is an evident lack of homogeneity of conservation between the various parts of the painting due to the moisture infiltration from the roof and because of the likely actions of pictorial and chromatic reorganization difficult to identify. The paintings are of excellent quality, rich in detail and color, with a construction volumetric sought through a skilful use of light sources and light in general: it comes from the two windows and illuminates uniformly the decorations on the walls, while the sails and the vault they are illuminated by the central rays of divine light. The light eighteenth century is very sought and has a great yield and volumetric perspective because it comes from above and stresses the

importance of the scene represented. Before the restoration, the vault it appeared at flattened and modified by additions pictorial present throughout the decorations.
Object of the restoration was the whole surface of the roof, from the presbytery to counterfaçade to the height of the majestic faux marble and stucco cornice and the back wall in its entirety.


Fig. 8: The underarch before and after restoration.

The vault of the presbytery. The representation of the dome is not original of the eighteenth century, but is presented repainted in the nineteenth century with later interventions in the twentieth century.
The techniques used for the decoration of the eighteenth century is a fresco with dry finishing and lime. The plaster that was used as the support is formed from lime mortar and rougher, coarse and greyish river sand. The definition of the figures was performed with a preparatory drawing made with the carry from cardboard that sometimes, backlit or raking light, we see transpire from the nineteenth-century paintings. The techniques used during the nineteenth century is of poor quality compared to the frescoes of the eighteenth century, as well as the colors used - tempera with pigments from purple tones more subdued compared to the colors of the eighteenth-century paintings. The paintings are taken up in part in the twentieth century with the introduction of cherubs and angels made of fatty and oily color pigments very vivid.
The paintings were in fairly good condition. The paint film was very dusty and of low resistance, the color appeared greyish and there were gaps in some points with loss of the painting, lifting of the color and plaster and were present surface sulfation due to infiltration of rainwater from the roof.


Fig. 9: Chapel on the left. Particular the restoration of the frescoes and the degradation of the vault.

The restoration consisted in the total cleaning of the vault, without the elimination of the layers of repainting, but keeping the succession of the interventions and trying to connect them and fuse them chromatically to each other. Has been totally removed the nineteenth-century painting exclusively from the cornice of the vault that it was incomplete and dissonant with the remaining portion adjacent. Were also removed some tweaks disfiguring present on the faces of some of the angels.



Fig. 10: Chapel right. Cleaning work of the painted surface. Details

Central dome. The decoration of the dome depicting the Assumption of the Virgin Mary surrounded by a mantle decorated like a starry sky. The painting is not the original of the eighteenth century, but it is repainted in the nineteenth century with later alterations in the twentieth century. This can be seen from the engravings on the plaster, visible with oblique light, and from falls and scrapes of color that reveal other colors from richer tones and lighter typical of the eighteenth-century painting. The playing technique of the eighteenth-century paintings is a fresco with dry finishing and lime. The support of original paintings is a plaster made from a very compact mortar of lime and river sand rough, coarse grained and greyish. The definition of the representations was performed with a preparatory drawing by carrying the design from cardboard that sometimes, against the light, you see transpire from repainting the nineteenth century. The techniques of the nineteenth century is of poor quality compared to the previous one, the colors are tempera and the pigments are purple tones and duller than previous ones. The starry mantle ends with two strips of linen cloth in triangular shape, painted with the same color blue and fixed to the wall with large nails original nineteenth century. The paintings will be remodeled in the twentieth century with the inclusion of angels and other figures on blue drapery.
The decoration was in good condition. The work carried out in the nineteenth century were made with color tempera lean, very dark and dirty from dust and smoke deposited on the surface. The additions of the twentieth century have been made with colors fats that have undergone detachments, were also present salt efflorescence due to water leaks from the roof.



Fig. 11: Restoration of an under arch. Details.

The restoration began with a thorough consolidation of the paint film which was detached from the substrate in flakes of color. It 'was then totally clean the vault without eliminating the layers of paint, but keeping the succession of interventions chromatically fusing them to each other.



Fig. 12: Presbytery. Detail of the frescoes of the vault before and after restoration.

Similarly to what has been described here was through the vault and on the side walls of the vault of the first and the third bay of the nave, on the back wall of the presbytery, on the counterfaçade and in the vaults of the side chapels.
The project also involved the installation of lighting that has been totally redesigned in order to enhance and give prominence to the restoration work carried out. The next few years were made restoration to the wooden works present in the church: the eighteenth-century furniture in the sacristy custom-designed by the architect Filippo Nicolis di Robilant, the choir and the compass input.
The restoration project of the Church of the Assumption of the Virgin Mary, which was developed from 2008 to 2010has involved different parts of the building, outside - the roof, the roof covering, the bell tower - internal - internal painted vaults, wooden works. All these interventions were carried out by implementing the best practices for the preservation of historic buildings, choosing the most appropriate solutions at every stage of the restoration. And every intervention has contributed to the larger project of recovering a complex structure, the center of civil and religious community of the city.



Fig. 13: Detail of the frescoes of the vault of the presbytery, before and after restoration

Bibliographical References

[1] VADDA, Cesare, *Monografia di Carrù,* Dogliani, 1902.

[2] CARBONERI, Nino, *L'architetto Francesco Gallo,* Società Piemontese di Archeologia e di Belle Arti, Borgo San Dalmazzo, 1954, vol. II.

[3] GRISERI, Andreina, *Le metamorfosi del Barocco,* Torino, Ed. Einaudi, 1967.

[4] ABRATE, Alessandro, (a cura di), *Il Castello di Carrù,* Farigliano, 1989.

[5] COMOLI, Vera, PALMUCCI, Laura, (a cura di), *Francesco Gallo (1672-1750). Un architetto ingegnere tra stato e provincia,* Studi Monregalesi, anno XI, n. 1, 2004.

[6] MAMINO, Lorenzo, PALMUCCI, Laura, (a cura di), *La Chiesa Parrocchiale della B.V. Assunta di Carrù. Tre secoli di storia (1703-2003),* Torino, Ed. Celid, 2000.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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GIUSEPPE AGNELLO "HISTORIC ARCHITECTURE": THE PROTECTION AND SAFEGUARD OF CULTURAL HERITAGE IN AESTERN SICILY

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Abstract
The relation between landscape and historic centre has been widely discussed in years following the Second World War. The problems of reconstruction and urban planning pushed the protagonists of Italian culture to wonder about the relation between new and old, keeping and expansion, reconstruction and modernizing. In these years, civil organisations and association play a very important role in national debate. The Italian Touring Club (TCI) was active in the moral and material reconstruction of the country. The tourism seem to be the most suitable sector to catalyse the hope of a return to an atmosphere of peace and development. Through its official magazine "Le vie d'italia", the Club fought important battles for the protection of cultural heritage. In Syracuse, Giuseppe Agnello was one of the most important protagonist of this debate. Often defined as a "historic Architecture", in reference to a particular inclination that led him to investigate the native land monuments from the III century to the XVII century. He had a depth and mature understanding of the need of knowing and protecting the local historical, cultural and natural heritage. In two reportage write for "Le vie d'Italia", Agnello denounced the building abuses, the dangers for the local monument and the massive destruction of the coastal landscape.

Keywords: Giuseppe Agnello, "Le vie d'Italia", Syracuse, Landscape, Historic Centre, Urban Planning, Safeguard Cultural Heritage.

1. Italy of reconstruction: the preservation of historic centres and landscape as town planning matter

The landscape has been considered among the goods deserving preservation, on the basis of its cultural and naturalistic values for several decades. An historic-critical approach that, by crossing the limits of the exclusively aesthetic, naturalistic or cultural exceptional nature, extends itself to a scheme of relations and identity resources, whose comprehension demands a deep knowledge of the never-ending interdependences among environmental frames, settling dynamics, local society lifestyles, and cultural and symbolic values linked to perception [1].
Nowadays, the indivisibility of the relation landscape/historic centre is clear. However, this very close relation has been very slow in establishing itself within the usual town planning procedure.
In the years immediately following the World War II, that were characterized by the problems of reconstruction, the Italian cultural world went back to wonder about the relation between new and old, keeping and expansion, reconstruction and modernizing. Architect and town planner culture foregrounds the building of contemporary cities, often by prefiguring a brand-new urban scenery, in which few selected and isolated monuments rise to the role of witnesses of the past.
This topic had already been discussed heavily at international level during the eighth CIAM Congress (United Kingdom, Hoddesdon1951); it would been the main theme during all the '50s and '60s even in

Italy. Here, the uncontrolled building activity involves the historical centers of the city, as well as, the suburban areas. The former were affected by the Reconstruction Plans, which not involved with the bonds enforced by the Town Planning Law of 1942 (which governs “the trim and the increase in building’s towns and usually the urban development in the territory”), just operated within pre-existing alignments. While, the latter, without a General City Plan, were intended a completely free from rules expansion, often assisted by proper economic actions [2].
Exactly in those years, lots of newspapers and specialized magazines pages (such as “Il Mondo”, “Casabella”, “Urbanistica”, “Restauro”, “La critica d’arte”) came alive for all the interventions on town planning problems with reference to city centres and natural beauties [3].
Architects, historians, critics, town planners and intellectuals quarrelled animatedly, firing up the national debate. Protagonists of this *querelle* were: Ernesto Nathan Rogers, Roberto Pane, Cesare Brandi, Leonardo Benevolo, Edoardo Detti, Luigi Piccinato, Gillo Dorfless e Renzo Men. All this, while in the Italian cities, as a result of delays of regulations and speculative interests, destructions continued and the expansion kept up uncontrolled towards areas once with farming vocation [4].
In this atmosphere, an important moment of new methodological and regulatory awareness is represented by the writing of “Carta di Gubbio” (Gubbio Chart, TN), *Final Declaration* adopted at the end of the debate arose from the National Conference “Preservation and restoration of historical and artistic centers" (Gubbio, 1960), which was promoted by Giovanni Astengo. The chart, stating the national importance of the issue, pointed out the fundamental principles of safeguard and restoration of historic centres. It reiterated also: the urgent need of an identification and classification of the areas to be safeguarded and restored; the introduction into the General City Plans (because “basis to the development of the modern city itself”); the immediate disposition of safeguard bonds; the halt to every building activity; the arrangement of the needed Detailed Plans of Conservative Renovation. Moreover, the Chart «refuses the criteria of reconstruction and stylistic additions, of mimetic rebuilding, of the demolition of buildings, also the unpretentious ones. It does not accept rarefaction of the texture, the isolation of monuments, nor new insertions in ancient environments» [5]. A year later, the same promoters of the conference will give life to the National Association for the historical and artistic centers (ANCSA) [6].
If the recovering of historic centres and their integration within the General City Plans have represented one of the main issue in the national debate, a special credit goes to ceaseless battles carried out by cultural association: ANCSA, Italia Nostra, Fondo Nazionale per la Natura, Istituto Nazionale di Urbanistica.
In those years, the historical campaigns of Antonio Cederna and Umberto Zanotti-Bianchi with the Association "Italia Nostra" have been crucial to prevent devastating demolition of Rome historic centers. The action of Renatuccio Bianchi-Bandinelli and Luigi Piccinato have preserved the historic center of Siena with its natural slopes. Very important ware the plans, respectively, of Edoardo Detti and Giuseppe Venuti for the defense of the hills of Florence and Bologna, and the plan of Assisi by Giovanni Astengo [7].
All this Institutions and people had the asset of debating the problems of historic centres and landscapes in their multiple theoretic-methodological and technical-administrative aspects. They had busily acted, through actions of denunciation, awareness raising and promotion, for the identification of an intervention guideline that would be able to combine the socio-economic needs and the naturalistic-ecological ones [8].

2. The Italian Touring Club: the role of Tourism in the years after Second World War

The ancients used to talk about *natura naturans* and *natura naturata* with an impressive exactness of perception and expression. In 1985, Carlo Giulio Argan stated: «the so told beauty of nature» should also be read as «the product of intelligence, thinking and human work in the course of various millennia; a huge book, a sum in which are written millennia of history» [9]. Such awareness had widely been revealed within the fundamental principles of the biggest and prestigious Italian tourism association, the Italian Touring Club (TCI). Federico Johnson and Luigi Bertarelli founded it the 8th November 1894, together with some enterprising lovers of trips, knowledge, and progress [10]. The Constitution asserted that the goal of the association is to pursue the «development of tourism, also meant as mean of knowledge of countries and cultures, of mutual comprehension, and respect among people». The main action are: «2). to exert oneself for preserve landscapes, distinctive natural environments, the geology, flora and fauna, the single monument and works of art in general, as well as urban complexes of remarkable historic, artistic, and ethnologic importance; to facilitate knowledge [...] about the environmental and historic heritage and its touristic fruition; 3). to exert oneself to solve every problem linked to tourism, by helping the spreading of a more qualified touristic culture and entrepreneurship also regarding the city planning issues» [11].

The ability of tourism to represent an effective tool of mutual knowledge among people resurfaces during the debate about the recovery of tourism industry, which grew busy since the first few month after the end of the World War II. As a matter of fact, also in Italy, tourism seem to be the most suitable sector to catalyse the hope of those who foretold a return to a climate of international relationships dictated by peace and tolerance. The importance to share and promote the authentic national identity revival as world heritage was declared during the congress of Northern Italy Provincial Tourist Boards that took place in November 1945. I was the first confrontation point among the sector operators after the end of the war [12].
These applications were kept for the following years too, taking the aspect linked to the natural-environmental heritage preservation and landscape safeguard, as well as the more and more emergent phenomena of uncontrolled urbanization and building, for the maintenance of "urban decorum" and the city aesthetics. In the following decades, the considerations about the effect of mass tourism on the collective identity had progressively imposed themselves. In the '60s, at global level, a tourist model emerged, and this, in a material point of view, turned into an overbuilding of touristic places, able to provide standardized services. In meanwhile, the town planning of tourism places has seen the speeding up of transformation processes into action in the previous decades, even at the risk of compromise the original environmental value[13] .
In the years after World War II, the TCI committed itself to rebuild the country morally and materially, faithful to its principles, it carried on its awakening campaign, involving Ministries, bodies and local governments. It got ahead a constant campaign for the reopening of Italian museums, and it especially engaged in the fight for the tourism development and against the tourism-invasion [14].
During the '50s, also the divulging activity restarted with a new ardour: guides map-making, and official magazines: "Le vie d'Italia" ("Routes of Italy"). The first number of the magazine was released in 1917, supervised by Luigi Bertarelli. The publishing went on until 1967; it was stopped only during World War II. In 1919, the magazine became the ENIT (state-controlled body of tourism studies and promotion) official organ. For the first time, with the establishment of this body, the Italian State recognized the importance of tourism in the life of the country. For the promotion of this Vie d'Italia were created during the war.

3. Malfunctions and wounds of Syracuse: the fight o fan "Architecture Historian"

The collaboration between Giuseppe Agnello (Canicattini Bagni 5 February 1899 – Syracuse 28 September 1976)[15] and Italian Touring Club monthly magazine "Le vie d'Italia" begun in 1928 with an article dedicated to *Un monumento millenario che risorge. Il Duomo di Siracusa già tempio di Athena* (*A reviving millenary monument. The Cathedral of Syracuse once temple of Athena*) [16]. In the occasion of the reopening of the Cathedral, after the end of restoration, the 14th January 1927, the scholar attended the official conference with a speech that he repurposed in the mentioned article.
In those years, Syracuse was living a climate of artistic and cultural interesting fervor, arouse around the famous figure of the archaeologist Paolo Orsi. He was sent to Syracuse in 1890 as Supervisor of Excavations and Museums; he was a scholar with a positivist education, whose activity, diverging from the antique tradition, put on a definitely innovative nature [17]. Agnello shared the same education with Orsi. Both they went to the Istituto di Studi Superiori di Firenze, a well-known school to which trace back the structure of the historicist-philological studies. Agnello taken this approach as hinge of his scientific activity, it is clearly recognizable in the whole methodological structure [18]. These general lines found the bases in the primary importance given to the historic document, to the discovery of the work, to its recognition, to the explanation, always accompanied by a detailed archive and source research that he considered unavoidable to the historic-philological investigation.

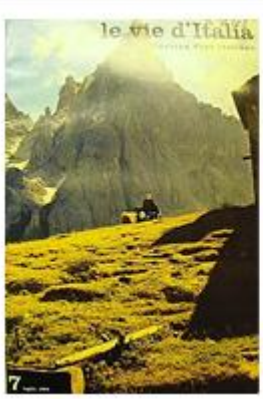





Fig. 1: Magazine cover. "Le vie d'Italia", XIX 1963.
Fig. 2: Magazine cover. "Le vie d'Italia", XX 1964.
Fig. 3: Giuseppe Agnello.

The filiation of Agnello's studies was shown up more than once, coming from those themes, which had gained the interest of his master Paolo Orsi. The first and fundamental studies on Middle Ages and its architecture took shape under Orsi's protection and pushing. In 1926 Agnello published *Siracusa Medievale. Monumenti inediti* (*Medieval Syracuse. monuments unknown*). It would obtain the appreciation of important personalities such as Benedetto Croce and Pietro Toesca. In 1935 it was published *L'architettura sveva in Sicilia* (*The Swebian architecture in Sicily*), within the "Collezione Meridionale" ("Southern Collection"), thanks to the good offices of the director himself Umberto Zanotti-Bianco. This volume was already prepared in 1931. It won the award from the Accademia d'Italia. Inside the series "Collezione Meridionale" in 1942 was published *P. Orsi Sicilia bizantina* (*P. Orsi. Byzantine Sicily*), in 1952 *L'architettura bizantina in Sicilia* (*The Byzantine architecture in Sicily*), and in 1961 *L'architettura civile e religiosa in Sicilia nell'età sveva* (*The civil and religious architecture in Sicily in Swabian age*). The interest of the scholar was not limited just to the investigation of Middle Ages. An important core of researches would involve the Renaissance and *Baroque* Syracuse: again, on "Collezione Meridionale" was published *L'architettura aragonese-catalana in Siracusa* (*The Catalan-Aragonese architecture in Syracuse*), in 1959 was released the essay dedicate to *I Vermexio architetti ispano-siculi del XVII* (*The Vermexio Spanish-Sicilian architects of the XVII*) [19]. In collaboration with his son Santi Luigi, *Siracusa Barocca* (*Syracuse Baroque*) [20] was edited in 1961 and, shortly after, in 1964, *Siracusa nel Medioevo e nel Rinascimento* (*Syracuse in the Middle Ages and the Renaissance*) [21] would be released. Besides, Agnello – who held the chair of Christian archaeology at the University of Catania – gave a remarkable contribution to the study of the history of art within the very first Christianity, by bringing to light the early Christian age, until then little known and investigated. Syracuse's hypogeum area is second only to the Rome one, and its maximum expression is in the area of St. Lucia, St. Giuseppe in St. Marziano, and Vigna Cassia catacombs [22].
During his career as scholar and teacher, Agnello had fully embodied that ideal, inhering in Toesca, for which to train to understand the work of art means to teach how to "see". Ability considered both intellectual and physiological, of the eye and of the mind. This deep sense of "seeing" was already theorised by Adolfo Venturi and become fixed in the famous formula "to see and to see again", it had been introjected in Croce's way also by Agnello [23]. Beyond the different periodization, the relation between the scholar and the monument, always accurate and thorough, firstly took place through recourse to a direct investigation on the field, based strategically on *Feldforschung* (investigation on the field, analysis live of monuments throughout photos and surveys). In these terms, he showed to already have a scientific maturity such that included both theory and the science of building, how Gustavo Giannoni, a Camillo Boito follower, would reassert it [24].
Therefore, the primary document identified with the work of art itself, strictly studied and well known. From this belief, it took shape the other fundamental aspect that characterised most of Agnello's activity; it was focused on the preservation and the safeguard of the goods and of their environment. Since 1948, the scholar committed in a stubborn fight in favour of the defence and the safeguard of monumental and landscape goods, of which he powerless was witnessing the growing decay. This new campaign, carried on through the pages of National and regional newspapers and supported by researches and scientific studies, gave him the appointment as president of Commission for the Safeguard of Natural Beauty in Syracuse Province, which he held from 1950 until 1974. The 18th July 1969 the Syracuse section of "Italia Nostra" was set up, in accordance with the model of what Zanotti-Bianco was doing in Rome.





Fig. 4: View of Syracuse town from Ortigia Island.
Fig. 5: Map of Syracuse ancient and roman (*Pentapolis*). By Charles Rollin (XVII-XVIII).

It was created thanks to the will of Giuseppe Agnello and the marquis Gioacchino Gargallo from Castel Lentini. This was created with the exact intention to actively work for the control of territory and for the safeguard Environmental and Cultural Heritage [25].
Also in Archimedes' city, the town planning events, started from the '50s, were characterised by the devastation of cultural and historic resources, by the neglect of the historic centre, by the uncontrolled and often illegal growth of suburbs and peri-urban areas. If the years just after the World War II mainly saw a city still concentrated within the boundaries of the old *Naos* of Ortigia, in the '60s, in the name of a demographic rise that would soon reduce, the city changed completely [26]. That process of expansion, started in the first half of XVIII century, sped up with a frantic rhythm. It was characterised by the massive occupation of all those areas that made "*Urbem Syracusas maximam esse Graecorum, pulcherrimamque omnium saepe audisti*" [27] already in classical age. The districts of the old *Pentapolis* of classical age: *Acradina*, *Tica*, *Neapolis* and *Epipoli*, all characterised by hill grounds, witnesses and keepers of monumental remains, were assaulted by agglomerate of concrete, incorporating the area of necropolis and the Monumental Archaeological Park of the Neapolis with the Greek Theatre, the Roman Amphitheatre, Ierone's Altar and the Latomias. Everything was surrounded, almost submerged and concealed by building.
Already in 1958, Cesare Brandi threw himself against this attack to the monumental heritage from the pages of the "Corriere della Sera": «with how much the foolish destructions in 1885, the buildings of the Fascist period, and the very recent ones had done to Syracuse, it is not really possible to hope in a miracle [...] the situation is so compromised, for some crucial areas, that worse would not be possible. However, it is essential to check this, and that the barricade of buildings on the edge of the archaeological area would not move forward anymore» [28].
If the focus on the preservation of archaeological sites was somehow primary, a similar idea could not widen also to the areas of early Christian catacombs that, in those years, Agnello reported in the light and explained. Syracuse, in fact, has perhaps the most important complex of late antique tombs after Rome. Among these it is particularly important the group of the Catacombs which are arranged from north-west to southeast, according to an internal arc taking up again the one formed by Latomies. The localization of these cemeterial areas is very interesting with regard to the planning history of the city in late imperial period: in fact, they are inserted inside of *Neapolis*, along the edges of *Acradina*. It is a clear indication of the narrowing of the inhabited area. The catacombs, use by the early III century AD, are preceded by a necropolis dating back to the first and middle imperial age. This confirms, with great emphasis, the news reported by Strabo (Amasea, Pontus, before 60 BC -20 AD approx) in the VI book of his monumental *Geography* (2, 4). In this passage the Greek historian and geographer explain like the city, almost abandoned and partially destroyed during the war between Octavian and Sextus Pompey, was largely rebuilt under the reign of Augustus, but just limited to the *Acradina* [29].
From the second half of twentieth century, after more than eighteen centuries, the city returns to expand on the mainland towards uptown of ancient *Pentapolis*. The building occupancy came to compromise irreparably the green zone that stretched from the Forum of Syracuse to the Temenite Hill, reaching Dionysian Walls that culminate in the Euryalus Castle, an imposing military area built by the tyrant Dionysius between 402 and 397 BC. It faded the confident hope to protect the area, between the complex of Neapolis and the Capuchin catacombs, expressed by the Superintendent of Antiquities and distinguished archaeologist, Luigi Bernabò Brea.





Fig. 6: Necropolis. *Neapolis* Archeological Park. Syracuse
Fig. 7: Lower area of the *Neapolis* Archeological Park. Syracuse
Fig. 8: Roman Amphitheatre. *Neapolis* Archeological Park. Syracuse

In an article published in the newspaper "Corriere di Sicilia" in 1947, he stated: «tourism was until a few years ago, and we hope it will return to be in a near future, one of the major resources, perhaps the major economic resource of Syracuse. The care of its beauty, the respect and the enhancement of its monuments are thus not just a luxury for Syracuse or the fulfillment of a duty to the culture, but an intimate breath of life and well-being [...]. It is now an area above all to protect and enhance from the expansion of the modern city [...]. This is what we would like to define the major tourist artery of Ancient Syracuse» [30].
With respect to this expansion of the city on the mainland, uncontrolled and unaware of the values of archaeological, historical and environmental heritage, we were witnessing the depopulation of the historic center, Ortigia: an island within an island. The tradition handed down to us by Strabo tells that the first Corinthian settlers led by the oecist Archie came here around 734 BC. The Temple of Athena with its Doric columns still stands on the highest and better visible point of the island, now part of the Byzantine basilica that is frame by the exquisite Baroque façade.
The proposal made in '52s by Agnello himself, as Chairman of the Commission for Natural Beauties, to put the landscape restrictions on Ortigia was worth nothing [31]. The regulation, amid obstacles and bureaucratic delays came, in fact, only in 1969, when by then the most serious damages were done: «Now more than ever speculative needs were a burden, with such clear threat, to the remaining heritage, in defense of which rather than the sanction of the laws of the state should stand the open condemnation and rebellion of the citizens themselves» [32]. This is the intimate reason with which Agnello returned, after more than thirty years, to write on “Le vie d’Italia”. In 1963, with a careful report he denounced *The malfunctions of Syracuse*; malfunctions that just a year later became symbolically *The wounds of Syracuse* [33].
Both the articles complained the stages of urban transformation, the state of destruction and of caging in which the most outstanding city monuments were forced. Agnello explained the failures of the institutions often unable, more often willfully obstinate to postpone the approval of the General City Plan (GCP), for which in 1954 was announced a public competition. A young architect won it, Vincenzo Cabianca. The plan was approved twenty years later because of several vicissitudes and different relationships. The GCP classified all Ortigia "special conservative Area, "approving the bond of "inalterability for everything that is already existing" [34].
In the period between 1952 and 1969, the worst damages to Ortigia urban heritage took place. Dates back to 1947, the first official act of "the beginning of the invasion”. It was the alienation of two of the major squares of Ortigia: «the old town had very few squares: so few that, for counting them the fingers of one hand were too many. Two – Luigi Greco Cassia square and the castle square – had disappeared. In place of the first, which was also bordered by the sea, there is now a pretentious modern building, which, with difficulty, it was possible to obtain a reduction of the height. The other, very large, on the tip of Ortigia, which housed the superb Federico II castle, was spoiled by inserting a senseless building agglomeration that has eclipsed the view of the sea».
It is clear from reading the two articles the scholar’s belief that the alleged work of restoration of the historic center was too often interpreted by local authorities as an opportunity to alter and destroy, using for their aim the pretext of forced demolitions in order to allow freedom of action to speculators.





Fig. 9: Square Luigi Greco Cassia before 1950. Ortigia
Fig. 10: Square Luigi Greco Cassia with INAIL building. Ortigia

In the two reportage for the TCI newspaper Agnello writes about the case of the "splendid concrete box" cleverly inserted between the Baroque Church of St. Giuseppe and the theater Damiani, the bank building built close to the "splendid ruins of *Apollonion*" the oldest Doric temple in Sicily. He mentions

the project for “a six and more floors barrak" that would occlude the fourteenth-century Palazzo Mergolesi and the fifteenth-century Palazzo Gargallo. He also explains the incomprehensible events that led to pull down a baroque palace in Archimedes Square, to destruction of the district between Giudecca and Logoteta Street and to break down the last remains of the monumental city wall built by the Spanish Emperor Charles V.
However: «where the frenzied speculation has reached paroxysmal forms is out of Ortigia [...]. To the relentless aggression, which spreads in all directions, not even one’s palm of green does escape. The intervention of the Superintendent had managed to delay here and there the advance of new construction; but the resumption of the offensive, by speculators was violent and relentless».
The Civil Hospital was built in the place where Landolini discovered the famous *Venus “anadiomede”*, in the early nineteenth century. The statue is today one of the top attraction of the Museo Archeologico Regionale “Paolo Orsi”. The Archaeological area of *Neapolis* was surrounded and the beautiful view that from the Greek theater opened on Ortigia was obscured. The building arrived to cover the “Grotticelle” necropolis, where legend placed the tomb of Archimedes; the same treatment was reserved to the beautiful Byzantine church of St. Giovanni and St. Marziano with its catacomb complex.
Among the most pervading interventions against Syracuse perpetrated in the years after World War II it is not possible neglect the events that led to the creation of one of the largest petrochemical settlements in Europe.
In a speech that took place in Syracuse in the March of 2012, Vincenzo Cabianca, recalled the long years of work at GCP: «In the early postwar period the easier and more common resources for local economies was formed by the parasitic income urban housing. It happened in the absence of town planning schemes and for the higher-level economy formed by big pollutant industrial settlements of semi-finished products of the petroleum industry. It was an expansion based on the illusion of the possible development of their induced form petroleum industries, by the mythology of iron and steel industry and by factories, very concrete, in cement» [35].
Within the perspective of conquering international markets, it was decided to set in coast between Augusta and Syracuse the industries for the oil refining and basic chemical and petrochemical industries.
The beginning of this industrialization that can be dated back to 1948, when a young Milan industrialist, Angelo Moratti, bought the facilities of a disused American refinery in Longview, Texas, thus the RA.SI.OM (Refinery Sicilian Mineral Oils) was born and subsequently sold to Esso. Taking advantage of the many benefits and economic incentives provided by the Cassa per il Mezzogiorno, in order to attract to the South both private and public groups, it began what was commonly called the "Economic Miracle". After RA.SI.OM, other industries such as Liquichimica, Cogema, Eternit, Sicilfusti, Edison, Celene settled. In 1953 was built the thermal power plant, Enel Tifeo, while in the early '70s was built ICAM (Joint Undertaking Anic Montedison) that still produces more than 700,000 tons/year of ethylene. And were assembled also the Enel thermal power plant Melilli, the Consortium of IAS Purifier (Syracuse Water Industry), the ISAB refinery, built by demolishing more than 200 houses in Marina di Melilli and literally erasing it from the map [36].
The ancient vestiges of the civilizations of Thapsos and Megara Ibla are "Cathedrals in the desert" incorporated between 30 km of iron. In this places, during «one of the many earthworks carried out at the foot of the hill where there are the RASION plants, the bulldozer invested time ago, and reduced to a heap of minute fragments a Greek statue of exceptional importance. In the little peninsula of Magnisi - the Virgil *Tapsus iacens* - a group of Sicilian tombs was destroyed to obtain blocks for the construction of the great dam of the port of Augusta».



Fig. 11: Petrochemical Syracuse- Priolo –Agusta
Fig. 12: The landscape before 1950
Fig. 13: The Island of Thapson

On 12th May 1976, the Sicilian Region issued the regional law for “The protection of historic centers and special rules for the district of Ortigia in Syracuse and for the historic center of Agrigento”, on 28th September of the same year Agnello died.

> «The Tourists who, after long routes through the Peninsula, ended their trip to Syracuse, remained fascinated by the sight of this beautiful coastal area, cut by the railroad, lapped on the one hand, by the tides, on the other hand, closed by an intense green frame extending up to the massive ramparts of the Ibleo plateau. Today everything has changed [...]. At the very least you left a good documentary, which fixes forever the face of the city that disappears: documentary that is jealously preserved in one of our museums, it would be able to leave in the tomorrow visitors that same moved and quiet admiration that the relics of past civilizations arouse in us».



Fig. 13: Church of St. Marziano. Syracuse (Photo by by F. Bruner-Flossman. In *Le vie d’Italia*)
Fig. 14: Church of St. Giovanni. Syracuse (Photo by by F. Bruner-Flossman. In *Le vie d’Italia*)
Fig. 15: Necropolis of Groticelle. Syracuse (Photo by by F. Bruner-Flossman. In *Le vie d’Italia*)



Fig. 17: The *Apollonion*, and behind the vacuum formed for the construction of a bank building. Ortigia (Photo by by F. Bruner-Flossman. In *Le vie d’Italia*)
Fig. 18: The modern building of the bank behind the *Apollonion.* Ortigia.



Fig. 19: Federico di Svevia Square, near Maniace Castle. Ortigia.
Fig. 20: St. Giuseppe Square. The modern building near the Church and the Theatre Damiani. Ortigia.



Fig. 21: Archeological area of Vittoria Square. Syracuse. (Photo by by F. Bruner-Flossman. In *Le vie d'Italia*)
Fig. 22: Vittoria Square today.

Bibliographical References

[1] FUSERO, Paolo. *Ecoscape. Valorizzazione del patrimonio ambientale e paesaggistico*. Pescara: Sala editori, 2004.

[2] MIRRI, Maria Beatrice. *Beni Culturali e centri storici. Legislazione e problemi*. Genova: Sagep, 1996.

[3] Centro di Documentazione di Ingegneria Civile, Architettura e Pianificazione Territoriale. *Documentazione bibliografica sui problemi dei centri storici e del rinnovo urbano*. Gubbio: ANCSA, 1973.

[4] SANTORO, Lucio. *Restauro dei monumenti e tutela ambientale dei centri antichi*. Cava dei Tirreni: Di Mauro editore, 1970.

[5] VV.AA. *La Carta di Gubbio. Dichiarazione finale approvata all'unanimità a conclusione del Convegno Nazionale per la Salvaguardia ed il Risanamento dei Centri Storici*. Gubbio, 1960.

[6] TOPPETTI, Fabrizio. *Paesaggi e città storica. Teorie e politiche del progetto*. Firenze: Alinea Editrice, 2011.

[7] SALZANO, Edoardo, *Fondamenti di urbanistica*. Roma-Bari: Editori Laterza, 1998.

[8] DELLA SELLA, Roberto. *La difesa dell'ambiente in Italia. Storia e cultura del movimento ecologista in italia.* Milano: Franco Angeli, 2000.

[9] CHIARANTE, Giuseppe. *Argan politico: gli anni del senato*. In CHIARANTE, Giuseppe. *Giulio Carlo Argan. Storia dell'arte e politica dei beni culturali.* Roma, Annali Bianchi Bandinelli, 2002, pp.131-144. The definitions are by Giulio Carlo Argan, stated in his speech to the Senate for approval of Law no. 431 of 1985, later known by the name of the proposer "Galasso law."

[10] PRIVATO, Stefano. *Il Touring Club italiano*. Bologna: Il Mulino, 2006. Born with the name of Italian Cycling Touring Club (TCCI).

[11] Referring Web Pages Web: http://touring.it/detail/167/Statuto .

[12] VV. AA. *Studi e Proposte per una riforma della legislazione turistica nazionale. Convegno degli Enti Provinciali per il Turismo dell'Alta Italia (Milano 7-8 novembre 1945)*. Bergamo: Stamperia Conti S.A., 1945.

[13] COCCIA, Luigi. *Architettura e turismo.* Milano: FrancoAngeli, 2012.

[14] SAVELLI, Asterio. *Turismo, territorio, identità. Ricerche ed esperienze nell'area mediterranea*. Milano: FrancoAngeli, 2004.

[15] AGNELLO, Giuseppe. *La mia vita nel ventennio.* Siracusa: Mascali editore, 1962.

[16] AGNELLO, Giuseppe. "Un monumento millenario che risorge. Il Duomo di Siracusa già Tempio di Athena". *Le vie* d'Italia, XXXIV. Milano: Touring Club italiano, January 1963, pp. 405-412.

[17] LIBERTINI, Guido. *Centuripe a Paolo Orsi animatore e Maestro degli studi di antichità siciliane*. Catania: Tirelli, 1926.

[18] GARIN, Eugenio. *La cultura italiana tra 800 e 900*: studi e ricerche. Bari: Laterza, 1962. I refer to the flourishing school of literary and philological studies of the Institute of Higher Studies in Florence (now the University of Florence), formed between 1860 and 1960 around the emblematic figures of Domenico Comparetti and Alessandro D'Ancona.

[19] AGNELLO, Giuseppe. *Siracusa medievale. Monumenti inediti*. Catania: Muglia Editore,1926; *L'architettura sveva in Sicilia*. Disegni di R. Carta e G. Di Grazia. Roma: Collezione Meridionale Editrice, 1935; *ORSI, Paolo. Sicilia bizantina.* (edited by) AGNELLO, Giuseppe; ZANOTTI-BIANCO, Umberto. Roma: Tivoli – Collezione Meridionale, 1942; *L'architettura bizantina in Sicilia.* Firenze: "La Nuova Italia" Editrice – Collezione Meridionale, 1952; *L'architettura civile e religiosa in Sicilia nell'età sveva.* Roma: Collezione Meridionale, 1961; *L'architettura aragonese-catalana in Siracusa.* Roma: Tivoli – Collezione Meridionale, 1942; *I Vermexio architetti ispano-siculi del XVII*. Firenze, "La Nuova Italia" Editrice – Collezione Meridionale, 1959.

[20] AGNELLO, Giuseppe; AGNELLO Santi Luigi. *Siracusa Barocca*. Caltanissetta-Roma: Salvatore Sciascia Editore, 1961.

[21] AGNELLO, Giuseppe. *Siracusa nel Medioevo e nel Rinascimento.* Caltanissetta-Roma: Salvatore Sciascia Editore, 1964.

[22] AGNELLO, Santi Luigi; PALERMO, Giuseppe. *Bibliografia degli scritti di Giuseppe Agnello*. Siracusa: Società Siracusana di Storia Patria, 1978. The rich bibliography of Giuseppe Agnello, has over six hundred titles, including monographs, essays, and articles.

[23] VENTURI, Adolfo. *Vedere e rivedere. Pagine sulla storia dell'arte* 1892-1927, (edited by) SCIOLLA Gianni Carlo; FRASCIONE, Mario. Torino: Il Segnalibro, 1990.

[24] CURUNI, Alessandro. *Gustavo Giovannoni*. In CASIELLO, Stella. *La cultura del restauro. Teorie e fondatori*. Venezia: Saggi Marsilio, 1996, pp. 267-290.

[25] DI NATALE, Iolanda. "Giuseppe Agnello: contributi sulla stampa periodica allo studio della Storia dell'Arte siciliana dal Medioevo al Barocco". ISSN 2038-6133. III.*TECLA. Rivista di critica e Letteratura artistica.* Palermo: Università degli Studi di Palermo, Maggio 2011.
Referring Web Pages Web: http://www.unipa.it/tecla/rivista/3_rivista_dinatale.php

[26] ADORNO, Salvatore. *Siracusa 1880-2000: città, storia, piani.* Venezia: Marsilio Editori, 2005.

[27] CICERO, Marcus Tullius*. In Verrem.* II 4, 117-119.

[28] BRANDI, Cesare. "Fermare l'avanzata dei palazzoni sul ciglio della zona archeologica"*. Corriere della sera*. Milano: 13 June 1958.

[29] STRABONE. *Γεωγραφικά.* (Translated by JONES, Horace Leonard). 2ª ed. Cambridge-London: Loeb Classical Library, 1967. The Geography of Strabo.

[30] BERNABÒ BREA, Luigi. "Creare un piano paesistico e monumentale". *Corriere di Sicilia*. Catania: 11 December 1947.

[31] AGNELLO, Santi Luigi; GIULIANO, Corrado. *I guasti di Siracusa. Conversazione sulle vicende dell'urbanistica siracusana.* Siracusa: Fondazione Giuseppe e Santi Luigi Agnello, 2001. The D.P. April 11, 1968 n. 290 relative to the Bond of Ortigia. Dates instead 1961, another bond proposal, put forward by the Commission chaired by Agnello, relative to the entire littoral of Ortigia.

[32] AGNELLO, Giuseppe. "I guasti di siracusa". *Le vie d'Italia*, LXIX. Touring Club italiano, Milano: July 1963, pp. 920-928.

[33] AGNELLO, Giuseppe. "Le ferite di Siracusa"*. Le vie d'Italia*, LXX. Milano: Touring Club Italiano, July 1964, pp.946-956.

[34] CANTONE, Fernanda; VIOLA, Serena. *Governare le trasformazioni del patrimonio edificato: un progetto per le corti di Ortigia e Siracusa.* Napoli: Alfredo Guida Editore, 2002.

[35] Referring Web Pages Web:
http://www.farch.unict.it/concorso/.../vincenzo_cabianca_20anni_utopia.pdf.

[36] ADORNO, Salvatore; ALOSCARI, Pasquale; SALERNO, Fabio. *L'industria, la memoria, la storia. Il polo petrolchimico nell'area costiera tra Melilli, Augusta e Siracusa*. Siracusa: Marrone Editore, 2008.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Design the Rural-Architectural Intensification as a strategy for sustainable growth of countryside.

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Abstract
The aim of this Paper it is to present a research project which derives from Italian National Research Framework PRIN2009: "Regeneration and renewal of rural landscape. Building strategies in the surroundings of new urban centres". This issue aims to the regeneration of the rural landscape, with particular focus on architectural design, which can become the instrument for promoting the value, the memory, the identity and the environmental quality of the rural landscape as cultural heritage.
The awareness of the fact that the categories "rural" and "urban" appear meaningless, where it is a question of marking out the boundary that do not have a well-defined specific function and that are increasingly characterised by mixed complexity – economic, functional, social and cultural – leads to reviewing the strategic guidelines of managing the landscape and draws increased attention to the qualitative aspects of the landscape development and the human-environment relationship.
A second very important aspect to point out is the resilience of the architecture in this concept of rural intensification: in landscape construction, every measure involves the subject of shape and space. From the building of a small footbridge to the renovation of the banks of a large stretch of river, from a project for a fountain to one for a roof garden or a park, it is difficult to tell the difference between a region's natural and man-made structures, since they should be always connected and interrelated.

Keywords: Rural-urban boundary, Humanlandscape design, Eco-social design, Architecture design

1. Section Introduction to the Rural Architectural Intensification
The paper describes methodology and results of a branch of research project that derive from Italian National Research PRIN2009 "Architecture as Heritage: innovative instruments for the tutelage and the improvement of the local border systems"; within this National framework authors from University of Pavia (coordinate by Prof. Tiziano Cattaneo) participate, deepening the theme "Regeneration and renewal of rural landscape". This issue aims to the regeneration of the rural landscape, with particular focus on architectural design, which can become the instrument for promoting the value, the memory and the environmental quality of the rural landscape as cultural heritage. Authors expose a operative action for the regeneration of rural heritage with a specific application to Rural Architectural Intensification (RAI). Rural Architectural Intensification is an innovative design action for architecture and landscape design. This operative action is applicable for regenerate and transform the contemporary city-landscape into use that are suitable for contemporary ways of living through the construction of a new paradigm that will shape an architectural project committed to sustainability.
The concept of Rural Architectural Intensification include three words:
Rural as high quality environment with richness of history, values, memory and identity;
Architecture as a process and construction product, which can create social, cultural, economic and technological innovation;

Intensification as a strategy for creates sustainable density of activities and spaces for citizens in which the natural environment and the rural-urban environment coexist harmoniously.
Moreover, the term rural has to face the modification of the economy system and needs also to be rethought it in terms of definitions. In different disciplines we assist to a controversy related to the distinction and definition of the terms *agrarian*, *agricultural* and *rural*.
In Geography, for example, the three terms are defined as follow: the agrarian geography is concentrated on the line of intervention for the agricultural development; the agricultural geography is related to the morphological form of the earth and, finally, the rural geography is the most recent discipline that investigate the whole rural space as the extra-urban territory. The term *rural* seems to take in account the technological and social evolution of the countryside. The countryside has to deal with different issues: the city, the multi-activities, and the climate changes. Furthermore, the term *rural* considers all the different elements of this non-urban territory affected by a continuous transformation.

2. The role of Architecture in the process of intensification of the rural context

The developments of European cities and their speedy urbanization have created a perception of contemporary space like a homogenous continuum in which city and landscape have lost their origin boundaries. So, the concept of boundary in the European cities includes some enlightenment – social, cultural, economic, geography, architectonic - and the rural landscape itself becomes a boundary, and it represents the real contemporary city-landscape.
The crisis in rural areas is essentially a European problem: depopulation and ageing of the population, abandonment and decay of small town centres, difficulty in keeping existing businesses, intensive agricultural practices to the detriment of biodiversity, pollution, a lack of infrastructures and services for tourism, as well as a shortage of job opportunities for the population, etc.
The research project addresses the specific cultural and productive features in the Italian and European areas in which this phenomenon it is processed and has reached significant levels of deprived neighbourhoods; like a big boundary whose either urban and rural shape cannot be surrendered to simplifications imposed by tourism's occupation, but towards hypothesis of regeneration the rural landscape of old villages and farm buildings.
The research aims is to identify the Best Practices which can be assessed in a qualitative way trough the description and interpretation of operative tools for architecture and landscape design that allow to regenerate and transform the contemporary city-landscape into functions that are suitable for contemporary ways of living. The rural landscape has seen a tendency to overcome the urban growth culture and quantitative development that had left a strong mark, represented by the negative concept of the countryside – only diversified by the varying quantities of building and non-agriculture related activities, and thus a decline of the concept of nature.
The awareness of the fact that the categories “rural” and “urban” appear meaningless, where it is a question of marking out the boundary that do not have a well-defined specific function and that are increasingly characterised by mixed complexity – economic, functional, social and cultural – leads to reviewing the strategic guidelines of managing the landscape and draws increased attention to the qualitative aspects of the lands development and the human-environment relationship.
The research project underlines the importance of the role of the Architecture in the process of intensification of the rural context for the landscape construction that involves the shape of the space. Rural Architectural Intensification means that every architectural intervention in the territory - from a small pedestrian bridge to the regeneration of the river banks, from the public space design to the project of a roof garden or park - have to restore the relationship between landscape and architecture as the history has taught. Through the Rural-Architectonical Intensification, is possible to create sustainable density of activities and spaces in which the natural environment and the rural-urban landscape coexist harmoniously.
Then think of the existing richness: in Italy’s rural areas, not just its cities, the artistic and architectural heritage is often of a very high cultural level and this just brings the subject of architecture into the centre of this debate. In a region’s various implementation strategies there must be an aspect of independence, of a close relationship and a necessary connection, not just at the level of regional marketing but above all in the construction quality of these measures and of their economic and environmental sustainability.
Enhancing rural architecture, small towns, farmsteads and ancient relics is one of the main components for the regeneration of the countryside. It is a strategy with a positive outcome, even only if it has been supported simultaneously by the possibility of creating more business (also working from this architectural heritage), but which nevertheless is planned taking into account the improvement of the perceived aesthetic structure of the countryside. Therefore, in this development process for business in the region, there also has to be an increase in environmental quality and in the infrastructures, which allow people to use the environment, etc.
The development of small and medium-sized enterprises also forms a possible opening strategy, but in this case as well, only if it allows the possibility at the same time of reusing the existing building

heritage or at least respects its presence as a unique value for a region. In the meantime, small and medium-sized enterprises should be supported by specific services, such as access to information and communication technologies, and they must also have new types of sustainable infrastructures for the environment which allow businesses to establish themselves in a region and to promote new initiatives. The protection of biodiversity, as well as new models of organic and bio-dynamic farming, can translate into opportunities to diversify the range of services towards other economic sectors as well, such as tourism.

3. Process and research's Parameters

The process starts with the identification of a "main aim", that is the final goal of the whole design procedure; in this case it is the RAI. Authors consider it is fundamental to specify the sequence of the phases that characterize the whole process because it combines various approaches that can be referred to the different scales and disciplines involved.

What we are interested here is the role which architecture has to play in this framework of rural intensification. In order to this reason was built the RAI Best Practices Report and it is a basic reference in which many experiences from all over the world have been classified and assessed in order to find general criteria. So, considering that RAI application depends on the characteristics of the territory in which it should work, once the main aim is defined, planners or designers analyze the territory starting from available net information. Based on the characteristics of the analyzed territory, decision makers and stakeholders define specific aims such as for example: concentration of new commercial activities in existing small centers, creation of a system of mixed use small centers, creation of a decentralized hotel, definition of territorial facilities, distribution of residential settlements in existing underused buildings, renewal of existing rural settlements, etc. Obviously, territorial interpretation depends on certain specific aims: in fact different spatial or economic factors may have particular relevance for each specific goals. At the same time the entire Best Practice database can be consulted and appropriate examples may be selected. Lastly a compatibility assessment among the territorial interpretation and the selected case studies carries to possible scenarios that decision makers and stakeholders should consider.

At this point the question is: What parameters can be used to assess the improvement of a rural region?

In the Best Practice Report built for the main aim RAI, each project is catalogued by four parameters:

a. development of local business capability;
b. development of cultural and tourist activities;
c. environment preserving;
d. facilities for population.

With more details:

a. development of local business capability: business and tourism, diversification into non-agricultural activities, diversification and innovation in agriculture, cultivate the landscape, cooperation and short chain, growth of the bio-economy, business and infrastructure;
b. development of cultural and tourist activities: tourism and architectural heritage, tourism and environment, small-scale tourism services, countryside vs sea and mountain, tourism and water, tourism and infrastructure, tourism in less-favorable areas;
c. environment preserving: environment and biodiversity protection , environment as heritage, environment and water, soil and environment, environment and animals, environmentally sustainable operations, limit consumption of the environment, bioenergy, environmental reservoirs, environment and urban space, environment and infrastructure, environment and waste, environmental risk, environment in disadvantaged areas, diversified environmental redevelopment;
d. facilities for population: population and employment: tourism, population and employment: diversification of agricultural activities, essential services to the population, country-city, population: energy saving, young population, population: infrastructure, cooperation in development, safe population, population and environment.

Thanks to the above parameters of intensification identified, we analyzed numerous architectural case studies through a double movement: for each parameter we identified a series of goals and strategies, that generate positive strategies in the territory through which we have evaluated the production of Rural Architectural Intensification. The overall framework has been interested in terms of quality and design's behavior.

4. Architectural Design Strategies for rural heritage

This article not intends to make a detailed and analytical description of the RAI Best Practices Report (which is composed by 140 case studies and more then 500 pages) but authors believe it is important to outline the concepts and the goals developed for the research project. Therefore, are listed here

below brief descriptions of the parameters that can be used to assess the intensification as design strategy for rural heritage.

4.1 Architecture for Development of SMEs

Agriculture stopped being the driving force of economic development for the countryside a long time ago now. For this reason, in recent years rural development policies have focused, and will focus more in the future, on strengthening jobs in non-agricultural areas, while taking into account the necessary involvement of farmers and existing farms in multi-sectorial rural development strategies. The creation of start-up companies linked to agriculture, which make the most out of a rural region's potential could improve the population's quality of life, bucking the current trend towards the socio-economic decline of these regions.

This study shows that the entrepreneurial projects which manage to take off are usually of a moderate size. We're talking about small and medium-sized enterprises, which are often family-run micro-enterprises in the processing and marketing sectors for agricultural products, livestock, local handicrafts, tourism, essential services, but also energy generation facilities from renewable resources (biomass and biogas heating plants, photovoltaic and solar panel).

Many people are involved with these businesses, which transform the region, not just from a socio-economic point of view but also in terms of the countryside, and, the architecture and their architectural heritage. For example, small food companies that have developed a wide range of products often choose to convert unused or under-used spaces within their companies or farms: old granaries, unused animal stables, silos which have now been empty for a while and converted into areas for new production plants, educational workshops or exhibition halls, stores, restaurants, ateliers, show-rooms, etc.

Often a small amount of precise, localised work is enough to stimulate more widespread development dynamics throughout an entire geographical context. When this happens, whatever the intervention, it is Architecture that makes it possible.

In 1997, Achleitner wrote about the Vals thermal baths designed by Peter Zumthor: "The tourism industry should be criticised for endorsing a town's cultural and environmental resources, without creating any new ones. This creates the architecture of tourism without the tourism of architecture. But at Vals a resource has been created that not only enriches the tourism of architecture with an essential attraction, but also represents a considerable boost for conventional tourism"[1]. The example of Vals is a paradigm: the thermal baths attract visitors due to their architecture.

4.2 Architecture for the development of tourism and cultural activities

Among its peculiar features, Italy has a very high number of abandoned towns: there are 5,308 ghost towns, 72% of all Italian municipalities. This phenomenon began after World War II and has not yet stopped: in most cases, the city seems to have a powerful magnetic attraction and the countryside as a place without a future.

These small abandoned town centres are often the only evidence of the many stories and layers behind a place's history, its identity and unique features; they are a memory of events, characters, the traditional agricultural economy and the evolution which the countryside went through. They must be kept alive.

During the architectural restoration of a building or of an entire inhabited centre, several more interesting solutions arise from the diversification of the planned activities compared with the original activities: an old sawmill can become an architectural studio; an unused granary can house a factory for producing traditional food products; a farmstead's neglected stables can become artists' studios, etc.

In Italy, where tourism is one of the main driving forces of economic development, there is a focus on inventing new tourism hospitality models working from this restoration of abandoned architectural heritage.

The research report shows that the measures which have an impact on the existing architectural heritage try to move away from the idea of second homes and therefore seasonal regeneration, which is purely based on tourism. The region needs to be permanently inhabited, only then can it avoid falling into decline. Rural architecture has a communal nature, either when it comes from reusing existing buildings or when it is about new buildings. Under this communal sense of responsibility and respect for the protection of the environment, the projects opt for essential qualities, the simplicity of form, easy solutions, low land take or even subterranean solutions, underground solutions that look to be discreet, making the most out of the context for its requirements, with minimum impact.

The nature of these places, their history, the shapes which describe and outline their landscape, their colours, but also all of their man-made structures with their materials and construction techniques, provide the tools which many designers work with and use to understand the region.

When you opt for new, industrial, pre-made materials, the relationship with the context is shown in these compositional choices, in the relationship between full and empty in the façades, in the form of

the roofing, the chimneys which take you back to the local architecture, or the local population's uses and traditions.
This research highlights how you can also enhance the architectural heritage through forms of "simple" census and surveys of cultural goods. As Aldo Rossi wrote: "A town is a monument of culture: housing, technology, law, economy, it is a settlement of endeavour, expertise and imagination. By observing its monuments, urban structures and rural settlements, by promoting a morphological and typological study, and by examining the distributional, architectural and iconographic analysis, the field of architecture lays down the foundations for a rational and systematic understanding of form"[2].

4.3 Landscape architecture for protecting and enhancing the natural environment

The general state of the environment is in the midst of a serious collective crisis. Biodiversity is disappearing and with it the "form of the countryside". Land is scarce even for farming; uncontrolled building developments continue in line with the constant population growth, taking much needed land away from plants, animals and ecosystems. Woodlands are being destroyed to make space for industrial expansions around the outskirts or for intensive farming of one-crop systems; species of animals are disappearing, which are deprived of their habitats.
The expansion or shrinkage of a city and its ability to attract tourism through hospitality, rather than a strong immigration phenomenon, may also transform rural areas. The emerging projects shine a light on a diverse series of possible measures. The afforestation of agricultural land with permanent forests for environmental and tourism purposes is a good example of how to cultivate the countryside by converting wild or over-grown land, rather than the arboriculture of wood for the manufacture of stakes, biomass or paper.
Also, the modelling which the landscape has to go through is undoubtedly needed in order to reduce environmental risks and hydrogeological disasters. However, this is just the practical objective: the spatial response which it generates in the landscape also needs to be considered, as well as its impact and sustainability. This is where landscape design comes into play, where the awareness of the architect in the skilful use of form and space is essential during a place's regeneration process.
Therefore it is a kind of "restoration" through protection, rebuilding characteristic elements of the countryside, such as built heritage, river dykes, woodland areas, ditches, hedges and swampland; and also protection to plan for the future of the land, to carry out work which represents an effective redevelopment of the region while keeping people in mind, providing activities for people that are in line with the principle of sustainable development.
This research shows interesting cases of protection, in particular, focusing on cases in which the re-naturalisation of a region has become an opportunity for its more general regeneration.

4.4 Architecture for Services for the local population

Rural areas are showing a gradual ageing of the population. The gradual reduction of the critical mass needed to financially support the services system has triggered a gradual but continuous loss and destabilisation of the essential services and functions required for families and companies to live in the region (housing, healthcare, communications, transports, education, modern information technologies, job, infrastructure, etc).
Through case study samples, this research has analysed the work carried out to develop services and initiatives for the implementation of integrated local strategies, which aim to improve the quality of life in rural areas and to develop the attractiveness of these areas for future generations.
The revitalisation of villages and rural areas through integrated initiatives including diversification, the creation of new productive activities and investment in the enhancing of cultural heritage can form a development strategy for the directly involved local population.
The projects implemented in the area of education are: farm nursery schools, primary schools, services for children and families, educational courses in food and the environment run by educational farms and gardens, etc, and also the development of cultural activities for the dissemination and passing between generations of the cultural heritage and identity, as well as the traditions of rural populations.
In the area of sport, well-being and relaxation: sport centers, swimming pools, cycle paths, hippotherapy centres and games rooms, recording rooms, discos and clubs, dance halls, pubs, general areas which help young people to invest in the rural region.
In the area of healthcare: herbalist shops, clinics, first aid, hospices, analysis laboratories, veterinary clinics for farm animals, home help, and mobility assistance for elderly and disabled people.
Lastly, one of the main essential services for the rural population is infrastructure. The railway, the road system and, in general, the main highways have often interrupted the existing road networks, blocking their accessibility and leading to the isolation and abandonment of small town centres. Any infrastructure should be seen as a vehicle for regional intensification, even a tiny structure, such as a

small footbridge which connects two parts of a region, can be crucial for the accessibility and the social and economic recovery of a given location.

5. Conclusion

For over a decade, various projects for the intensification of rural areas have been launched over Italy and Europe. These are multifunctional measures that aim to develop businesses, especially those linked to tourism and cultural activities, or linked to the improvement of areas of society which have often deteriorated. At the same time, these measures aim to protect and enhance the natural environment.

In fact, the idea was to stimulate a whole series of various intervention models in rural areas. As a whole, these models would add to the development of rural regions. They would build a management system for goods and services based on innovative forms of multifunctional businesses. This would ensure adequate flows of income for those involved in these initiatives and would therefore help to guarantee the success of the work carried out on the goods which the region has to offer.

In Italy, for example, the same Rural Development Plans which every region has prepared, as well as the National Rural Development Plan, confirm the need to intensify multi-sectorial, multi-axis projects with regard to the protection of the environment, the development of local business skills, tourism and cultural activities, as well as services for the local population.

This need for multi-model and multi-sectorial intensification would seem a given fact for anyone who, in theory and practice, plans, designs and carries out concrete actions in a rural region. The idea of area micro-projects organised by macro-projects, which theoretically should help the single management, is often found in local implementation plans and programmes.

The reality is very different and often when something does occur, it happens with such erratic and fragmented reasoning that it only creates partial success which is too limited to represent real, concrete development for the region. In most cases, there is not even any intent during the planning phase to prepare any multi-model and multi-sectorial intensification measures. It just works through impermeable districts, while in the region as a whole even a route from one municipality to another will interrupt the building of a cycle path.

In fact, even the aforementioned Rural Plans, developed through a series of objectives and strategies belonging to different models and axes, do not specify that these connections are necessary, these intertwining objectives and strategies which need to be put into effect. There still seems to be little awareness of this issue and with it the possibility that the implemented measures have a resilient effect on the region.

Conversely, in our opinion, it is a decisive issue when:

- The measures do not reach sufficient concomitant, multi-sectorial development and they are not able to simultaneously be strategies for the protection of architectural heritage, the natural environment, the population and for tourists;
- There is no real recovery and they do not create the conditions in the region that could stimulate economic, social and cultural growth.

Only the combination of architecture and measures seems able to provide results in terms of quality: this intertwining of measures and also therefore of the regional policies which are studied and put into effect at every level and on every regional scale.

The relationship which links and connects all the components involved in development processes cannot be separated, just as a small town or a small architecture is inseparable from its own history, from its surrounding natural and man-made elements, its forests, fields, industries, and infrastructures which outline its surrounding landscape.

6. Appendix

In this section are introduced 4 project description that are included in the Best Practice Report as examples of the virtuous architecture of Rural Intensification.

6.1 Upper Twyford Studio. Farmhouse regeneration as office of architecture. Hereford, West Midlands, UK, 2009. Architect: Architype

Upper Twyford demonstrates the possibilities for transforming derelict structures into modern sustainable buildings. It was also an opportunity for Architype to develop our approach to sustainable design, which we describe as ‘eco-minimalism’. This approach is based on assessing from first principles what is actually the most efficient and effective way of achieving long term sustainability. At Upper Twyford this meant avoiding tech-no fixes and add-ons, and focusing on making the basic architecture work in an efficient sustainable way.

Learning by doing:

The design, construction and occupation of Upper Twyford was also envisaged as a learning process for Architype, and so the building is being monitored in use. This monitoring is enabling us to:

• compare performance with theoretical predictive models, so that we can understand the relationship between prediction and performance;
• assess our subjective experience of comfort against the building's actual performance;
• experience at first hand natural ventilation and daylighting, thermal mass and night cooling, high levels of insulation and airtightness;
• achieve further energy reductions over time.



Fig. 1: Upper Twyford Studio. Farmhouse regeneration as office of architecture. Hereford, West Midlands, UK, 2009. Architect: Architype.

Upper Twyford has become a focus for how we as individuals and as a practice can develop more sustainable ways of living and working.
Economic sustainability
It is also having a positive impact on the local economy and is influencing debate about the sustainable economic development of the Herefordshire economy. For example we:
• buy fuel (woodchips) from local supplier and woodlands
• have daily staff lunch supplied by a local café that sources local organic ingredients
• have vegetable box scheme delivery to the office, for staff then to take home
• have sublet space to establish a new business selling ecological paints and green building products
• encourage cycling to work by staff
• recycle our waste and buy office supplies from sustainable and fairtrade sources
• host regular visits and lectures from local organisations
Upper Twyford demonstrates the potential for high quality employment in rural locations dispersed around the county, rather than locating in existing towns and industrial parks.
Design Approach
With a sensitive respect for Upper Twyford's history, and an appreciation of it's context in the landscape, our aim was to create a modern workplace from the ruins of the old barn, which was an exemplar of sustainable contemporary design, and an inspirational
place to work.
We set out to create a design studio amply lit by daylight, providing exceptional views across fields and woodlands, unpolluted by chemical treatments, naturally ventilated and heated, with ample space for working, meeting and socialising.
Externally at ground floor level the barn is rough stone but the partly rebuilt first floor is constructed from and clad in untreated Douglas fir. This is departure from the original building, which was all stone because substantial parts of the original stone building had fallen down or were very weak. At first floor level we replaced the stone with timber framed construction. The pitched roof is reclaimed Welsh slate. A studio space has been inserted at first floor level and is set back from the glass screens creating double height spaces at both the front and rear entrances to the building.
Eco-design principles
A summary of the principles of eco-design applied to the project, are:
Orientation and the use of daylight and sunlight for light and solar gain; Use of 'breathing' timber construction; Use of thermal mass; Using high levels of insulation; Minimise cold bridging; High performance windows and doors; A range of options for natural ventilation; Biomass boiler for heating and hot water; Re-use of materials from original building; Use of UK sourced timber; Adoption of state of the art water efficiency measures; Natural paints and stains; Innovative low energy purpose made light fittings; Landscaping to extend local biodiversity.

6.2 Nørre Vosborg - New Hotel. Vemb, Jutland, Denmark, 2008. Architect: Arkitema



Fig. 2: Nørre Vosborg - New Hotel. Vemb, Jutland, Denmark, 2008. Architect: Arkitema

In Denmark, we have many beautiful manor houses. Some still function as agricultural producers, but many now offer experiences instead. Nørre Vosborg is among the latter – a place where people can enjoy unique experiences. Surrounded by nature and architectural history, and with gastronomic experiences, cultural and conference activities close at hand.
A manor house with a long history
The history of Nørre Vosborg stretches back to the original stud and barn buildings constructed in 1532. Today, after surviving various fires, the manor farm is an interesting mixture of 18th-century history and architecture, together with more contemporary alterations from the post-war period 1946-50, and a great many functional alterations since then.
Now after restoration, conversion and extension, beautiful Nørre Vosborg manor is now an up-to-date hotel, cultural venue and conference centre, with a newly-built hotel wing and new design solutions for all of the manor's many different buildings.
New building for hotel accommodation
The new hotel wing matches the largest of the complex's buildings in terms of volume. Despite its size and location, however, it does not compete for attention with the historical courtyard area and the main axis of the complex. To lower the impact of the hotel wing and avoid an imbalance in the historical structure, we sought to use alternative materials in relation to the stud buildings' dominant red brick and thatched roofs. We used wood, which satisfied the relevant criteria, and which is an unpretentious material alongside the frugal red-brick buildings. Wood pervades the entire building, even the roof, which is clad with planks of radial-sawn Siberian larch, laid in a clapboard pattern.
The hotel is characterised by a roof without dormer windows. We have lifted and opened the clapboard pattern, and thereby enabled the creation of a belt in the roof surface which integrates the openings necessary for habitation in the roof storey.

6.3 Burgenland. Sprawl hotel in the vineyard. Deutsch Schützen-Eisenberg , Burgenland, Austria, 2011. Architect: Pichler & Traupmann



Fig. 3: Burgenland. Sprawl hotel in the vineyard. Deutsch Schützen-Eisenberg , Burgenland, Austria, 2011. Architect: Pichler & Traupmann

In the vineyards surrounding Wachter-Wiesler Ratschen, an award-winning restaurant in southern Burgenland, Pichler & Traupmann Architects have developed a project in which an association of prize-winning wine-growers from the renewed winegrowing area of Deutshc Schützen took part. It offers guest a pleasant way of ending a day spent wine-tasting in the various cellars.
The work of Pichler & Traupmann Architects is known for its dialogue with the landscape and sensitive handling of each project's particular context, but also for a high level of innovation and the contemporary interpretation of unusual building commission.
In this case the project development involved a number of special factors, as the aim was to combine the simple, authentic and meditative qualities of the space with a high quality ambience.
In the area of tourism distributing the bedrooms of a facility that offers overnight accommodation amongst the vineyards is an usual approach. From the restaurant, where the reception and breakfast room are also located, you can retire at the end of an enjoyable evening to one of the free-standing bedrooms amidst the vines. The units, each with two beds and an additional couch, are provided for guests.
The free-standing residential elements are oriented on the culture of the rows of vines and are derived from this landscape element. The long side walls of the rooms take up the lines of the rows of vines and the distance between them, making them into built elements between which the various functions are placed. One sleeps between the rows of vines, so to speak, and they are reflected in the large windows and appear to continue into the rooms.
The language of the materials also express the strength of this design concept. Inside and in the outdoor area wood is used throughout as a naturally renewable building material, in different surface finishers and with different characters. The building's energy concept incorporates renewable energy. Thanks to the excellent collaboration between all involved in the project, it proved possible to implement in in a "record construction time" of around 100 days.

6.4 Regeneration and reuse of existing mill. Lochussie, Dingwall , Scotland, UK, 2011. Architect: Rural Design



Fig. 4: Regeneration and reuse of existing mill. Lochussie, Dingwall , Scotland, UK, 2011. Architect: Rural Design

Incorporating the few remaining freestanding walls of a former mill building, the project engages with the buildings past, without replication of its traditional forms.
The starting point for the Mill project was the few freestanding walls that remained on the site. The existing walls created a series of courtyards, some of which has begun to be re-inhabited by nature.
Our clients brief was for a large family house. We were keen to re-imagine the building in a progressive form, layering a series of forms over the ruins to create a clear juxtaposition of old and new.
Some elements are clearly defined as freestanding objects, the Garden Room, Gym and Garage building slide alongside the existing walls, the new raised upper story is overlaid, with a folded larch roof and wall floating over the castle-like structure of the existing walls.
All the forms create new and intriguing courtyard spaces, allowing the creation of a variety of sheltered spaces to allow our client to engage in his passion for gardening. Two south facing courtyards have been created, the eastern courtyard terraces down in insitu-concrete walls inhabited with plants to a

small burn. The western courtyard allows evening light to be drawn through the depth of the house, through an existing tree that has been preserved, and also became the axis for this series of spaces. The internal spaces are typically one room deep, with simple linear circulation, capturing light at ad hoc points where existing openings remained. Where possible stone walls have been preserved internally, allowing a look through the layers of the structure.
A three storey timber “tower” sits at the southernmost part of the house, rising from formal dining room, to sitting room, to master bedroom, which has a high level 270 degree view of the wider countryside. The master bedroom is accessed by a stair that floats alongside the old rough stone walls, and cantilevers out from a massive larch wall.
At all points the houses axis’ are terminated by events, light, and occasional symmetries.
The existing fabric has been treated with respect, however this has occasionally required major surgery, for example the new arched window to the formal dining room has been cut forcefully into the existing fabric, recalling not only the water wheel, but also the art deco furniture colllection contained within.

Bibliographical References

[1] ACHLEITNER, Friedrich. Le terme di Vals. Pietra e acqua. Elementare profondità. In *Casabella* n. 648. Milan: Mondadori, 1997, p. 61.

[2] ROSSI, Aldo, CONSOLACIO, Eraldo, BOSSHARD, Max. *La costruzione del territorio. Uno studio sul Canton Ticino.* 1ª ed. Milan: Clup, 1986. P. 31.

BEURET, J-E., KOVACSHAZY, M-C. Rural amenities policies: future stakes, in: G. P. Green, S. C. Deller, D. W. Marcouiller, Amenities and Rural Development. Theory, Methods and Public Policy, University of Wisconsin–Madison, USA Edward Elgar Cheltenham, UK - Northampton, MA, USA, 2005, pp. 33-47.

CATTANEO, Tiziano. “Water as a composition element of the landscape”, in: T. Cattaneo, “Architecture&Landscape design”, Maggioli Editore, Santarcangelo di Romagna, Italy, 2011, pp. 12-29.

POTOCNIK, J. European Commissioner for the Environment, “Guidelines on best practice to limit mitigate or compensate Soil Sailing”, Published by European Commission, 2012. http://ec.europa.eu/environment/emas/news/archive_en.htm.

Prokop, G. “Corine land cover technical guide 2006 raster data”, Published by EEA (European Environment Agency), 2011. http://www.eea.europa.eu/publications/COR0-landcover.

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Preserving "*Time*" in Space and "*Space*" in Time: Cultural Urban Landscape of Niš, Serbia

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Abstract
The main objective of this paper is to study the process and patterns that influenced framing of spatial imaginary of the city of Niš. The focus will be on the understanding of modern and heritage urban landscapes, and their interactions as a products of creative activity between man, space and time. The questions were razed upon persevering historic landscapes in urban environments and understanding spirit of the place and time. In this context it is proposed landscape architecture approach to urban heritage conservation. The study of the spatial imagery is based on the evaluation of its historical and cultural values through analysis of landscape qualities. The proposed approach has been applied on the cultural urban landscape of the city of Niš, Serbia, using as a reference historic sites and contemporary comprehension in using them as primary expression of identity. In creation of cultural urban landscape, general inquiry has been conducted on the topological level through history, art and culture of Ancient, Byzantine and Ottoman city of Niš. As a result of the analysis, the potential of the historic site of the Fortress built in 18th century at the place of Roman castrum, has been reconsidered in correlation to the belonging urban and natural environment, what gave the guidelines for future sustainable development of the city. Historic *time* in space and *space* in time, is an urban texture, becoming the focal point for future enrichment of urban life.

Keywords: Niš - Serbia, landscape study, pattern-process, spatial imagery, spirit of place.

1. Introduction

"…their past, as much their spaces are crucially constitutive of their presents"
Christopher Tilly [17]

Unique distinctiveness of cities in south-east Europe, and the city of Niš in Serbia as one them, is related to their rich shared past which is embodied in peculiarities of open space. The fact that in this part of Europe public spaces in the historical city center are predominantly, above all, at locations of historic monuments and archeological excavations, engages their timeless spatial quality that originates from the long history, contemporary everyday experience and changeable and vivid character. The questions raised in proposed research are considered upon persevering historic sites in urban environments through landscape study and landscape architecture approach of reading the quality and meaning of historic sites as urban open spaces of the city.
Our starting hypothesis is that these open spaces of the city at the historic sites are not empty voids (J. Simon, 1984), but a place full of memories, activities and experiences (P. Dauvergne, 1977), made through socio-economic values of life and culture and ecological conditions (M. Ananidou, 1991) [1].
Finally, the paper focuses on the research of historic site of the Fortress and urban landscape of Niš in Serbia through methodology of reading the cultural landscapes used as a method of analysis in landscape architecture in order to support subsequent explanation and interpretation of the flows of materials, energy and information, which characterize the city. Main objective is to study the historic patterns and process, rhythms and values that were layered through time and space, on and within the land and gave "spirit" to a place, framing the spatial imaginary of the city of Niš. The evolution of

Niš cityscape and its impact on the contemporary landscape is outlined. As result of the analysis, the proposal for the future design measures was made.

2. Terms and Methods

2.1 Monument - Site - Cultural Urban Landscape

The first and essential step in reading the quality of historic urban sites is to come to terms with the phenomenon of space-time and monument-site- landscape evolution. In the process we are also hoping to clarify some of the semantic dilemmas which confront us in relation to the terms of urban open space and landscape concept.

Phenomenon of space, along with time, is one of the basic concepts of reality and existence of the matter [9], where human existence in the space (real - objective: *anthropomorphic(cultural, social and physical) /natural* or symbolic (*cosmic)* - subjective) is associated with his relation and understanding of the world and its image: "imago mundi" [16]. This understanding of space is materialized in place and its spatiality through duration of time and times (temporality). Factors of making the place are first, and sometimes continuous, acts of design that transform, or conserve, space for human inhabitation and use and inescapably embody a concept of space.

Such environments of sensual experience, past actions and memory, are referred to as having attributes of a site (Greek: τοποθεσία, contains two words: τόπος - place and θέση - position), the meaning that in contemporary understanding corresponds to the concept of the "site" as used in archeology: *the location of human activity in the past* [7].

Dichotomous discourse of historic sites comprises the relations of the architectural monument as an archive of authentic sources - containing universal order – static message of the past which is superimposed in the dynamic and vivid space setting of everyday life, its natural and social context, devoid of apparently manifested order [3]. But those values created in urban open spaces of the city are evolved from human-space-nature relationships subliming harmoniously in the process of reconciling within each other, and resulting in framing the urban land and *scape* of the city. Exactly those "topos" became the places of identity, places of reality and open spaces of everyday life and perceptions of the city and therefore the cultural urban landscape as a whole.

As used here, and according to the accepted understanding of landscapes as works of art and culture [6], a cultural urban landscape is a matter of an artistic production of urban open space, a creative activity between man and space, architecture of land (landscape as architecture) and in that sense whose artistic volition of meaning is possible. Hence, the cultural urban landscape is conceived as a mirror of the development of the city, its form and metamorphosis of the space and it is defined as the physiognomy of the city, its spatial image and imagination[1]. Within recent trends toward landscape understanding, according to Tom Ingold: *landscape is defined as a processual, material and perceptual engagement of body and world, enacted in terms of a distinctive temporality – a rich duration of inhabitation.* The significance of the development of social-cultural and physical (real-objective) environment in space and time led to the perception of landscape as a process or landscape as a long-term history. Also for Simon Bell the landscapes develop and evolve through an interacting series of processes – climatic, geological, ecological and cultural – over varying periods of time. These processes shape the structure and character of the landscapes which we experience and by understanding this complex pattern–process interaction we can obtain a deeper awareness of landscape [5].

In that context accepted attitude toward the urban open spaces is that they are not voids nor empty spaces according to J. Simon, and on the other hand, according to the Jackson [4] landscape cannot be seen as simply natural space, a feature of the natural environment or simply environment, the most frequent semantic dilemmas which confront us in relation to the terms of urban open space and landscape understanding.

According to the synthesis of recent thinking about the complex but vital phenomenon of landscape, conclusion is that cultural urban landscape cannot be seen separable from human activity in space over time, as a product of a complex and multiple pattern-process interactions, where historic sites serve as "*coordinates*" in a primary expression of identity that influence the framing of spatial imaginary of the city.

2.2 Landscape Study and Urban Preservation: Preserving "*Time*" in Space and "*Space*" in Time

Many academic disciplines have found the concept of landscape very important, used as a qualifier that delineates whole sub-disciplines: landscape ecology, landscape planning, landscape archaeology, and so forth. Another case is that landscape studies progress under a broader banner, such as heritage studies [8]. In this regard, within international charters for heritage conservations, last is given by the 2011. UNESCO recommendation on the Historic Urban Landscape. It is outlined a

need for understanding and preserving spirit of the place through application of new methodologies dealing with the concept of landscape which includes a broader interpretation of the historic site, integrating the evolution: monument - site - landscape.
Landscape architecture analysis methods of existing conditions and landscape character are proposed, as the most relevant for the topic of inquiry. During the landscape study specific ecological, social, historical and cultural information about the landscape are collected, revealing particularities and character of given landscape, its genius loci, what represent backdrop for guiding principles necessary for decision making in design proposal [15].
This reading of landscape qualities is possible through analysis based on a socio-ecological and perceptual approach in order to specify the potential, suitability, capacity and the capabilities for future development [2].
It is argued that application of this methodology and landscape architecture approach can make an important contribution to heritage practice.

3. Case Study: Cultural Urban Landscape and Historical Site of Niš Fortress

City of Niš, in 2009 became the member of *L'Alliance de Villes Européennes de Culture* as the first municipality from Serbia, regarding the fact of an almost 2000 years long cultural history as a well known imperial city and the birth place of Roman Emperor Constantine the Great. Today Niš is the second largest city in south Serbia and the capital of Nišavska region with approximately 300.000 inhabitants.
Diversity of natural landscape types in Niš territory has been shaped by two dominant rivers, South Morava going from the south and river Nišava – going from the east, that gave birth to the outstanding landscape developed in the Nišava valley, characterized with cultivation patterns in contrast to the mountain terrain in the north-east direction (Fig. 1) [13]. During the history the city was considered "the gateway to the East", connecting East with the West and North to the South. All this influenced the turbulent and violent history of the city, followed with glorious cultural urban climax and forced disappearances. Today, material traces of life from antic, byzantine and medieval period are rare to be found in great number, but markers and scares of its long history are integrated in spirituality of modern city core.

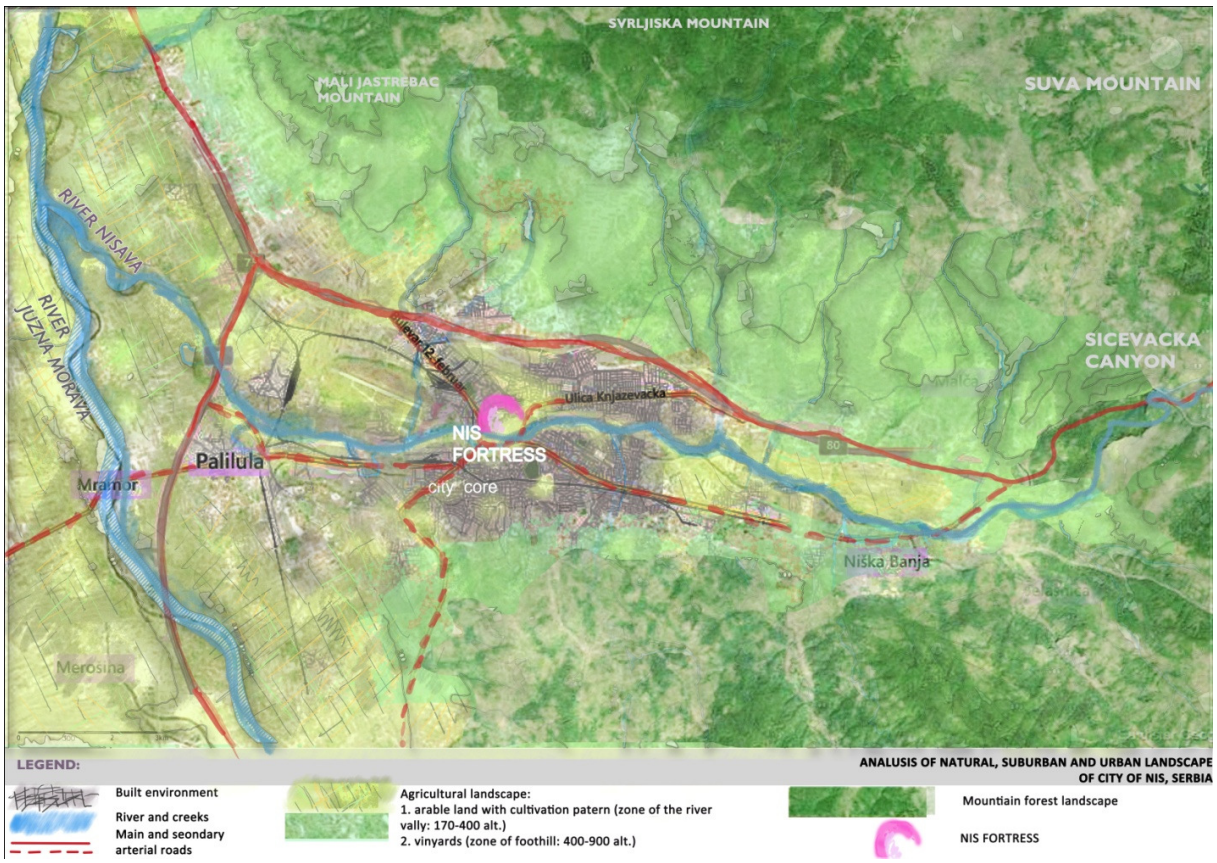

Fig. 1. Analysis of Natural, Suburban and Urban Landscape of the City of Nis (after: J.Rakocija) [13]

3.1. Heritage Landscape and Pattern-Process Evolution

The Ancient city of Niš (*Naissus, Ναίσσος*) occupied the central position in the Roman province of *Moesia Superior*, formed in the first century AD in the center of the Balkan Peninsula (Fig. 3). It was situated at the crossroads of the main roadways connecting the southern cities (Thessaloniki, Scupi, Ulpiana) with the northern ones (Singidunum). This was definitely recognized suitable geographic location, right on the elevated plateau at the foot hill of the Vinik and strategic position: for the formation of a military camp castrum. The Romans conducted the process of urbanization with main streets (*cardo* and *decumanus*) and forum (The route of the street, a decumanus, is discovered in the center of the Fortress) [12]. The continuity of the space and ancient urban pattern with forum is archeologically confirmed also to be used in the Early Byzantine and Byzantine period, when the church replaced the roman municipal building, and even in ottoman Nis, when the Beli-Bey mosque was built in 1521 (today preserved) on the place of the church. Important landscape metamorphosis is featured in the first regulatory plan of Nis made by Austrian architect Vinter from 1878, which respected the the spatial orientation on the south river bank of Turkish oriental Niš, but introduced the western models of streigh lines (Fig. 3 right-iv) [14].

The evolution of urban space from ancient to medieval city was followed by great destructions: the city was eclipsed in the massive damage of the Huns and finally In the seventh century, by Avar-Slavic invasions. In X century Nis again was revived in the Byzantine commonwealth, now named Nisos (Νισος). As the other major Byzantine cities in this region (for example Novi Pazar) and city of Niš was formed on the three hills, the core of the walled city was its **acropolis** inside the fortress and particularly esteemed sacred part around the city wall is formed with church and monastery complex (the remains of the early Christian necropolis in today's urban settlement Jagodin Mala and preserved remains of the a **monastery complex with Church St. Nikola on one hill and Church Pantelejmon on the other**) (Fig. 2.). In this directions was happening the expansion of the urban space, what is predominantly seen in today's layout [12]. At the beginning of XVIII century Turks started construction of one of the biggest fortresses at the Balkans that covered surface of 22 hectares dominating still the existing urban layout (Fig. 3 right-iv) .

Without a doubt, the most prominent landscape transformation in Nis occurred with oriental-Ottoman invasion, but on the other hand it is confirmed that Turks have respected the heritage and sacred spaces, adjusting them to their own needs. Therefore, Byzantine influence during the Middle ages, is probably the most important, crucial period in framing the spatial imagery in the Balkans, because it is precisely the moment when the conception of space was influenced by new interpretation of the world shaped by the new religion, Christianity. Break down of the Roman empire, meant also the first break down between east and west, influencing the landscape imagery. Religious conception of the space, generated the type of urban open space - with symbolic and structural unity of the landscape in recognizable manner and relation of the city and the church[10].

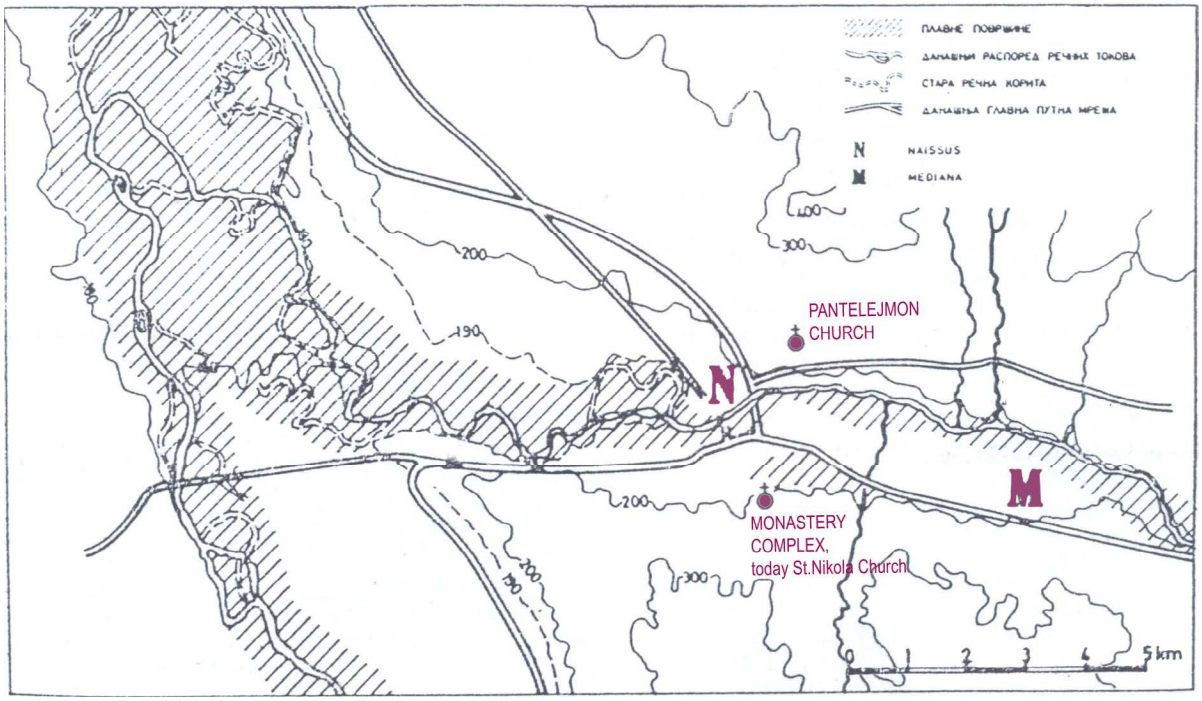

Fig. 2: The character of Natural environment with position of the walled city (**N**) with surrounding location of byzantine monastery complex-today Church St. Nikola and church St. Pantelejmon in Niš valley. Marked position of Roman Villa urbana – (**M**) Mediana.(source: J.Rakocija, according to J. Ćirić)

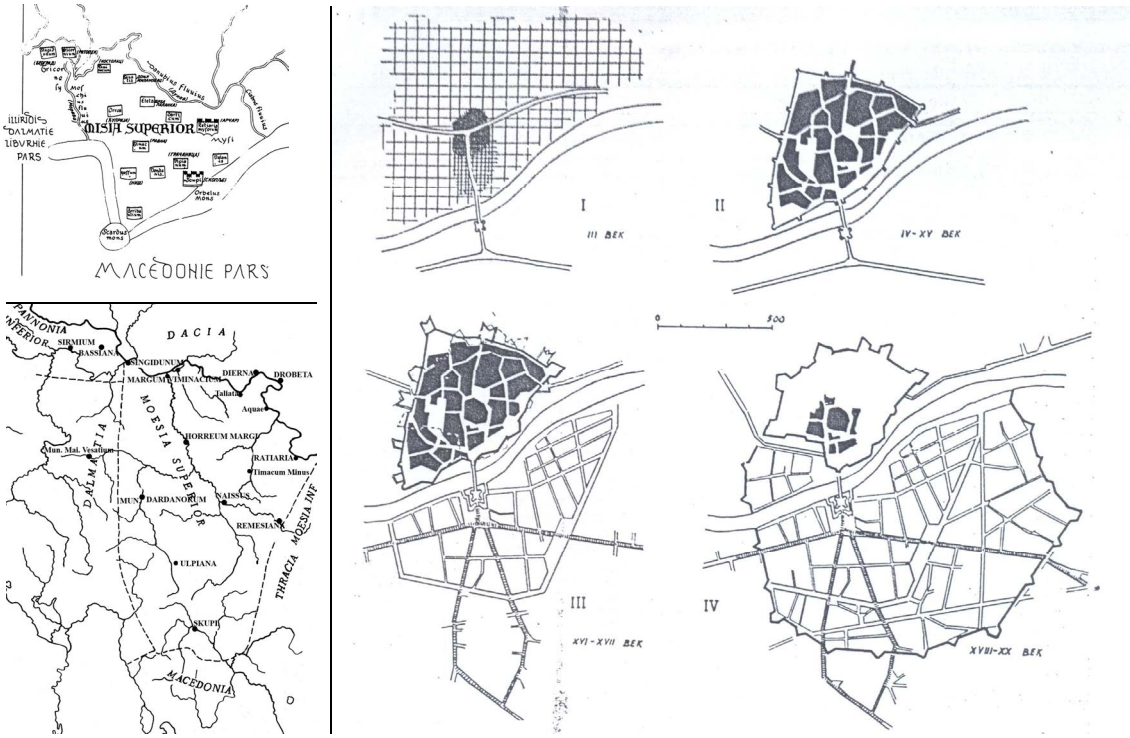

Fig. 3: Left top: Ptolomej map of Balkan peninsula,II c. (М. Мирковић, Istorija srpskog naroda 1, 1981). **Left bottom**: Central Balkan provincies of Early Empire. **Right:** Stages of urban landscape evolution: I – until 3rd c.; II – from 3rd until 15th c.; III – from 16th until 18th c.; IV – from 18th until 20th c. (after: D. Jovanovic, Neki topografski podaci o starom Nisu, in: Starinar, 1956)

3.2 Contemporary Urban, Cultural and Historical Landscape of Niš Fortress. Proposal

"In our vision of the modern Niš, was installed and that width which in its time radiated a thriving imperial city."
D. Medakovic [11]



Fig. 4: *Panoramic view on Nis fortress from the city center (photo: http://sr.wikipedia.org/sr)*

The landscape qualities of evolved urban landscape, as the long-term process, reflects the scenery that is framed within topography and revealed in the sense of spatial atmosphere:
1. Obvious centrality of the urban tissue emerged on the dominant curve of the river Nišava, as to be later centrifugally developed under the curve, seen today in radial lines of central urban tissue, together with linear extension of the city along the river front and parallel to it.

2. Built environment shaped around the river, folded and overlaid around it, in compositional unity which essentially follows the river flow, and seems to start from the confluence of two rivers, and disappears into the crack of Sićevačka mountain.
3. Scenery of the Fortress within natural composition as the live green north boundary of the city with reach natural feature of high trees dominating the inside the Fortress and giving that artistic simulation of emerging from the plain of the river that ascends into the mountain ranges within the background of the city (Fig. 4.).
In addition to the analysis of the cultural urban landscape, as the basis for planning and design proposal, it is concluded that a key element in giving Nis its worldwide identity is understanding of rich layered history and topological semiotics that occur inside the fortress in coexistence within natural and urban landscape. The unification plan of public open spaces with historic monuments and constituting main network of axis, named historical paths [13]: connecting Nis Fortress with the Byzantine monastery complex near St. Nikola church, and with the sacred space of the martyrium in Jagodin Mala (the remnant of the necropolis and Early Christian Naissos), is proposed (Fig. 5.)

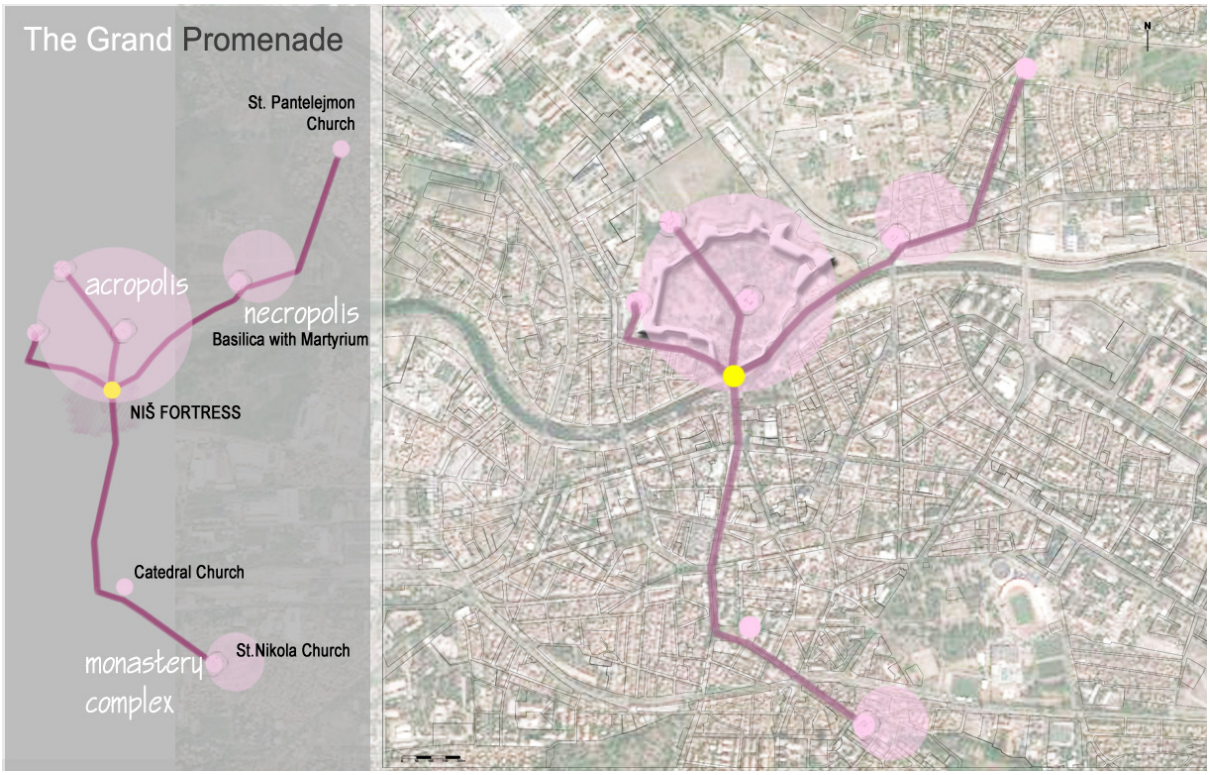

Fig. 5: Revival of the Christian historic landscape of Nis: position of Acropolis, Byzantine monastery complex and Necropolis, with possible connection of historic sites within Grand Promenade (after: J.Rakocija) [13]

According to the landscape analysis of Nis Fortress, four landscape character entities [13] are defined on the basis of broadly similar cultural, social, ecological and perceptual patterns, whose quality should be considered in future design proposals:
1. Entrance area is defined in predominance of urban character and planned vegetation associated as “TRANSITIONAL” site from the built environment of the city center into natural Fortress ambient (Fig. 6., Fig. 10.)
2. FOREST site is found in the central and east parts of the Fortress, characterized by high vegetation (Fig. 7.)
3. “ENCLOSED” site with archeological remains of roman street at the place of the forum, is found in the center, on the highest point of the Fortress - acropolis. The sense of enclosure is found in the tree mass that represents natural perceptual boundary (Fig. 8.)
4. “FILTER” site, occupying the west, central and peripheral parts, is characterized by scattered vegetation masses which disappear in the marginal spaces of the fortress and edges of the walls. This transition is characterized as filtration of the natural vegetation and accordingly the name is assigned (Fig. 9.)



Fig. 6: Perception of the Fortress from the city center, TRANSITIONAL site from the built environment of the city center into natural Fortress ambient. (photo. J.Rakocija, 2013) [13].



Fig. 7: ENCLOSED space of central are of Nis fortress with Beli Beg mosque that used to be Acropolis of the city, has a potential to represent an symbolic scene as a former place of city forum. (photo. J.Rakocija, 2013) [13].



Fig. 8: Central inner part of Fortress characterized with dominant natural character of FOREST landscape (photo. J.Rakocija, 2013) [13].



Fig. 9: Marginal east spaces inside the Fortress. Interruption of tree masses on the open views is characterized as FILTRATION of the natural vegetation what gives an possibility in perceiving of the Wall edge. Feature that should be incorporated in design proposal (photo. J.Rakocija, 2013) [13].

4. Conclusion: Continuity of Discontinuity

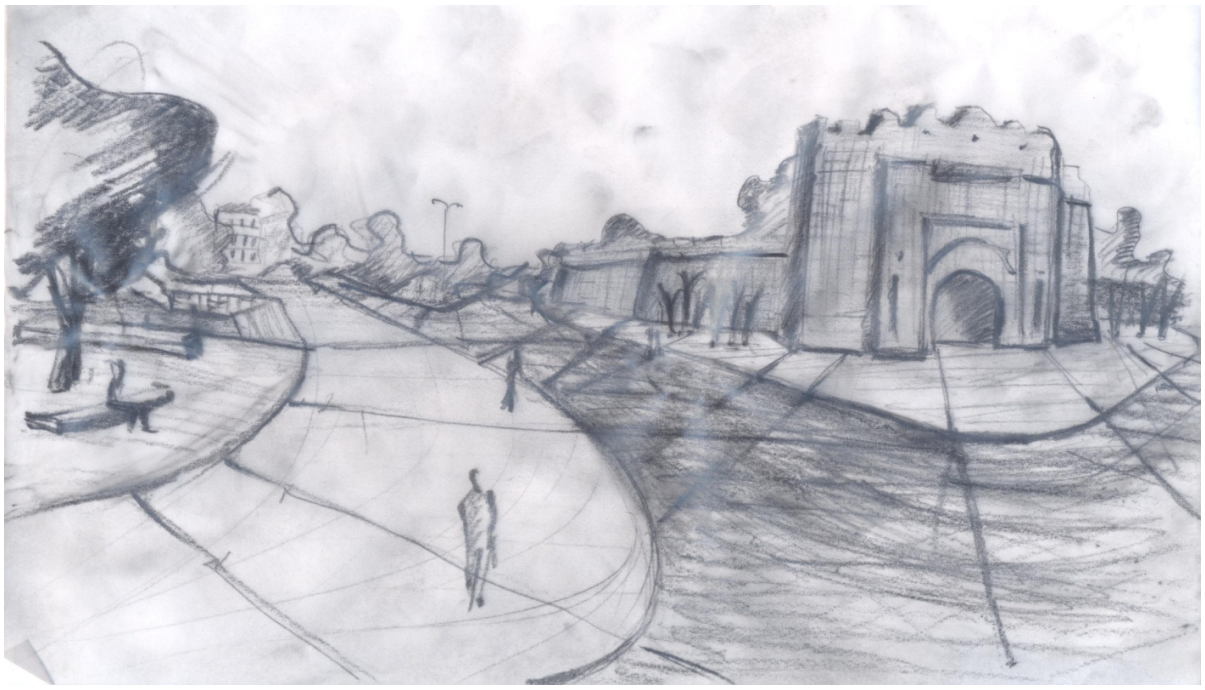

Fig. 10: Hand Sketch as a imagined proposal for entrance area (J.Rakocija, 2013) [13].

Niš is the spatially organized city, coherent urban and natural entity that has its genesis, development, climax and forced disappearance. All this in a period ranging from antiquity to the late Middle Ages, in a way recognizable for many important urban centers within the wider Balkan region.
Historic sites in the city, apart from being a palimpsest of architectural forms encased in a network of urban discontinuities, are also places with deeper sense of meaning where continuity of landscapes in temporal contexts reveals **patterns and process,** rhythms and values that were layered through **time and space**, on and within land and gave “spirit” to the place. The concept of dynamic change and urban discontinuities is associated with continuity of rhythm and ways which according to G. Jellico create urban spaces and demonstrate a sense of human purpose in place and time.
In addition to the pursuit of the landscape study as the basis for heritage preservation, planning and design proposal for historic sites as open spaces of the city, the proposed paper forefronts the landscape architecture as science and art dedicate to reading and understanding of landscapes as a creative products and records of human experiences, actions, beliefs and relationships in space over time, capable of expressing identity and society’s goals and ambitions, where historic *time* in space and *space* in time, is an urban texture, becomes the focal point for future enrichment of urban life.
Proposal was made in constituting of the network of historical paths to revive the past pattern and process as a symbolic framework for Christian Niš, with recognized four landscape characters in relation to the contemporary life and perceptions within the Niš fortress.

Bibliographical References

[1] ANANIADOU - TZIMOPOULOU, M., 1997. Landscape Architecture. Urban Space Design. Thessaloniki: Ziti Editions (in Greek)

[2] ANANIADOU – TZIMOPOULOU, M., 1996. Cultural Urban Landscapes. A Future for Historic Gardens and Sites in Thessaloniki. In: Paradise on Earth. IFL 33rd World Congress Proceedings, 1(1), pp. 148-153.

[3] ANANIADOU – TZIMOPOULOU, M., 1999. Greece. The legacy in Landscape Design. In: Topos, pp. 88-94.

[4] ANSCHUETZ, F.K., WILSHUSEN, H.W. and SCHEICK, L.C., 2001. An Archaeology of Landscapes: Perspectives and Directions. In: Journal of Archaeological Research, 9(2), pp. 157-211.

[5] BELL, S., 2012. Landscape: Pattern, Perception and Process. 2nd ed. New York: Routledge.

[6] BIRKSTED, J., 1999. Relating architecture to landscape. London: Taylor & Francis.

[7] CARMAN, J., 2002. Archeology and heritage. London: Continuum.

[8] HOWARD, P., THOMPSON, I. and WATERTON, E., 2013. The Routledge Companion to Landscape Studies. New York: Routledge.

[9] KADIJEVIĆ, A., 2010. Architecture and Sprit of Time. Belgrade: Gradjevinska knjiga.(in serbian)

[10] KIRICHENKO, E., 2008. The Church and The City: On The Symbolic and Structural Unity of the Russian Sacred Space. In: Comparative studies in sacred Spaces. Russia.

[11] MEDAKOVIC, D., 2002. Messages of Byzantine civilization. In: M. Rakocija, ed. 2013. Nis and Christian heritage. Nis: city of Nis.

[12] RAKOCIJA, M., 2013. The Constantine's City - Ancient Christian Nis. Niš: Grafika Galeb.

[13] RAKOCIJA, J., supervisor Dimitriadis, E.P., 2013. The Fortress in the Center of the City - Nis, Serbia: Urban Landscape Architecture for the Historical and Cultural Site. Thessaloniki: AUTh.

[14] RAKOCIJA, J., supervisor Ananiadou – Tzimopoulou, M., 2012. Nis Fortress as Natural and Cultural Landscape. Thessaloniki: AUTh.

[15] J.RAKOCIJA, M. DIMANIC, 2013. Affirmation and Integration of Architectural Heritage in Urban landscape. Contribution of Landscape Architecture,In: C.C. Fiorentiono and M. Piscitelli, eds. 2013. XI Forum: „Le vie dei Mercanti: Heritage, Architecture, Landesign“. Italy, Napoli: La scuola di Pitagora editrice.

[17] SHULZ, N.C., 2006. Existence, Space and Architecture. Belgrade: Gradjevinska knjiga.

[18] TILLEY, C., 1997. A Phenomenology of Landscape: Places, Paths and Monuments. Providence: Berg Publishers.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Sarno river and its plain

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Abstract
The research deals with the theme of the reclamation of a territory rich in memories of the past and in important traces of its country and settlement's culture, today overall largely degraded.
The study area is the plain of the Sarno river, on south of Vesuvius Mount, between the slopes of the volcano, the Picentini mountains and the sea coast, with the river as central axis.
It's just an area full of historical memories: Pompei stood there with its harbour on the river, Stabiae and Nuceria, and there are the remains of several *centuriatio* that left the marks on which the territory was built. Since ancient times it was been crossed by major communication routes between north and south. The Sarno river, with its central axis and an extensive network of tributaries and canals, was the principal resource of the area, due to the abundance of water and to the rich volcanic soil, and it has always been a land of specialized crops and of manufacturing production. Even today it's an important agricultural area, and a landscape of interest.
But now the plain, especially towards the sea, is a territory invaded by an uncontrolled urbanization, with high density zones of poor-quality buildings, who have paid some cities between them. And the carelessness made the river the first cause of the ecological disaster of this area (with waste, industrial and food poisons): a typical urban territory sprawled and polluted.
So we think an important design issue is thinking of the Sarno River as the soul, the element that still can restore the lost area identity. So (after the rehabilitation already begun) it will be possible to redevelop the relationships between urban areas, rebuilding their hierarchies, and restore the character of agricultural areas and the existing typical nature, by protecting and enhancing them

Keywords: Urban design, geography, infrastructures, urban-rural settlements, collective centers.

1. Geographical structures and urban-rural settlements
The architectural issues addressed in this study mainly relate to the theme of the existing relationships between the territory's geographical structure and the urban settlements and human works arrangements. From this relationship we think today it's possible to start again for the reclaiming and the transformation of deteriorated areas.
The history of the human land occupation has always been linked, as it's well known, to the criteria of selection of the most suitable places for different activities, of practical choices for a good life, safety , health, productivity. These criteria then become rules, measures and settlement's forms with ritual, canonical, symbolic characters, all closely related to the different cultures and eras. Just think of the recurring foundation's elements of the Hippodamus city (Coppa 1968). Or the *sulcus primigenium* in Italic settlements. Or the *centuriatio* of territories in Roman times (Bussi, 1984), when the practical needs of the division and allocation of the fields is matched by a whole world of measures (the actus, the iugerum, the heredium, the centuria), of guidelines, of hierarchies that have become persistent signs of a settlement culture. But also they have became the particular characteristics of entire areas of the Italian territory, recognizable landscapes. Fields, roads, urban settlements, canalizations systems, are all signs around which the transformations of those territories has been carried out. And still today they could be the structure around which to rebuild a persistent character and a recognizable identity.

Already in Vitruvius the choice of the places where *condere urbem* or *coloniam deducere* was linked to health and fertility. Or in the pages of Alberti we find information on "the shape of the decent and charming place; never lower sunk, but rather high above the surrounding area, and that can be continually cheered up by a good air".
So even in the modern era, considering the problem to devise the new post-industrial city, Ludwig Hilberseimer (1949) designed a precise limited-size settlement units, to be distributed in a widespread and regular way on the territory. He divided them into different functions, arranged in a non-confrontational way and careful of the exposure and winds. And he tested the feasibility and adaptability of these schemes right through their inclusion in geographically and topographically different places: along a river, on a hill, in rural areas of varying nature. And the geographic features determine the adaptation and variation processes, related to that specific place. So he reached a definition of an *urban-rural planning system,* where to retune industry and agriculture with the human settlemenst, as a new model of modern urbanization with regional character.
Starting instead from a reading of architecture and design of a well-defined geographical territory (Abruzzo), Agostino Renna (1980) detects a character that he still calls "urban-rural", in which "the emerging feature ... - relating to the use and the occupation of the soil, to the precise demarcation of the place, to the very small buildings amount compared to the entire area - is that both the buildings and the not built land assume the same role and dignity in the overall composition ... the possibility of an urban shape, including the countryside as its permanent member, emerges from this research." The countryside, with the activities that take place there, it is understood as an element of the construction of the morphology of this particular form of non-compact city.
Not only the relationship with nature and the topography directs modifies and conditions the human intervention, the urban forms and the architecture, but the same structure of the territory, the elements that are present, their reciprocal arrangements define the character and the shape of the areas.
What I mean is the morphological structure of a persistent territory, arisen from the defined relationships between the present elements (that river with that plane, with those mountains ... linked to that specific location), is the matrix of identity and recognizability. And really those are the characters that scattered or cumulated current urban and territorial transformations tend to forget and cover with indifferent plots.
With this setting, this study is aimed at the reading of the Sarno plain, a territory between Naples, Vesuvius and Salerno, a clear geographic structure, rich in resources, full of memories and signs. But today it's affected by large deeds of scatter and land consumption, with linked settlements, and a high environmental pollution.
Even in the existing urbanized areas, difficult to read and to understand, as the Sarno plain, it continues to seem inevitable a reading methodology to highlight, to describe and to make a list of their basic elements. As always it’s important for us to try to identify what is really part of the city building, or of the territory, whatever is the nature of the described area.
And so also in the case of contemporary problematic areas the aim is always to think that "the so-called chaos is quite a still not understood order" (Corboz 1998), to know and investigate its components, to "find places in the chaos" of the urban territories, "to give them a name, and to develop their peculiarities. It’s therefore an art of urban discovery and not of invention "(Ungers 1997).
Today we must understand which aspects of these complex urban territories (and compromises) are the real components of their structure and the potential development points for the transformation, and which ones are to overcome and abandon, avoiding to raise the "degradation" in an aesthetic category.
So it’s necessary to describe, select and put back together the area's interesting data with a different logic, with the same attention to everyone: from the special characters, with the memories that each past filed and transformed into meaningful marks, up to the current emerging issues that these areas show us. We want to together re-put them, to give other possible readings of the elements, and to form, with the design interpretation, new and varied interesting relationships between things. This one, with appropriate and realistic (for feasibility and use) visions of the future (needs), will let us imagine a more beautiful and livable territory. (Gregotti 2008, De Solà Morales 1999).
The characters of the reading of urban areas, so as we have done it, have a designing and an interpretative valence. This complex and layered reading will allow us to identify inherent issues in the different areas, where the generality of the chosen theme joins itself to its precise delimitation and to the peculiar needs related to the place's individuality. (De Matteis 1996, Lucci 1998).
This reading then has taken to identify the overall Sarno plain as a city-countryside: a spread polycentric urban-rural city, consisting of small urban centers, from a tiny network of local roads that follow the trends and divisions of the fields, and finally, from an extended part of productive countryside.
The themes of the project, identified to conduct the plain to its regeneration as an unified and eco-sustainable settlement system, have addressed the issue of the relationship between natural

infrastructures of the territory and public places of the city and of the countryside, understood as a system oriented to the overall area's reconstruction.

2. The study area

The study area is the Sarno river plain extending to the south of Vesuvius Mount, between the slopes of the volcano, the slopes of the Picentini and Lattari mountains and the sea coast between Torre Annunziata-Pompei and Castellammare, with the river as central axis.
It's an area full of important historical traces: Pompei stood there with its harbour on the river, Stabia, Nuceria, and there are some remains of three different centuriatio (Choquer 1987).
The urban settlement types are of different nature and they have different roles and locations, also due to the particular nature of the alluvial soil: each one chose places that would give security against the river's floods: there are two towns on the coast, at the two limits of the area (Torre Annunziata and Castellammare). Then there are the piedmont settlements, standing in upper areas not subject to flooding, as Sarno and Nocera, and those built on small hills in the valley, with the typical circular pattern, such as San Marzano, San Valentino and Striano.
Almost in the center of the plain there is the town of Scafati, real crux of the area, born at the crossroads of two major existing infrastructures: the ancient Puteoli-Nuceriam road and the Sarno river.

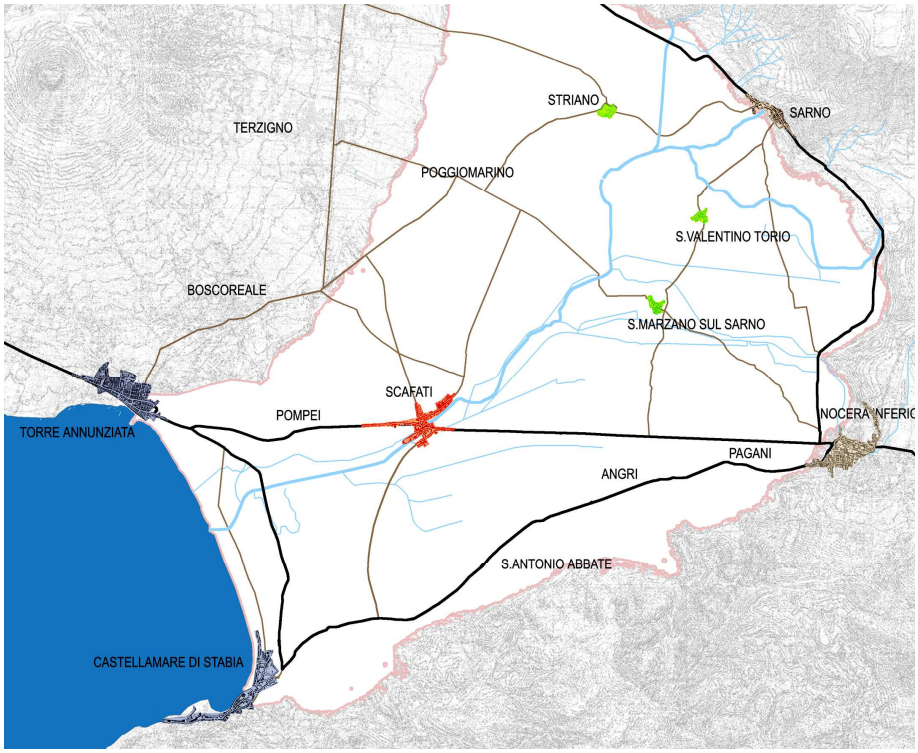

Fig. 1 The original structure of the Sarno plain

Still today the whole plain is a very rich volcanic soil with a dense network of waterways, and this is why it has always been a place of special crops and manufacturing production, a rich and beautiful countryside dotted with farms and isolated individual buildings, with the typical shape of a vaulted ceilings cube (Musi 2003).
Today, especially at the lower stripe towards the sea, the plain is a invaded territory by an uncontrolled urbanization, with high density areas of poor quality housing that have welded together some urban centers (Torre Annunziata-Pompei-Scafati-Angri-Pagani-Nocera) and have lost any distinction between urban and agricultural territory. There are areas of tiny building, often abusive, widely scattered, and a significant presence of plastic greenhouses covering the agricultural soil.
Since ancient times, the area was crossed by two main routes between north and south: the Puteoli-Nuceriam road - then road of Calabria, now 18 SS on the coast side - and the Popilia, at the foot of the Picentini mountains, from Nola, on the other side of Vesuvius Mount. At the present time, these well-established roads have been placed side by side, with a similar direction, by the A3 Napoli-Salerno-Reggio Calabria motorway, and the upper section of the A30.
However the plot of the minor roads until today has remained a minute and irregular network, not organizing for the scattered settlements: the roads do not join two defined points of the plane, but they follow, surround and accompany the shape of the fields. This one enhances the feeling of

disorientation perceiving through the entire area. The Vesuvius remains the only strong element of orientation.
Lately the fully elevated SS 268 Vesuvius road, running in north-south direction, was added to the two highways transversely crossing the flat, in order to improve the possible evacuation of the area for eruptive and seismic reasons. There is also an extensive network of state, regional and local railways, starting with the first and most famous coastal railway line Naples-Castellammare (1840), with the bridge over the Sarno river. The last addition, on the other side, is the current extension of the high-speed line to Salerno. All these lines are uncritically superimposed on the territory with their own technical layout, and still today they are not organically connected to each other.



Fig. 2 The plain today

3. The design

The Sarno plain is currently an area where carelessness turned the river, once so important in the local identity to be identified with the deity of the place (Pesce, Milone 2006), into the responsible of the ecological disaster of the area, with the discharge of waste, industrial and food poisons, and with the lack of maintenance and upgrading of plumbing necessary for the proper flow of the water.
Therefore now it's a typical urban contemporary territory, dominated by housing densification and sprawl, by an extensive network of various infrastructures and by a significant pollution. But, though much impaired, the area still shows a possible unitary structure.
It's a clearly bounded area, with a polycentric network of urban settlements, that we can name city-country because of the structure and the relationships among its components (the close relationship between morphological structure of urban settlements and the agricultural land, and the widespread presence of type of houses linked to production), and finally because of the agricultural vocation, preserved in a large part of the area.
Altogether, it's evident the current lack of clear "urban" relationships between the various settlements, namely the lack of a balance and a mutual role of "necessity" between the elements of the set, and of a hierarchy between parts. Each town has expanded (with different dimensions) according to their own ways, still today in an individual manner through the existing planning instruments. The expected growth and the public facilities are designed with a limited overview of the relationship between the municipalities and the plain. Each administration autonomously develops, "in solitude", the plans for the own municipal territory, and the whole plain is further divided between the provinces of Naples and Salerno.
Whereas the current PTCP (Territorial Coordination Plan of the Naples Province, adopted in 2009 with programming 2009-2014) argues that "the analysis of the identity's components allows an allocation of the provincial system in meaningful areas related to the recurrence, the unity and homogeneity of the environmental and cultural roots". It suggests a vision for over-communal homogeneous areas to perform a strengthening of "environmental infrastructures", a conservation of biodiversity and of landscape identity.

With a similar perspective, the reading design led to believe that the river Sarno can be the soul, the fundamental element that still can restore the lost identity of the entire area. This one will make possible to reconstruct the relationships between the existing different urban areas, giving them a clear hierarchy and returning the typical character to the agricultural areas and the nature, by protecting and enhancing it, even with a reconstruction of the historical plots of rural landscapes.
The axis of the river thus becomes the place along which locate a unique crossing way and the major public places for the overall settlement's structure of the valley, the city-country, where to place over-communal facilities enhancing the identifying characteristics of the territory.
The design mainly identifies the way to "slowly" cross the plain with a new road (all running on the ground , with bike path, pedestrian walkways and parking areas, the red line in the figure) substantially parallel to the course of the river, recovering as much as possible existing paths and local roads. The new road starts from the current Ripuaria road at the mouth of the river and continues until it reaches the town of Sarno at the foot of the Picentini mountains. So it reconnects the coast and the mountains - the two limits of the plain – with a clear sign of orientation and crossing that allows a continuous relationship with the river, now lost, and systematizes the plot of the minor roads.

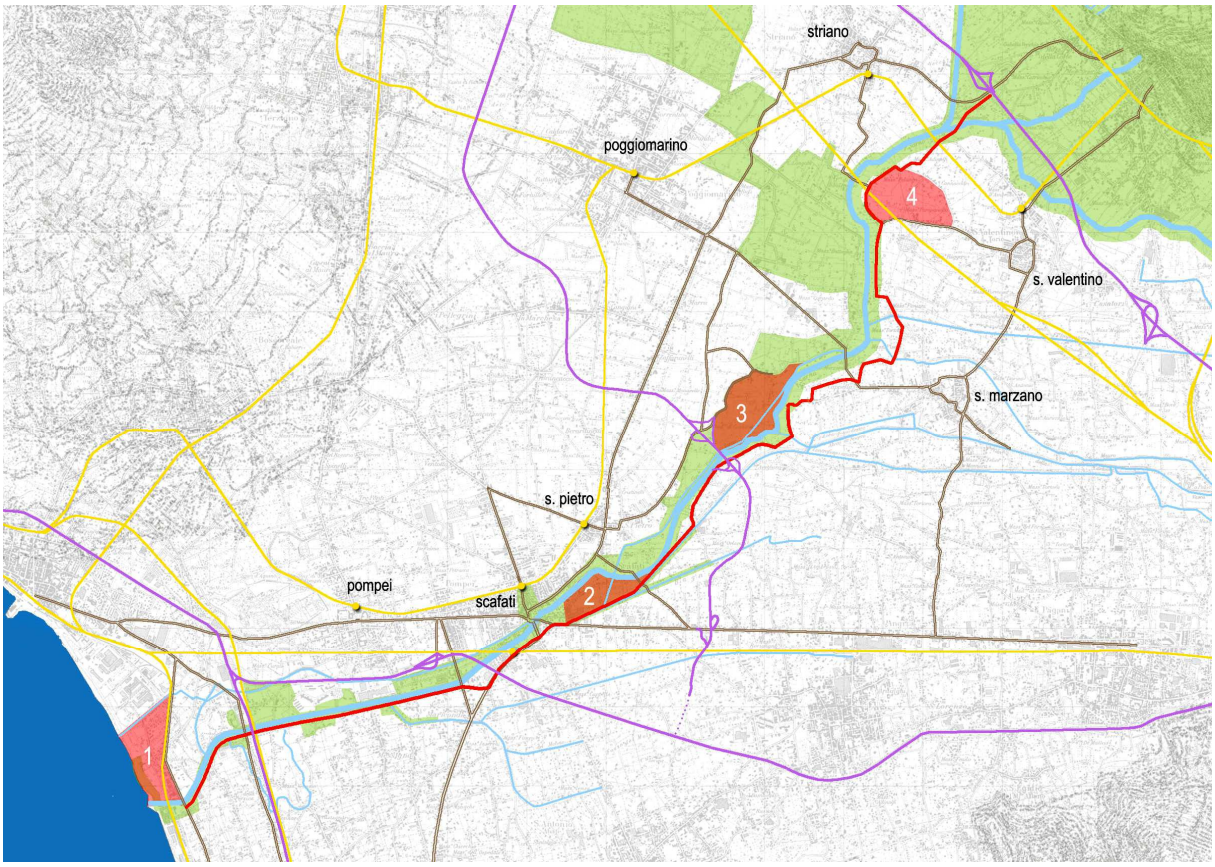

Fig. 3 The design of the plain

The new road is thought as the backbone, as a long central spine along which are arranged the new collective places: along its going there are so localized a series of collective territorial centers, linked to the particularities of crossed zones. Different activities are here condensed, related to present value elements (archeology, nature, agriculture, tourism), to become the main attractive characters for the whole area. These places are connected in an organic way with all existing infrastructures (roads and rails), and are located in different areas of special nature, according to the strategic role of the various zones in relation to the morphology of the valley: the mouth of the river and the coast; the central area of Scafati; the agricultural areas and the landscape on the point of confluence of several river branches and canals; and those areas related to small towns originating in the upper part of the valley, close to the new archaeological discoveries.
The prescribing's principle of the settlements, characterizing all areas, is to consider them as centers of the urban/rural city. Collective activities are here realized in low-density buildings with appropriate characters to the existing urban and rural types. The predominance is given to green areas, some with facilities, part of reforestation, but largely the agriculture is still left. Always everything is in close relationship with the river, and with the new road.

4. The collective territorial centers

In the area of the **Mouth** the theme is the reconquest of the relationship between river and sea, lost for the localization in this coastal area of industrial and manufacturing sectors. Between the current mouth and the new canal that will be the second mouth it will be created a tourist accommodation and spa, with a building structure that refers to the courtyard type. There is also a landing on the new canal and a restored beach. It's provides for a new regional railway station (now there is no intermediate stops between Torre Annunziata and Castellammare), a railway bridge-station reconnecting parts of the territory now cut off from the sea by the tracks. And finally, between the two mouths, it's located a park with facilities, linked with the city of Torre Annunziata in an only urban waterfront, along the beach for bathing use.

In the area **The center**, in Scafati, we want to consolidate the morphologically central structure of the city for all the plain. Like the Sarno city, at north, Scafati is the only urban center where the structure of the river had a strong presence and had entered in the definition of its character. In fact the city was founded around the pons Sarni on Urbulana road from Pompei, and its name originates from "scafa", an old ferry-boat's type. The oldest central district, the Mulini, is born just from the milling activity developed in the sixteenth century. And here it was made a dam and was opened the Bottaro canal to improve the flow of the river. Just beyond this central area, in a bend of the river even in urban areas, it is located the second collective center of the plain, a point to start for the knowledge of the area, and also an improvement of equipment for the city. Here it will be a great info-points (either on news on the riverside park or on the whole area of the Sarno plain and on its vicinity). It consists of a wall's enclosure fabric, with fences and courts, related to the texture of the ancient urban fabric, and directly accessible from the new crossing road. Towards the river shore lies a urban park with facilities for rest and sports (tennis, gymnastic routes, little athletics), and with recreational facilities (outdoor theater and cinema ...), and a naturalist trail on the river, with an wooden elevated walkway with resting places, from which to resume the view of the river, whose banks are often covered by tall reeds.

At the height of San Marzano sul Sarno, in an agricultural area located at the confluence of the Sarno with the Cavaiola canal and other small waterways, there is a **Knot of water**. The elevated road S.S. 268 is the main access, and pedestrian bridges are connected to the new crossing road. Here the prevailing theme is nature, green, and enhancement of agricultural production, with large preserved farmland, and extensive areas of gardens and reforestation (especially towards the river). Here is localized a "SouthEataly" (market and restaurants km. 0) such as a large greenhouse into a garden. Then there is a scattered hotel with small residence buildings in the countryside, some cubes placed in a little regular pattern of new canals; and finally, there is the same elevated wooden walkway, as a mark of constant relationship with the river.

At last, there is the center **Nature and Archaeology**, close San Valentino Torio, in a wide bend of the river with crops and greenhouses, close to recent findings of ancient pile-dwellings .
So it was decided to locate in this area a system of public places with a small archaeological museum that collects the finds, with guest quarters and workshops, and a center for training (for River Park employees and other local needs). There are also educational farms, still reforestation areas along the river and the wooden walkway along the shore, connected to the archaeological site with small pedestrian bridges.



Fig. 4 1. The Mouth



Fig. 5 2: The Center



Fig. 6 3. The Knot of water



Fig. 7 4. Nature and Archaeology

Bibliographical References

[1] Bollettino Regione Campania (2004) 27-5-2004, Parco naturale del Fiume Sarno
[2] BUSSI R. editor, *Misurare la terra: centuriazione e coloni nel mondo romano*, Edizioni Panini, Modena, 1984
[3] CHOUQUER G. et al. (1987), *Structures agrarie en Italia centro-meridionale*, ed. Ecole francaise de Rome,
[4] COPPA M. (1968), *Storia dell'urbanistica. Dalle origini all'ellenismo,* Einaudi Torino
[5] DE MATTEIS G. (1996), *Progetto implicito*, Franco Angeli, Milano
[6] DE SOLÀ MORALES M.(1999), *Progettare città,* Quaderni di Lotus 23, Milano
[7] GREGOTTI V.(2008), *Il territorio dell'architettura,* Feltrinelli, Milano
[8] HILBERSEIMER L. (1949), *The new regional pattern*, P. Theobald ed., Chicago
[9] LUCCI R. (1999), *Percorsi del progetto urbano*, Kappa, Roma
[10] LUCCI R., (2012), Napoli verso oriente, in LUCCI, RUSSO editors, *Napoli verso oriente*, CLEAN ed. Napoli, p.10-12
[11] MUSI P.(2003), *Metonimie. La terra del Sarno*, ed. Patto dell'Agro
[12] PESCE A., Milone A, (2006), *Una storia scritta sull'acqua,* Massa ed., Napoli
[13] RENNA A.(1980), *Le illusioni e i cristalli*, CLEAR ed., Roma, p.68 e 72

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ADA. A *Bilderatlas* of images, bodies and cities

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Maps are to the world as the anatomy of a dead corpse is to a beating heart.

Karl Ritter, *Einleitung zur allgemeinen vergleichenden Geographie*, 1852

We should always remember that the work of art is invariably the creation of a new world, so that the first thing we should do is to study that new world as closely as possible, approaching it as something brand new, having no obvious connection with the worlds we already know.

Vladimir Nabokov, *Lectures on Literature*, 1981

Thinking of a figure signifies looking at them. Figures are seemingly elementary things but strange powers emerge from them; just show some things, people or situations, yet they never tell you what to think directly. On the contrary, it'll be up to you to represent them when you begin looking at them, but to do so you have to be willing to become like those figures, a mystery that never ceases to pose the thorniest of questions for the beholder. Once you have thought of them, you will be fully-fledged authors of those images, this play of emotions and what emerges from them. Are you ready?

Fanny & Alexander, *Ada, romanzo teatrale per enigmi in sette dimore liberamente tratto da Vladimir Nabokov*, 2006

Abstract

Collecting pictures in order to remember lives from the past, examining the built spaces that have housed these bodies more closely, observing them together with their accoutrements which have since dispersed, yet to emerge on the surface as forgotten traces, and thus shedding light on a present which is interwoven with the past in a multiplicity of ways… these are some of the reasons why more than thirty years ago a group of scholars at Iuav – meeting in what was previously the Institute of History and later the Department of the History of Architecture, including Bruno Zevi, Manfredo Tafuri, Fancesco Dal Co – assembled a collection of slides and old glass plate negatives which now amounts to nearly 100,000 images.

This atlas of images, organised through archipelagos of meaning – in practice transparent envelopes containing up to twenty slides each – conveniently viewable on a large light-box. From time to time new routes might be plotted or those previously drawn up by early explorers may be followed.

The digitalization of these images, carried out in the late nineties, has paradoxically impoverished the atlas-like form of this remarkable collection: the archipelagos of architecture, painting, sculpture, coinage, artefacts, drawings, plans, documents, maps, portraits, film stills – once organised by various scholars as a rotating display for the walls of Palazzo Badoer – were no longer appreciable in a single glance, whether or not its limits and boundaries were redrawn.

This led to ADA, a searchable web database in the form of a *Bilderatlas* (picture atlas). It quantifies at first sight the abundance and outstanding nature of its iconographic material, distributing them in the

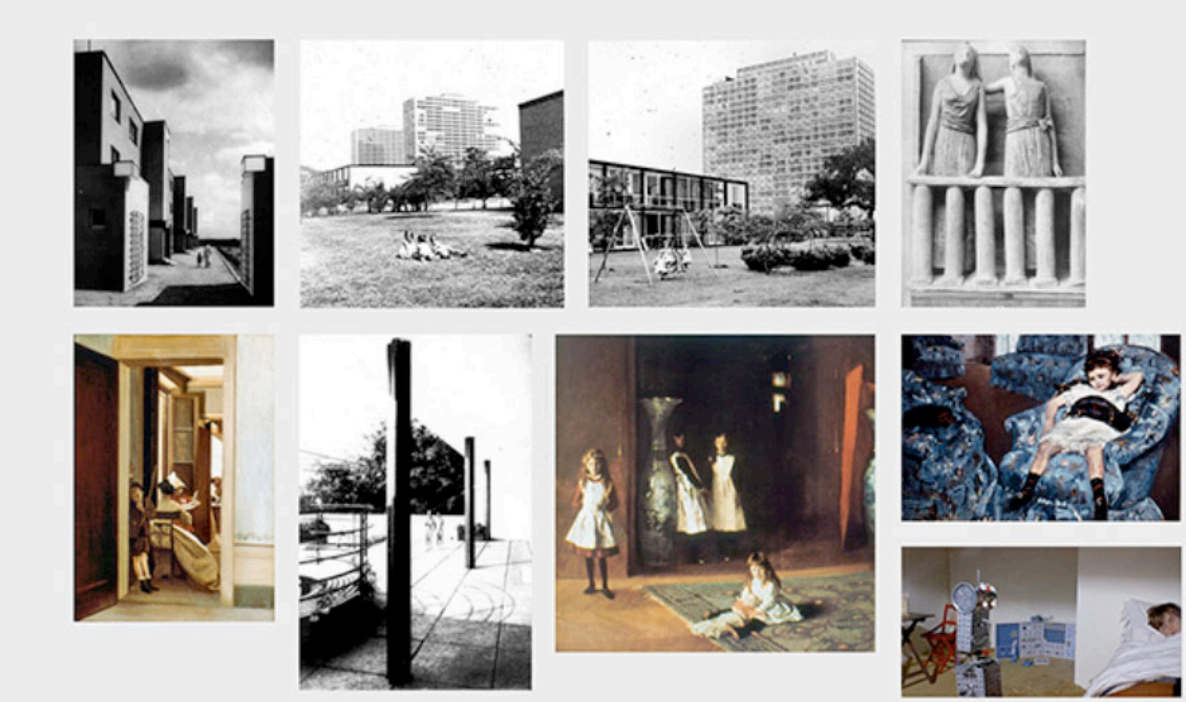

Fig. 1: ADA, Housing the game #03.

form of bright points on a map of the entire globe, thus giving back the ability to visually explore, via ‘light boards’ to both old and new archipelagos of meaning.

Keywords: Architecture, art and technology platforms; Heritage, art and memory

1. The name ADA: a way to describe oneself, reading the other

ADA is a palindrome that gives freedom to movement, which allows entry (*ad*, going to somewhere) and exit (*da*, coming from somewhere) to stand above or below, to look right and left.
ADA or Ardor is a literary work that oscillates constantly between fiction and reality, passion and perversion, body and writing, its summation; it is a world in which the geographical and linguistic nomadism of its author — Vladimir Nabokov — is an anticipation of postmodern globalisation.

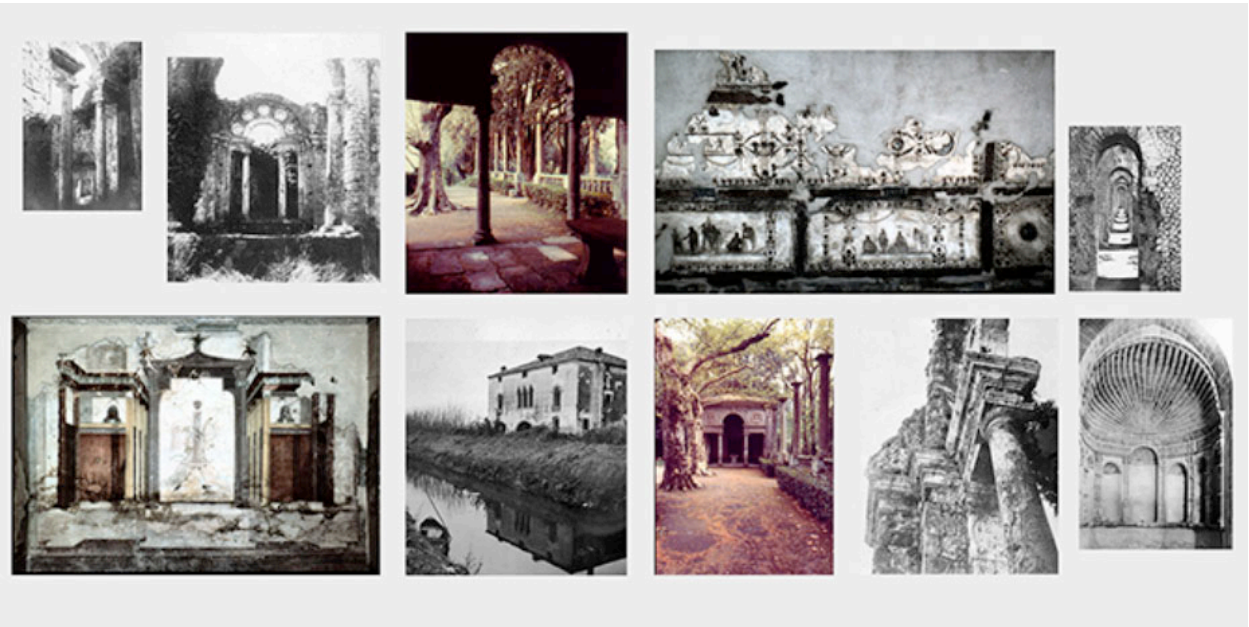

Fig. 2: ADA, Nature and artefact #07.

ADA is a theatrical play; a novel for enigmas in seven dwellings, a game in book form and a free interpretation of Nabokov's work — created by Fanny & Alexander (theatre company) — in which every show/room in turn leads to other rooms, variously linked together.
ADA is one of a number of possible acronyms (Atlas of Digital Architecture, Art Database for Architects or *Archivio di Diapositive Analogico*) .
ADA is a searchable web database parting from a map — an intangible and mutable point-cloud created from images of artefacts and bodies that make up the collection — tracing and overlaying those images onto todays world.
ADA is a *Bilderatlas* consisting of a series of islands, partly formed during the last decades of the twentieth century, partly in an adjustment phase, partly undiscovered.
ADA is a project coordinated by Malvina Borgherini (Department of Architecture and Arts, scientific director of MeLa media lab) and Vitale Zanchettin (Departement of Architecture, Construction and Conservation), also bringing together Flavio Rizzardi (design and construction informatics), Anna Casagrande Zennaro (archival supervision), Gianluca Asmundo, Alessandro Forlin and Eleonora Porcellato (editing and digital graphics).

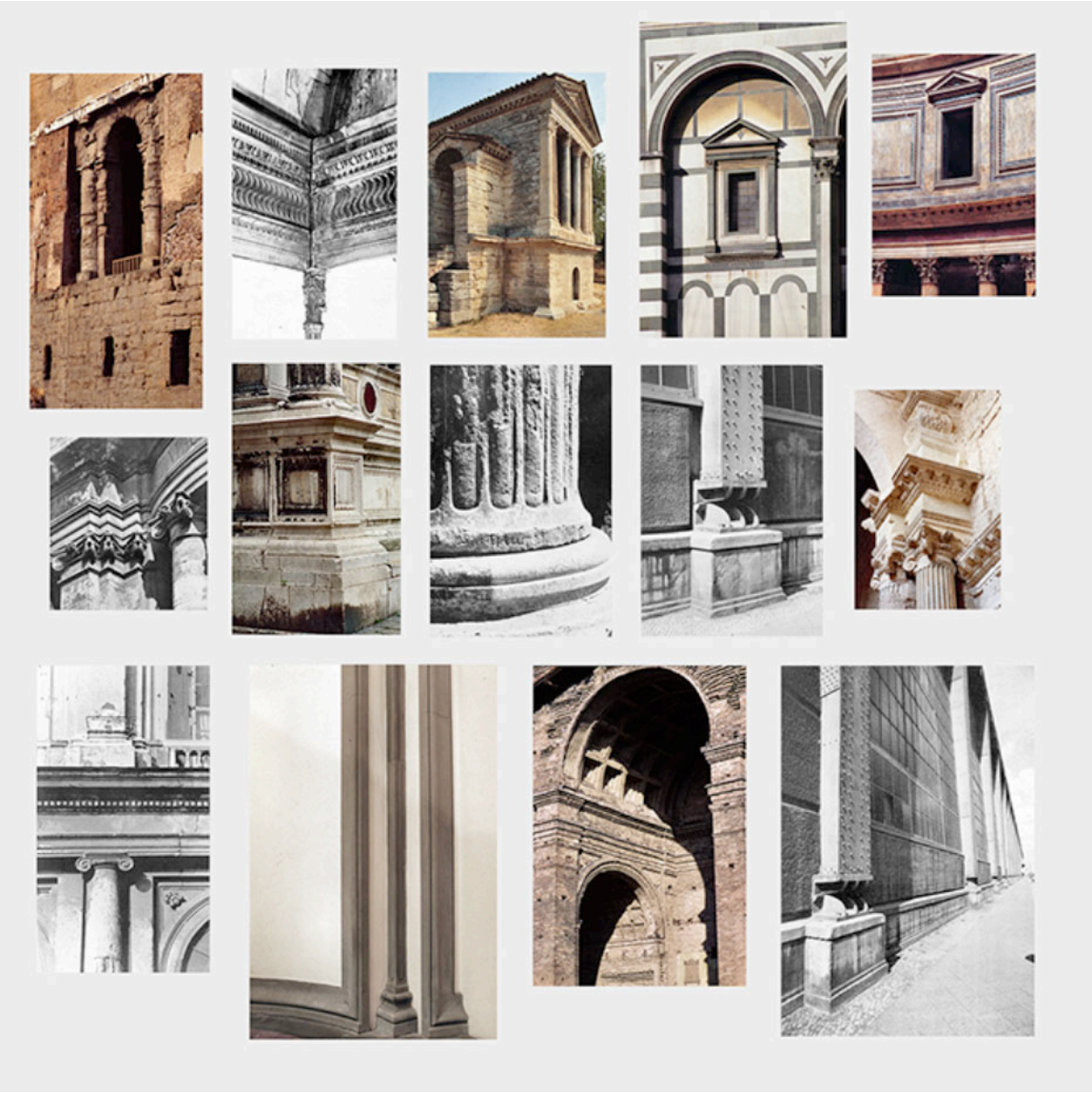

Fig. 3: ADA, Joints #12.

2. The atlas form: a visual form of knowledge, a knowledgeable form of seeing

Hailing from Greek mythology, the figure of Atlas – the Titan condemned to carry the world on his shoulders for all for eternity – is the image of necessary toil so that knowledge can be grasped. And as a

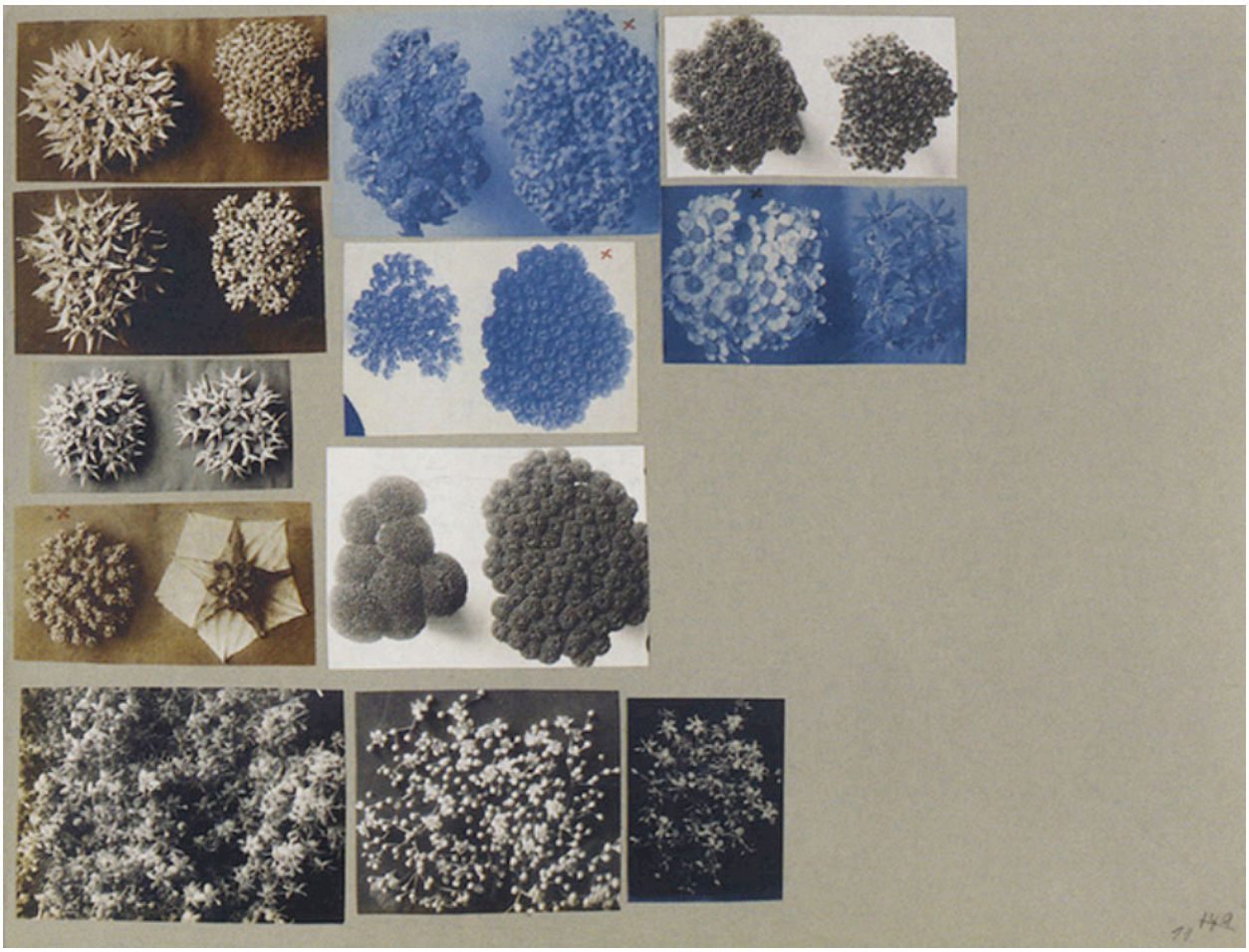

Fig. 4: K. Blossfeldt, *Unformen der Kunst* (1905-25). From G. Didi-Huberman, *Atlas. How to Carry the World on One's Back?*

demonstration of his importance the vertebra that supports the most consequential part of the body – the head – takes its name from the powerful giant.

The form that the endeavour will model itself upon will be precisely that which has established the spread of knowledge of both the starry heavens and the entire globe: that of the atlas. No longer mythologial (where things are found inside one another, like the earth contained within the celestial sphere), but in the form of a modern map collection, in which for the first time in space (deriving from the Greek *stadìon*, the unit for measuring of distance) all parts are mutually equivalent (Farinelli, 2003). Indeed, from the sixteenth century onwards, atlas maps displayed geographic scales, the graphic indicator for the linear scale of the drawing in ratio with the measure of reality.

But if we reflect on the ways in which an atlas is traditionally used – and in this regard we follow the path around the margins of the exhibition (and in the book) *Atlas. How to Carry the World on One's Back?* (Didi-Huberman, 2010) – we find that it does not 'read' as a novel or a historical essay from first to last page. We note that this strange book is not made of 'pages' in the usual sense of the term (written or illustrated), but rather *tables* within which a number of *images* are arranged. When we consult it, seeking highly specific information, sooner or later our attention will start to veer off down streets and take unforeseen turnings where we are inclined to lose ourselves, forgetting the passage of time .

The atlas, in short, with its seemingly innocent and utilitarian aspect is a unique 'visual form of knowledge, knowledgeable in the form of seeing.' […] «Yet, combining, overlapping or *implicating* the two paradigms that this last expression assumes – an *aesthetic* paradigm of the visual form, an *epistemic* paradigm of knowledge – the atlas in fact subverts the canonical forms in which each of these paradigms tried to find its own excellence and even its fundamental condition of existence» (Didi-Huberman, 2010).

Platonism has handed down an epistemic model founded on the primacy of the Idea: true knowledge assumes that an intelligible sphere is extracted or purified from the sensible space – the world of images – where the phenomena appears to us. And in the modern versions of this tradition things (*Sachen* in German) find their reasons, their explanations only in causes (*Ursachen*) correctly formulated and deduced through the language of mathematics.

The atlas form, in spite of every epistemic purity, introduces the sensible dimension into knowledge, and the diverse, and the lacunary character of each image. Its principle, its drive, is nothing more than

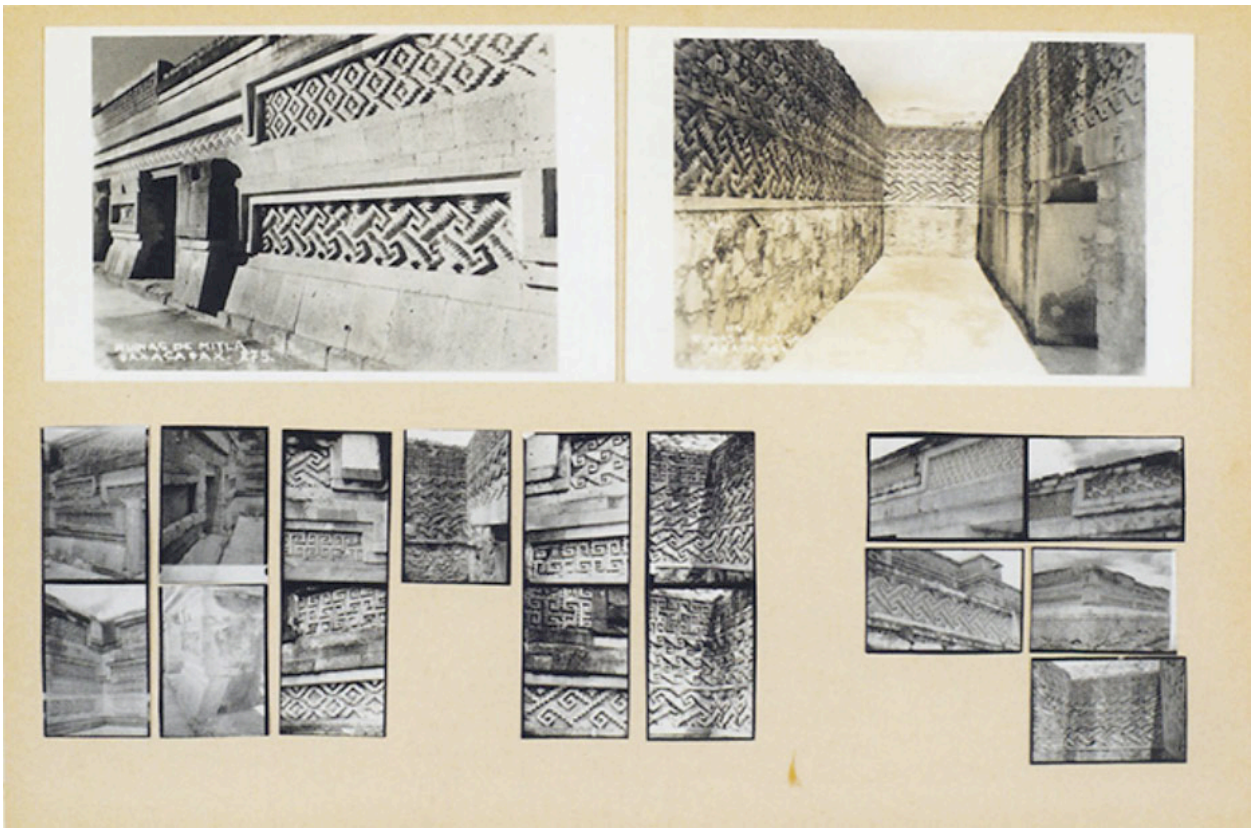

Fig. 5: J. Albers, *Mitla, Mexico* (ca. 1937). From G. Didi-Huberman, *Atlas. How to Carry the World on One's Back?*

imagination, that extraordinary aptitude by which a casual glance may suddenly reveal connections which might otherwise have escaped a more meticulous observation.
«The Imagination is not fantasy; nor is it sensibility, even though it is difficult to conceive of an imaginative man who would not be sensitive. The imagination is a quasi divine faculty which perceives first of all, outside of philosophical methods, the intimate and secret relations of things, the correspondences and the analogies.



Fig. 6: G. Richter, *Baader-Meinhof gang* (1977). From G. Didi-Huberman, *Atlas.*

The honours and functions that he [Poe] confers on this faculty give it a value such… that a wise man without imagination non longer appears like a false wise man, or at least like an incomplete wise man» (Baudelaire, 1857).
There are two ways of understanding the passage: one, the most direct, chasing the message, and another, more imaginative reading which stretches into the montage. An atlas of images can thus be a reading machine in the very broad sense that Benjamin wished to confer on the concept of readability: you get into a constellation of devices ranging from the *camera obscura* to the photographic camera and camcorder, as well as from the cabinet of curiosities, or more mundane versions; shoe-boxes stocked full of postcards that can still be found amongst the stalls along old Parisian thoroughfares .
At the end of the nineteenth century, and especially during the first three decades of the twentieth, there erupted an earthquake among scholars working in what we now call the humanities, triggering a collective consciousness: not only in the works of George Simmel's sociology, but also in Marcel Mauss's anthropology, as well as Sigmund Freud's ventures in psychoanalysis and Aby Warburg's studies on iconography; the mediating role of the imagination and its imagery as a basis for knowledge was recognised for the first time.
The Warburg's *Bilderatlas* (picture atlas) *Mnemosyne* in particular not only radically changes the way to organise and reproduce studies of ancient and modern artworks – from the first decades of the twentieth century onwards – but also acts structurally as a way of conceptualising and laying out the works of many contemporary artists.



Fig. 7: T. Dean, *c/o Jolyon* (2012-13).

3. Memory and imagination: thinking about memory as an act of creation

In the exhibition *Atlas. How to Carry the World on One's Back?* by George Didi-Huberman (in Madrid at the Museo Nacional Centro de Arte Reina Sofia, Karlsruhe's ZKM Center for Art and Media and Hamburg's Sammlung Falckenberg in 2010–11) the intent seems to be the creation of a montage of figures, a constellation of graphic, photographic and video-graphic memories accrued by invited artists in order to shape this magnificent atlas inspired by the Warburg's *Mnemosyne*. It ushers in a comparison between the idea of an imaginary museum and the more recent hypothesis of a virtual museum or universal access to images, yet it's also a reflection on the close relationship that we forge between memory and the act of creation.
The theme of memory and its reinterpretation in the form of work/atlas is not an unusual one, it's even found in major international exhibitions such as dOCUMENTA (13) in Kassel in 2012, curated by Carolyn Christov-Bakargiev. In the main venue, the Fridericianum's Rotunda, I saw the most touching 'atlas' that I have ever had the chance to explore. To name but a few pieces: a small glass showcase containing Man Ray's *Indestructible Objects* (1923–1965) and *Perpetual Motif* (1971), accompanied by a letter from Lee Miller to Man Ray (1929) and a photograph by the artist of the young student Miller (1932) who then reappears, shoulder to camera, in Hitler's bathtub a few years later (1945). Along the perimeter of the Rotunda are other objects placed between two seemingly identical stones: actually it's a single work by Giuseppe Penone, *Essere fiume 6* (*Being River 6*, 1998), consisting of a sizeable river



Fig. 8: dOCUMENTA (13), the Fridericianum's Rotunda, or *the Brain* (Kassel 2012).

boulder and its exact Carrara marble replica. Penone places them (as a collector more than an artist) amongst display cases containing other, much smaller, older, hand-fashioned stones: these are the so-called Bactrian Princesses, mostly female figurines, carved from small pieces of soapstone, calcite and river pebbles between the late third and early second millennium BC, by an ancient civilisation from the Turkmenistan, Uzbekistan and northern Afghanistan region. Here also are two old postcards sent from Afghanistan, images of pre-war Kassel by Tacita Dean, after having water-coloured them, superimposing small fragments of modernity, and sent via Jolyon Leslie, CEO of the Aga Khan Trust for Culture from Kabul. On the opposite side of the wall to Lee Miller's photos I found a curious piece of Giorgio Morandi's world: in addition to six of his oil paintings were five objects that the Bolognese painter had obsessively depicted throughout his life (both on canvas, portraying them as beloved bodies, and on their own surface, as if transforming them into objects that he wanted to see). I reviewed the world of Giorgio Morandi in an exhibition at MAMbo (2013-14), in his home town of Bologna, where Tacita Dean had previously shot and shown her Morandi related films: *Still Life* (2009) and *Day for Night* (2009). These two films – the first follows the intricate lines that Morandi used in determining the precise positioning of the objects of his compositions, the second shows portraits of every single component that makes up this unusual 'family' – makes use of slow-motion, close-ups and light as a tool of interpretation.

Memory to cultivate, memory to recall, memory to create. Memory that can even be activated by looking at the back of an image. This is the case with Elisabetta Benassi's artbook *All I Remember* which takes its title from a supposedly unpublished novel by Gertrude Stein, exposes her personal atlas of images, consisting mostly in written form. All parts of the work, shown at the Venice 54th Biennale Art Exhibition 'ILLUMInazioni' in 2011, were photographed by the artist over the years that she spent browsing through Italian and international press archives. Her images don't merely reproduce news photographs from the newspaper archives but rather illustrate the underside, the B-side, or the location in which they are shown – meticulously in some cases, in others hastily and inaccurately, occasionally with incorrect data – with indispensable caption information for publication (date, archive reference, handwritten notes). These 'images', brought to light via nine microfilm readers that automatically – with syncopated

movements, horizontal or vertical – projected onto nine screens the hundreds of amassed facsimiles, revealing an innovative assortment that mixes memorable events with everyday life and gives us a portrait of the twentieth century to envisage and explore. Benassi, in subtracting the materiality of images from the spectator, adds potential by way of projection that invites the viewer to traverse a new iconography of the twentieth century.

Bibliographical References

[1] BAUDELAIRE, Charles, *Notes nouvelles sur Edgar Poe*. In PICHOIS, Claude (ed.), *Œuvres complètes.* 2ª ed. Paris: Gallimard, 1976, vol. 2, pp. 319-337. ISBN 978-20-7010-853-4.

[2] BENASSI, Elisabetta. *All I Remember.* Roma: Nero, 2011. ISBN 978-88-97503-00-2.

[3] DEAN, Tacita, *Film. A book about film an the importance of analogue in the digital age*. London: Tate publishing, 2011. ISBN 987-18-5437-999-3.

[4] DIDI-HUBERMAN, George. *Atlas. How to Carry the World on One's Back?* Madrid: MNCARS, 2010. ISBN 978-84-8026-429-7.

[5] dOCUMENTA (13), *The Book of Books*. Ostfildern: Hatje Cantz, 2012. ISBN 978-3-7757-2951-2.

[6] FANNY & ALEXANDER. *Ada. romanzo teatrale per enigmi in sette dimore, liberamente tratto da Vladimir Nabokov*. Milano: Ubulibri, 2006. ISBN 978-88-77482-65-5.

[7] FARINELLI, Franco. *Geografia. Un'introduzione ai modelli del mondo.* Torino: Einaudi, 2003. ISBN 978-88-06-16020-3.

[8] NABOKOV, Vladimir. *ADA o ardore* (Translated by CREPAX, Margherita). 2ª ed. Milano: Adelphi, 2011. Translation of original book title *Ada or ardor: a family chronicle* (1969). ISBN 978-88-459-1504-8.

[9] NABOKOV, Vladimir. *Lezioni di letteratura* (Translated by CAPRIOLO, Ettore). 3ª ed. Milano: Garzanti, 1982. Translation of original book title *Lectures on Literature* (1980). ISBN 978-88-115-9957-1.

[10] RITTER, Carl, *Einleitung zur allgemeinen und vergleichenden Geographie, und Abhandlungen zur Begründung einer mehr wissenschaftlichen Behandlung der Erdkunde*, Berlin: Reimer, 1852.

[11] ROYOUX, Jean-Christophe, WARNER, Marina, GREER, Germaine. *Tacita Dean*. London: Phaidon, 2006. ISBN 978-07-148-4428-2.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Subtracting the ornament from the fairytale Gino Coppedè architecture. The case of the villa of the Fairies in Rome

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Abstract
The contribution mentions the well-known fairytale neighborhood in Rome, which was designed by architect Gino Coppedè and the works began in 1918. The district consists of palaces and villas, which are characterized by a decorative baroque with monstrous and unreal figures, unmistakable emblem of "Coppedè" style. This style has no precursors nor followers and it denotes a linguistic formula personal and easily recognizable. The buildings are carriers of forms and expressions without boundaries, so as to be called "fantastic and fabulous architecture".
The goal is to check if the fabulous and fantastic character of the architecture is due to the form as an extension of the content or, conversely, this appearance is due to the overpowering decorative apparatus which wraps facades and goes up to their immediate surroundings. The target of this study is to carry out, with the help of new technologies and in particular through three-dimensional simulations, a methodological process of "stripping" or "subtraction" of typological categories of decorative elements which are present in these buildings (stone ornaments, masks, wall frescoes, niches, columns, wind vane, gates, torch holders, etc.).
The three-dimensional elaborations produced were also drawn with the photo modelling technique with which we are able to realize pseudo three-dimensional models directly from the measured data, which are accompanied by real textures acquired directly from the photographs.

Keywords: Coppedè, Villa of the Fairies, survey, modelling.

1. Premise *
The "Modern Construction Company" began to work in 1919, on behalf of the Financiers Cerruti, on the construction of a new neighborhood in Rome in an area between Parioli and the neighborhoods, still under construction, of Trieste and Salario. The task was given to Gino Coppedè, a renowned Florentine architect who, for the scope of the work to be performed, moved to Rome, the Eternal City where, in the last three decades of the nineteenth century, two master plans were made at only ten years of distance, the first in 1873 and the second in 1883, without avoiding what revealed to be a real " building fever ". Only at the end of the first decade of the new century, in 1909, a new Master Plan, conceived by Edmondo Sanjust di Teulada, established the rules for expanding areas. It was with these new rules that Gino Coppedè began working for the new Roman neighborhood that now holds his name. A district that occupies an area of 31.000 square meters in which palaces and villas coexist harmoniously, and that is permeated by a fabulous atmosphere that is the more palpable in the central hub of the neighborhood.
The formation of Gino Coppedè is definitely unusual; along with his younger brothers Charles and Adolph, he trained at the Casa Artistica, the Florentine workshop of his father in which carved and sumptuous furniture typical of the décor of the Umbertine age was created. Only in a later time he began to devote himself to architecture. At the end of the 19th century, he completed his training by attending the vocational school of Decorative and Industrial Arts and was awarded by special merit with the title of Engineer in addition to being lecturer in Architecture at the University of Pisa. Gino quickly became the star of an architecture in which elements, materials and shapes of different

derivation coexist, defining a neo-eclectic language that became almost synonymous with the expression of " fantastic architecture ".
His architecture re-proposed elements of Renaissance, Gothic, Mannerist, Baroque and Babylonians styles, whose peculiarities were mixed by the designer with great skill , receiving a substantial number of professional duties by a particularly demanding bourgeois clientele interested in architecture.
The great skill of Coppedè resided mainly in the ornamentation, that ornament so varied in design and use of materials that represents the unique character of its architecture, able to complete and connote it [1]. The works in the district began on 09/13/1919, as shown in the application that was submitted by the building company to the 5th Office, the Building Inspectorate of Rome, and that is now preserved in the Historical Capitoline Archive.

2. The villa of the Fairies *

The centerpiece of the Coppedè neighborhood is constituted by Piazza Mincio, the square that, if observed by the monumental big arch which is the entrance to the neighborhood, along the diagonal street, now Via Dora (Fig.1), is a real scenic backdrop, with at its center the small but articulate fountain of the Frogs in the baroque style (Fig.2) . The entire composition recalls, and seems to want to pay homage to the Turtle Fountain in Piazza Mattei and most of all, through the shells and the presence of large bees [2] placed in the hinge of the valves of the shells, to the small Fountain of the Bees, which was planned by Bernini to give honor to his client (Pope Urban VIII Barberini) by inserting the three Bees of the heraldic symbol of the Barberini family and which is now located between Via Veneto and Piazza Barberini.
The great monumental arch, the fountain, the fronts of the buildings (Spider and Ambassadors) and the Fairy Cottage create forms and spaces of refined sophistication and are bearers of a decorative architectural appearance without boundaries, place and contents so as to be defined , " Fantastic and Fabulous Architecture".
But of all those architectures that face the square there is one in particular, the so-called " Fairy Cottage ", that contributes strongly to confer such a look at this site. (Fig.3)
.



Fig. 1: The Coppedè. The monumental arch of the entrance to the neighborhood (via Dora, already Diagonal Avenue).
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Fig. 2: The Coppedè. Piazza Mincio with the Fountain of the Frogs.



Fig. 3: The Coppedè. Piazza Mincio. The Fairy Cottage.

Located between Via Brenta, via Tanaro and via Olona [3], it has a covered area of about 500 square meters and is surrounded by a garden that, in order to give even more the fairy tale aspect, Coppedè had enriched with lush exotic vegetation; the garden is surrounded by a sinuous design wrought iron railing that rests on a low brick wall and access is secured through both the wrought-iron gates and the ones finely crafted in wood and wrought iron.

The project drawings of the cottage [4], consisting of plans at various levels, one section and two elevations (the shorter one on Via Tanaro, and the longer one on Via Brenta) do not at all stand apart from the realization (Fig.4).

The particularly articulated facades are punctuated by a varied series of elements. Canopies, turrets, arcades, balconies, windows of various types, round and pointed arches, stairways, etc., follow one another at a brisk pace (Figs.5,6) .

Dense decorations return and emphasize an architectural unity also through the use of different materials, their cut, their processing and their different design obtained through different modes of installing the material. Brick, travertine, marble, terracotta, iron and glass are associated with colonnades, mullioned windows, capitals, moldings, etc., and give, together with ample wall frescoes, a chromatic and perceptual appearance which brings us back immediately to mental images of our childhood: fairy castles and houses that made us dream!

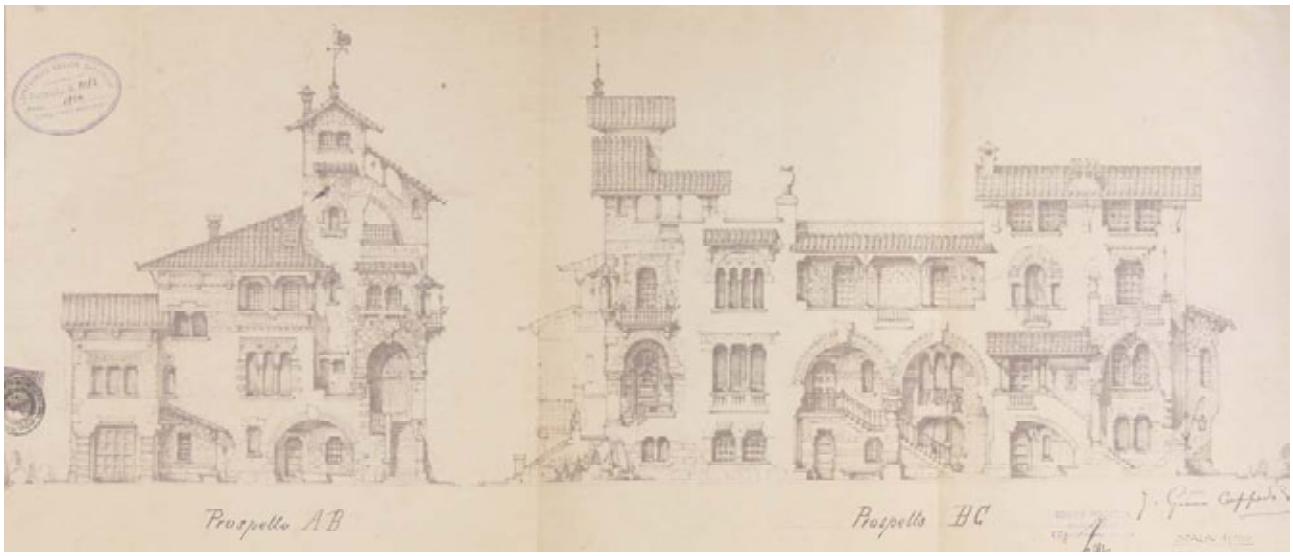

Fig. 4: Gino Coppedè. Project design. The elevations of Fairy Cottage.

3. The dispossession of the elevations of the Fairy Cottage *

This contribution does not aim to investigate the cottage according to Vitruvian criteria like *ordinatio* , *dispositivo, distributio, eurytmia, symmetria, decor* [5]; it simply aims to verify a methodological path of "subtraction" of typological categories of decorations, fundamental architecture components that are able to enhance and accentuate certain parts of the overall aesthetic value and exist along the facades of the eccentric architecture. In this way the architecture is deprived of any ornament , bringing to the light the tectonic-functional aspect of the building, its pure form as an extension of content and verifying how the fantastic and fairy-tale character can be attributed to the architectural unity of form, function and decoration, or to the sole decoration, or again, to the formal and proportional qualities of the building .

In order to achieve the goal and to be able to provide a possible answer to the above question, we will use the new information technologies that, even in this case, assist to our problems. In order for the new information technologies to be bent to our specific purposes in an intelligent way, knowledge is required together with a preliminary analysis of the building that allows us to identify and systematize the main membering, to catalog them and then start some sort of decorative subtraction. The preliminary direct type approach to the work, together with a proper photographic documentation made it possible to highlight, beyond the most obvious decorative elements, all the finer and less redundant, but no less significant, details which determine by their presence the perceptual, chromatic and chiaroscuro aspect of the cottage (Figs.7,8,9,10) .

The study, still in progress, provides that " spoliation " is done first for the entire building and, subsequently, to extend the process to all buildings fronting on the square in order to understand the perceptual effect that you would get .

The categories identified were as follows :

- *Stone ornaments*: columns with only aesthetic value, sculptures, moldings, architraves, entablatures, shelves, etc. ..
- *Brick Ornaments.* cornices, arches, windows, thresholds, etc. ..
- *Treatment of the plaster*: rustic or smooth.
- *Frescoes:* large, borders, frames, cornices, quoins, soffits of arches, Latin writings, painted edges to mark material changes
- *Windows:* stained or leaded glass.
- *Iron ornaments:* fences , gates, balustrades, grates, lamps, lanterns, wind vane, torch holders , etc. .

The architecture, as usual defined through the Vitruvian triad: *Firmitas, Utilitas, Venustas*, is then subjected to a spoliation of all elements belonging to the above categories, verifying, at the same time,

also the components which mainly influence to confer the surreal and fairy atmosphere to the entire composition.
In this regard, we firstly operated executing the survey of the building and then developing a three-dimensional modeling of the architecture in order to be able to separately analyze the above mentioned categories. After the spoliation operations will the architecture, reduced to nuts, still be able to be defined as "Fairytale"?




Fig. 5: The Coppedè. The Fairy Cottage. Detail of the corner tower.
Fig. 6: The Coppedè. The Fairy Cottage. Detail of the arch of the loggia of the main facade.




Fig. 7: The Coppedè. The Fairy Cottage. Corner of the building between Via Brenta and Via Olona
Fig. 8: The Coppedè. The Fairy Cottage. Detail of the promiscuity of materials that give color and chiaroscuro effects.


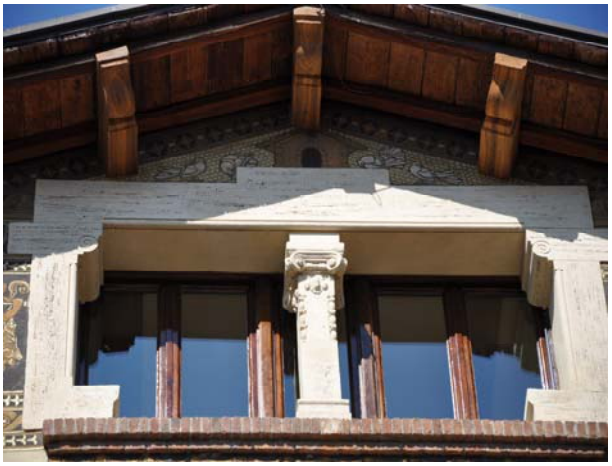

Fig. 9: The Coppedè. The Fairy Cottage. Superior part of the façade of Via Olona with keystones paintings interspersed with those brick.
Fig. 10: The Coppedè. The Fairy Cottage. Detail of the window of the façade of Via Olona.

4. The digital survey of the Fairy Cottage: the use of digital photogrammetry and laser scanning for three-dimensional modeling **

Today it is recognized that both the surveyed architecture and the designed one are represented through segmented virtual models, broken down into various elements, editable, visible from infinite points of view, which simulate a real or imaginary context. The three-dimensional view is the most complete means of display of the formal, morphological and textural aspects of the surveyed or designed object. In this research, the objective of which is the documentation and analysis of the decorative exterior facades of the architecture of the Coppedè neighborhood, 3D modeling is therefore the method of representation more meaningful and functional to the purpose, as an effective tool documentation, interpretation, communication, and analysis of architectural elements.

The graphic and communicative completeness of three-dimensional models that makes them easy to understand, clearly demonstrates their fundamental and irreplaceable value. The increasing use of this kind of processing has also influenced in part the subject area of the survey that, as that of the representation, has undergone significant changes with the introduction and use of advanced technologies that have revolutionized both the operational processes dedicated to the withdrawal of the measures and those of graphical display of data in terms of restitution and representation. In particular through the new digital technologies, represented symbolically by the laser scanner and the photo modeling, it is possible, in an almost fully automated way, to realize the pseudo-three-dimensional models directly from the measured data, with different processes of transformation, union and representation, ruled by algorithms that are diversified for each program.

The laser scanner system, as well as that of photographing, provides, as a direct result of the measurement session, a set of three-dimensional coordinates, in a reference system correlated with the instrument, for a very high number of points that are hit by the laser beam or acquired through photography; the cloud of points so generated apparently describes the outer surface of the scanned object. Regarding the use of photo shoots for the photo modeling technique, this also responds to the need to achieve a pseudo-three-dimensional models directly from the measured data [6].

The two technologies, now widely diffused, are a valid support to modeling and three-dimensional (3D) rendering of the observed physical surfaces.

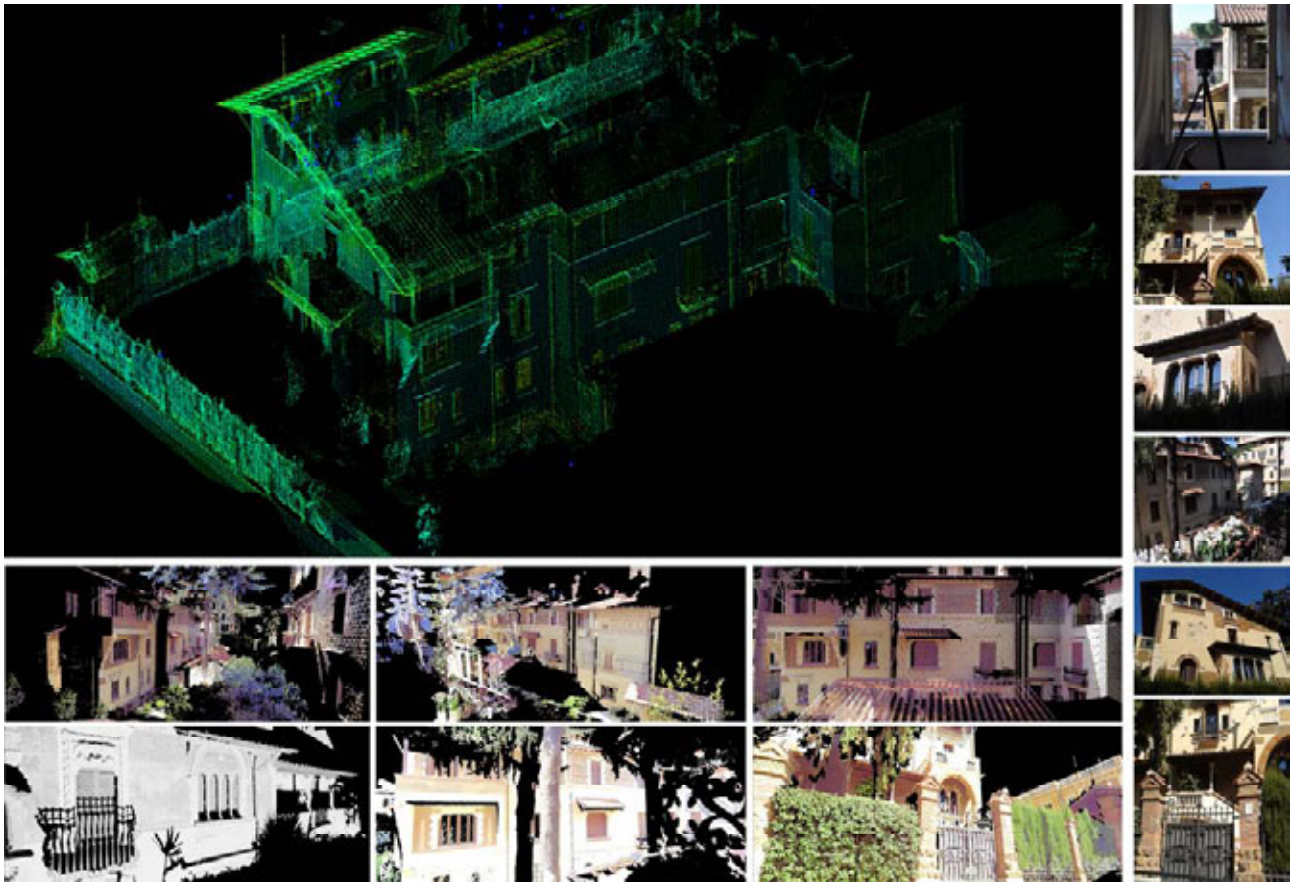

Fig. 11: The Coppedè. The Fairy Cottage. Views of the scanworld in RGB color, in black and white and in reflectance mode.

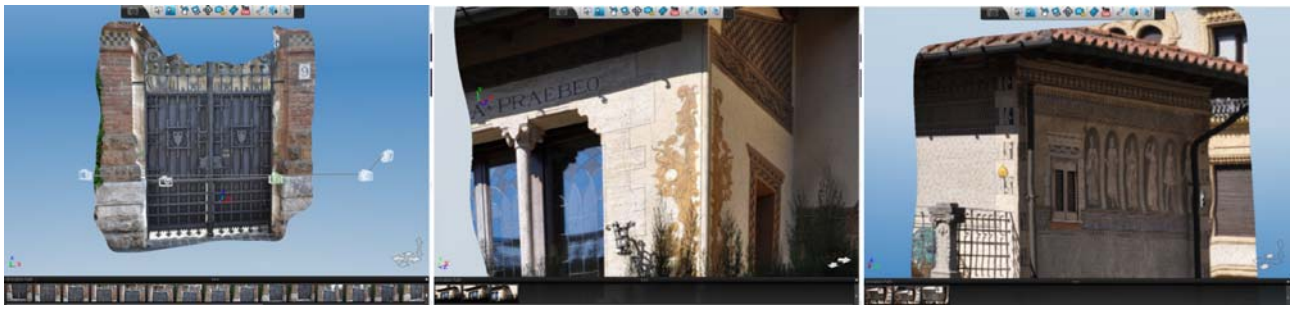

Fig. 12: The Coppedè. The Fairy Cottage. Examples of photo-modeling elaborations obtained with 123 Catch software.



Fig. 13: The Coppedè. The Fairy Cottage. 2D and 3D elaborations of the scanworld with and without meshing.

The Fairy Cottage lends itself favorably to the integrated use of these techniques especially for technical and practical requirements dictated by the need to act quickly and in areas not physically accessible. The survey project was therefore set up in order to integrate the data acquired with a laser scanner with those derived from photographic detail, taking into account first and foremost the objective of the survey itself, that is the development of a three-dimensional model to be explored. For the acquisitions of data the following devices were used: a Total Station TCR 703, a Focus 3D laser scanner CAM2 (Faro) and a digital SLR camera Nikon D90. In the overall survey activity, a total of 25 records have been carried out with range-based technique together with approximately thirty shooting stations with image-based technique (Figs.11,12).
The polygonal topographic framework network that was realized allowed to fix the plano-altimetric configuration outside of the complex, producing the coordinates of the support points for the direction and control of the produced point clouds.
This ensured, subsequently, the correct assembly of both restitution and the other processing resulting from the use of these measuring techniques. The programming of the campaign of acquisition with a laser scanner also took into account what was to be the next phase, relative to the union of the pairs of clouds and their processing; the planning of the measuring stations was conducted trying to keep distances which may prove optimal for the processing of union of pairs of clouds maintaining a large gap overlapping homologous areas in order to reduce the error margin. The post-processing activities led to the recording of all the acquired data in a single scanworld which provided a three-dimensional view of the complex.

5. The analysis of the decorative elements of the Fairy Cottage: from the real to the imaginary perception **

The aspects to be analyzed in the context of this research are basically two: the facade (and ornament) and the environment or best the context in which the architecture is inserted. In this phase, the focus will be only to the analysis of the decorative and ornamental elements of the facades of one of the most significant buildings of the Coppedè district: the Fairy Cottage. The implementation of the model was obtained from the processing of point clouds acquired with a laser scanner: these were recorded in a single scan world with the Reconstructor software and subsequently exported to the Geomagic platform for meshing (Fig.13). The model produced was further synthesized and translated into geometric volumes that are easily manageable for the operations of "spoliation" of the decorative elements. Specifically, we report in this paper the elaboration carried out on two sides of the cottage, namely the north-east (of which only a portion is shown) and the south-east ones. On the basis of photographic documentation and of models made with digital photogrammetric image-based method, the mapping of the model was carried out in all its formal and decorative aspects, namely the brick thresholds, the sculptures, the lintels, the shelves, the frescoes and all the other elements that are typical of the architectural language of the Coppedè district and that makes instantly recognizable its buildings.



Fig. 14: The Coppedè. The Fairy Cottage. 3D modeling of the façade prospecting on Via Olona after “spoliation”.

Starting from this three-dimensional complete model, the operation of "spoliation" was conducted in successive stages that involved, from time to time, decorative elements attributable to a well determined type of membership (Fig.14). Following this methodology, have been removed first the painted decorative pieces, then the stone sculptures and finally the colors of the stained glass windows (Fig.15). The architecture thus virtually represented, albeit depleted of these decorative elements, and then in a certain sense deprived of its formal identity, still maintains those characteristics of sobriety, simplicity and quality of the composition that refer to an essential ideal of beauty. A dual valence of the ornamental element is then showed: on the one hand, it contributes greatly to define the character of the architecture, making it unique and unmistakable; on the other, in his most blatant and elaborate realizations, it is likely to be a superfluous something that indeed hides the substantial and essential character of the architectural structure itself.



Fig. 15: The Coppedè. The Fairy Cottage. Illustration of the “spoliation” process as conducted on the 3D model of façade prospecting on Via Brenta.

Although the architecture has rarely considered the applied ornamentation as extraneous, perceiving them as an integral part of his language, often displaying and emphasizing the essential structures, to describe the construction and define it in its organic structure, there have been, over the centuries, authoritative opinions that instead refused decoration and ornament as unnecessary and even "tacky". If so Vitruvius attributed to the embellishment a place of honor, as long as you do not come to the excessive decoration and the useless pomp, as he recognized that the order, arrangement, number, décor, and the distribution itself of architectural elements had an intrinsic ornamental purpose, on the other part Adolf Loos argued that to embellish corresponds to "defile the walls with obscene drawings" [7].

This contribution comes from organic collaboration of both authors agree that attributed respectively to paragraphs marked by asterisks (*Laura Carnevali, **Mariella La Mantia).

Bibliographical References

[1] *Archivio Storico Capitolino*, I.E.2076/1919. 1:500 floor plan with indication of temporary warehouses to be built on the ground of the Modern Construction Company (Società Edilizia Moderna). The premises for which building permits are required are destined for offices, warehouses, dormitories for workers, "... and that since it is necessary to appeal to special labor, even not of the site, particularly for works in concrete and decoration". From here it can be seen how much the architect would take into account the decorative aspect of the buildings that were to arise in the new district.

[2] The decorations with Bees are not only on the central fountain; they occur in the form of painting, sculpture, mosaic on the facades of the buildings, in the pavement, in the various types of arches on the facades of the Fairy Cottage, on the monumental arch, etc.

[3] Via Olona was not foreseen in the extract of the original plan as designed by Gino Coppedè; it is a narrow closed road that runs along the short facade (shown in the drawings as BC elevation) of the Fairy Cottage.

[4] The design drawings of the Fairy Cottage are kept in the Historical Capitoline Archive (IE 9192/24).

[5] BOSSALINO, Franca (a cura di). Marco Vitruvio Pollione. *De Architectura*, Roma: Ed. Kappa, 1998.

[6] LA MANTIA, Mariella*. Il rilievo del complesso monastico* in CUNDARI, Cesare, BAGORDO, Giovanni Maria, LA MANTIA, Mariella, LANFRANCHI, Fabio. *S. Lorenzo fuori le Mura.* Roma: Aracne Editrice S.r.l., (2013), vol. 5, p. 167-179.

[7] LOOS, Adolf, 1908. *Ornamento e delitto*. Trad. it. di Gessner, S. in *Adolf Loos, Parole nel vuoto*, Milano: Adelphi, 1972.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

VAISON-LA-ROMAINE: THE HISTORICAL LEGACY IN THE DEVOPLMENT STRATEGY

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Abstract ID 095
The expansion of the culture of the Roman Empire beyond the Alps has left significant traces of his passage on the territory of Southern France. Evidences of considerable interest that embrace not only archeology, but also the religious sphere. They give rise, especially in the Middle Ages, the proliferation of congregations and, consequently, churches, monasteries, cathedrals, around which they have developed the current concentric.
The attention has been focused on Vaison-la-Romaine for its peculiarity to possess within itself the distinctive characters, perfectly preserved in the various historical phases. It is observed that in Vaison, in the alternation of periods, each of these hasn't devastated the previous one, so in the eyes of the visitor today, the city is clearly divided into three parts: the matrix of Roman , medieval era and the modern . The richness of the cultural heritage has favored the tourist aspect triggering processes of conservation, promotion and communication, involving in this process the settled community and indirectly the entire territory.
With a view to sustainability based on local resources, we can say that Vaison-la-Romaine is a clear example of how the cultural and historical heritage lives in symbiosis with the city today. The survival of each of the periods is linked to the existence of the other, in a dynamic that generates large-scale benefits.

Keywords: Paysage, Archaeology, development strategies

1. The archaeological site

The attempt to reconstruct, through an examination of the evidence received from the past, the evolution and the relationship between the individual and the environment, leads me, inevitably, to the period of Roman colonization and the birth of Christianity in Southern France. The research is carried out on Vaison-la-Romaine, whose organization of the plan differs from the planning rules dictated by the *castrum* which was based on the *cardo* thistle and *decumano*. Being this small town located in the Province inner, away from the commercial and military routes, the Roman influence was manifested differently, making it a particularly interesting case.
Vaison does not appear as a colony, but the capital of a vast territory south of Narbonne inhabited by Voconces (fig. 1), mountain tribes strongly attached to their land and their freedom, close relatives of the Ligurian peoples. The alliance of this population to the Roman army against the Cimbri and the Teutons, gives them the title of the civic federation and, therefore, become citizens of the Empire. It is in this period (75 BC), who as a result of peace occurred, Vaison manifests its peak with great development of the arts and sciences, and an administrative organization composed of seven districts, called pagi. It possesses all the attributes of a thriving city where the architecture marries the culture by adapting the Roman style to the climatic needs of the region, in particular at the periodic occurrence of the Mistral.

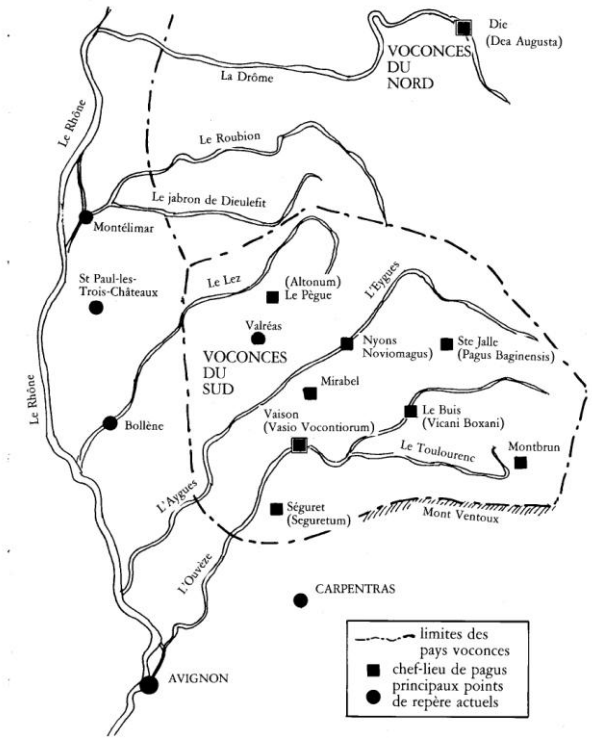

Fig. 1 - Territory of South Voconces (XI sec.)

It has not yet been able to trace an exact plan of the ancient Vaison because only two districts have been affected by archaeological digs that of Villasse and Puymin hill, located to the west at the edge of the watercourse called Ouvèze (fig. 2). A dense network of canals across the two areas by feeding the civilian houses and fountains. Our itinerary starts from the known Villasse. What most impresses is the sheer size of the buildings fronting on the main streets. The road of the shops has a straight line with a moderate slope and is surrounded by columns on the left and on the right you can find small

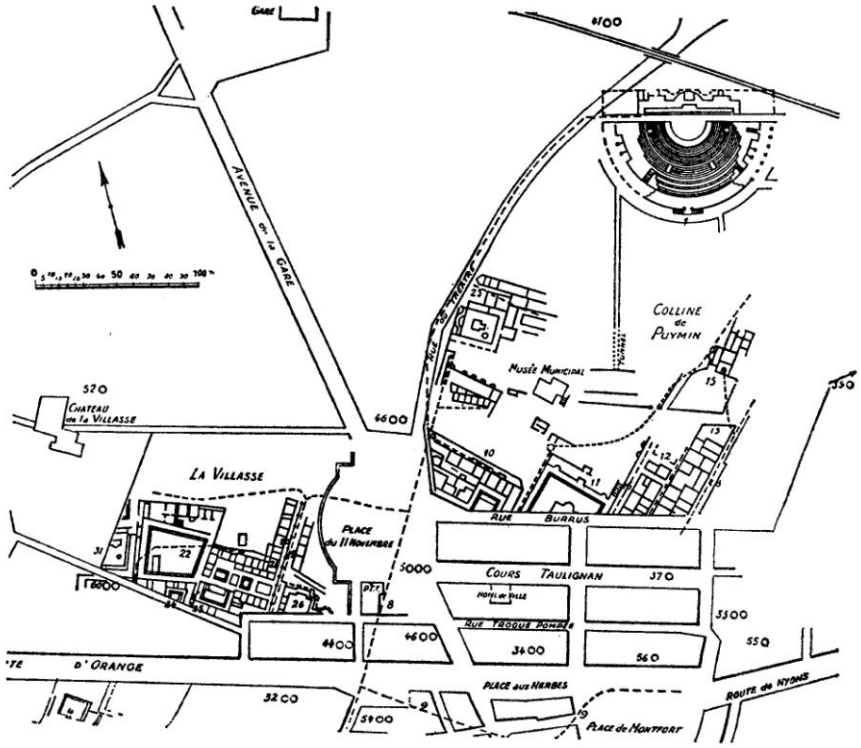

Fig. 2 - Plan of archaeological site

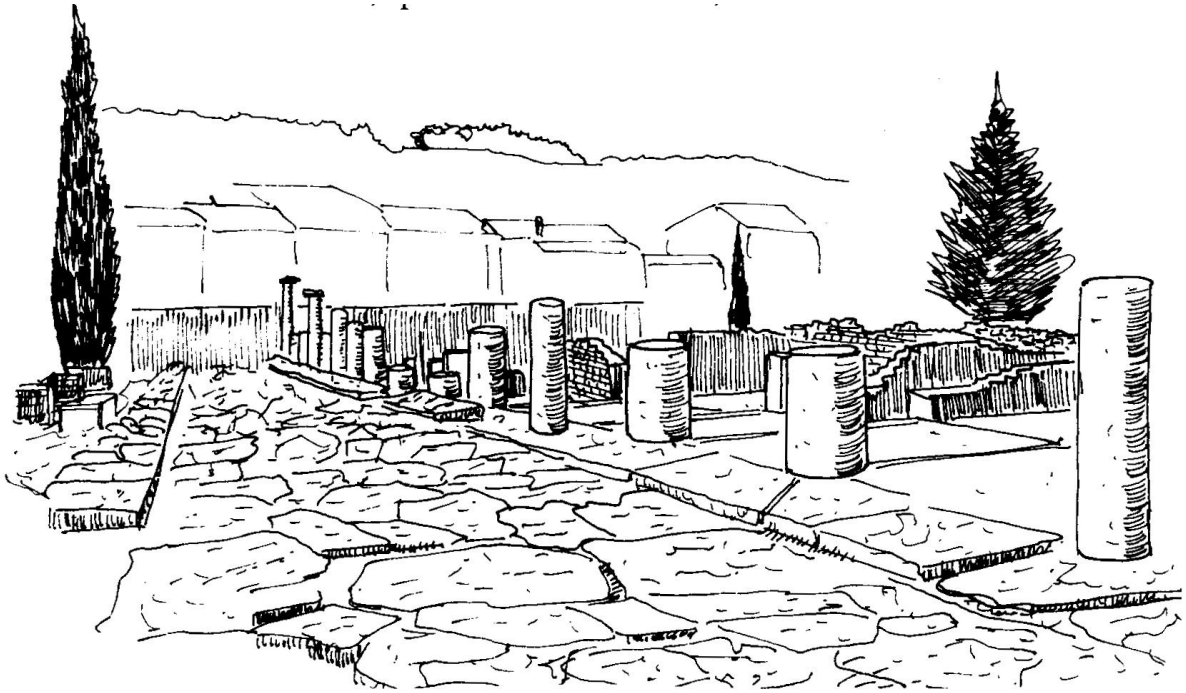

Fig. 3 - Excavations in the area of Villasse

buildings used to store. It is a large shopping street, on which, at the time, was facing a covered gallery that it appears inside a headless statue of Mercury (recognizable by the winged sandals) dominates the environment (fig. 3). At the edge of the area is located just across a large arch, the only survivor of the building used to Thermal Baths and so identified by the finding of a dense network of canals which are concentrated in its vicinity.

This whole area is headed by a large villa known as the home of the Silver Bust, in which, during the excavations, they found a metal bust dating from the time of Traiano. It is a large and luxurious complex that, slowly, has incorporated the nearby houses to take up a considerable size. Here we find the classic ground plan of Roman settlements, *atrium*, *oecus*, *peristyle* with basin and *tablinium*. At the extreme west of the villa there is the home of Daphne, much smaller than the previous one, but of considerable architectural interest.

The excavations in the hill Puymin have revealed a set of buildings patricians and the Theatre, it was built in the time of Tiberius, and, from what has been found, it seems, was adorned with countless statues and rich wallpaper that shows that the life that led to Vaison was extremely wealthy. Dated around the year 20 BC in the classic style, could accommodate 7,000 people. The steps to access and stairways are entirely carved into the rock, and thanks to the restoration and reconstruction of 1932, is still used to the present day, especially in summer season (fig. 4).



Fig. 4 - The roman theatre (20 B.C.)



Fig. 5 - Particular of mosaic

Below the theater, at the foot of the hill Puymin, whose name refers to the cult dedicated to Minerva (Podium Minervae) extends the noble district with splendid buildings. Among these I remember the home of the Roman family of the *Messii*, directly connected to the theater by a staircase. You enter a large room which gives access to the bathrooms and the kitchen, which envisage two internal courtyards. In addition you will discover the atrium, the heart of all Roman houses, squarely, around which there are the apartments. It takes the light from the top and at the center *impluvium* collects rainwater that fed into a large basin helps to refresh the environment. In this place was found a beautiful head of Venus, mascot of the house. Adjacent to the Atrium, the *lararium* hosts the depictions of the protectors of the hearth. Not far away there are the apartments that overlook a large peristyle that surrounds the large basin open pit. In the words of Abbot Sautel , passionate archaeologist who, for half a century, has participated in excavations in Vaison-la-Romaine, contributing to the discovery of important findings: "*La partie centrale du péristyle, qui n'était pas couverte, comportait un bassin de 15,70 m de longueur sur 2 mètres de largeur, qui occupait tout le còté exposé au soleil, le long de la colonnade. Le reste de l'espace libre parait avoir reçu des plantations de fleurs et d'arbustes, mais tout autour de ce jardin avait été établi un ruisseau d'écoulement, énduit de béton à tuileaux, d'une telle solidité qu'il a pu être utilisé à nouveau pour assurer le trop-plein du bassin. Quand on connait le goùt des Romains pour l'eau et pour ses mille jeux dans les cascades, on peut imaginer le caractère pittoresque de ce péristyle, entouré d'eaux courantes et orné de fleurs, ainsi que le plaisir qu'apportaient aux yeux ces ondes claires animées par les nombreaux animaux dont la fantaisie du propriétaire les peuplait souvent..."*
Finally, through a long path you will reach within the *oecus*, where they held meetings, parties and banquets. The floor was marble, slate and decorated with mosaics (fig. 5).
Definitely for fans of Roman history, visiting these places will discover the charm through the abundance of artifacts, with the paths in the various districts of the city, you will fall into a timeless dimension enriching their culture.

1.2 The historical center

You could talk endlessly and in more detail about the monuments exposed to the curiosity of the visitors, but Vaison-la-Romaine offers other features that deserve attention. I am referring to the period that spans the Middle Ages and that propels us on a scale of values and conception of space different from the previous era the Upper Town is the current center (fig. 6). The first inhabitants of Vaison-la-Romaine, in pre-Roman times, settled on the rocks that looked out over the river Ouvèze in a sort of *oppida*. In Roman times, most of them descended to the functional and magnificent city built by new allies. After the destruction of the barbarians and the incursions of the Saracens, drawing much of the building material from the Roman city, they settled on the hill and gave rise to a new fortified town, which occupied an extent greater than that existing today. Finally, when the peace and tranquility is re-established, many residents of the Upper Town, for reasons of convenience, returned to live in the lower part of building up in the vicinity of the current excavations. It is for this reason that the historical center, although nicely renovated is considerably limited compared to the size reported to the seventeenth century, at the time of its greatest splendor when, locked inside a double wall, the houses came up to castle dominating the entire region. The robustness of the ramparts (late fourteenth century) and strategic location on the steep rocks, was such that during the Wars of Religion, Vaison-la-Romaine had never conquered. Bad luck also had the bloody Baron of Adrets, skillful Dupuy-Montbrun, the fearsome Gaspard Pape St. Auban, which, to their credit, they had conquered, almost all of the cities of Provence and the southern Dauphiné.
Crossing the Roman bridge (fig. 7) over the river and past the first door of defense, you are immediately in a medieval atmosphere: high walls with loopholes, protruding towers, heavy doors in

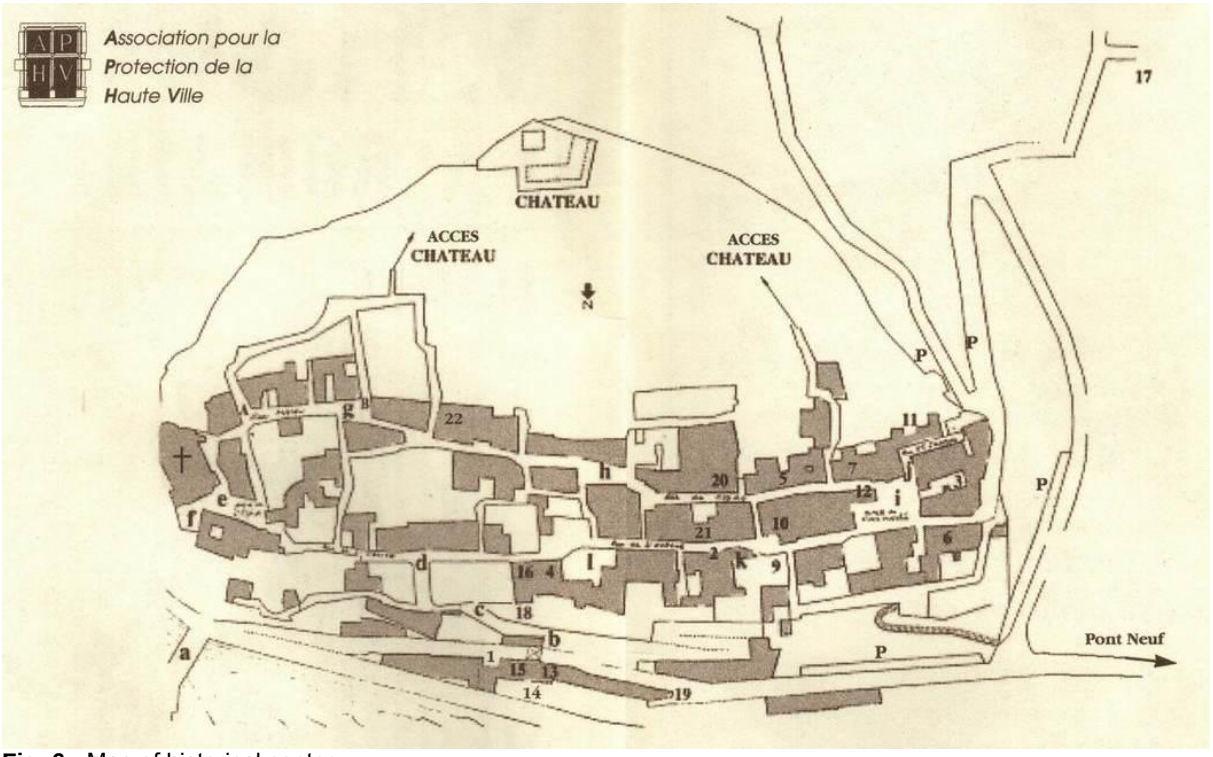

Fig. 6 - Map of historical center

wood and iron windows with thick iron bars. Only when you get to the second boundary wall, the door of the Belfry, which in ancient times was equipped with by a drawbridge, and go into the real village. The constant remakes and adaptations through the ages gives the place a tone of Renaissance.
There are many monuments that you can visit but definitely the protagonist of the visit is the atmosphere that you breathe so far from our time and yet alive and throbbing. I dwell on the description of two squares, in my opinion, tell us much about the history of Vaison-la-Romaine. The first is the Elm Square, a place full of charm, with a fountain, the old presbytery which supports a large stone doorway surmounted by an oculus and a spire, belonging to the facade of the chapel of Santa Costanza, now destroyed . To complete the set, you can see two buildings on the square, one of the sixteenth century, belonging to nobles (fig. 8) and the other, in front of the fountain, in the Provencal style of the late eighteenth century with pergola and attached an old shop.



Fig. 7 - The Roman bridge (watercolor)



Figura 8 – Palace of nobles (XVI sec.)

The second is the Market Square shaded by huge plane trees and adorned with a fountain that throws water from Mascheroni, this is the oldest fountain in Vaison-la-Romaine dating back to 1460. The square is surrounded by ancient and well-preserved palaces and its functions were various: from market to a place of entertainment and justice. Studies and research shows that here was located the pillory for citizens to expose the condemned to public ridicule. Southwest corner stands a large stone portal that allowed the isolation from the rest of the Jewish quarter of the city.
Visual landmark is the Castle, belonging to the Counts of Toulouse, that dominated from the top of the hill the whole Vaison-la-Romaine. Its history is linked to the bloody struggles arising from supremacy between political and religious power. Currently it is not possible to visit it, the bad condition in which it is deserves a careful restoration and requalification aimed to rescue this building, on the one hand as a missing link of union between the Roman period and the Middle Ages, on the other hand, from the point of view landscaped, as panoramic observatory on the complex of Mont Ventoux, on the countries of Dentelles and the mountains of Baronnies (fig. 9).

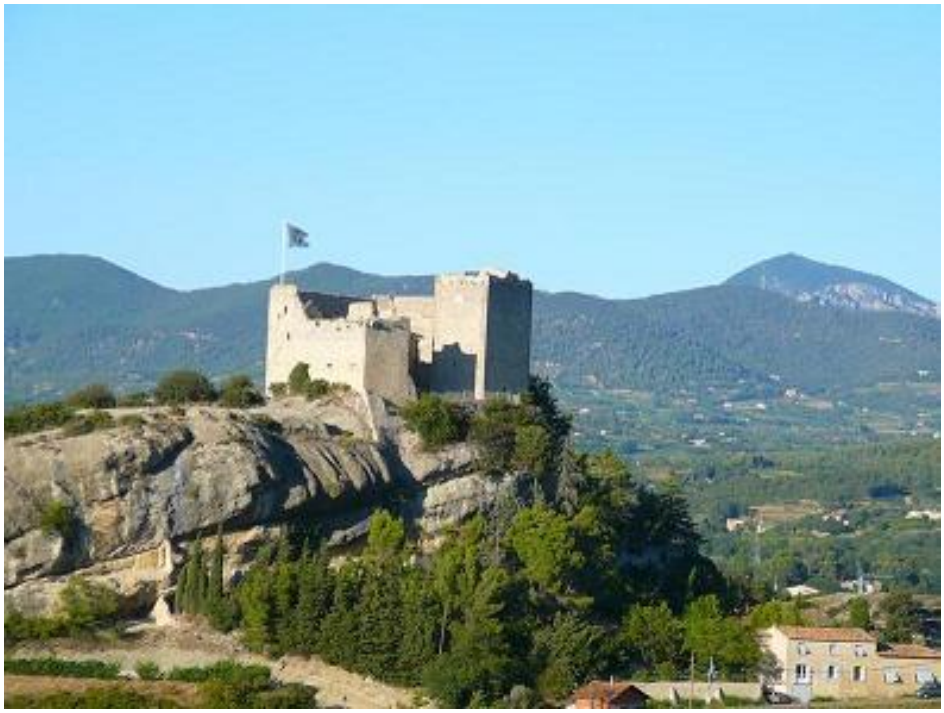

Fig. 9 - The Castle

1.3 The religious heritage

The most interesting monuments, from the religious viewpoint present in the territory of Vaison-la-Romaine, are the Chapel of Saint-Quenin and the Cathedral of Notre Dame de Nazareth. The first is located near the Theater in a dominant position, and offers a wonderful view over the whole city. The most extraordinary part of the building is the triangular in shape apse on the outside, whose workmanship greek-latin style did think that it was originally a temple dedicated to the cult of Diana.
The experts agree that the reconstruction and adaptation of the building to the needs of Christianity occurred in the second half of the twelfth century. The period coincides with the religious fervor of the medieval period, which has given rise, not only in Provence but throughout Europe, to the great monasteries and the immense wealth dedicated to Christian worship. The chapel is built of blocks of white limestone enriched with cornices, columns and capitals, finely sculpted that emphasize the perfect architectural proportions (fig. 10).



Fig. 10 – Saint Quenin

The Cathedral of Notre Dame de Nazareth is a large complex built on the places of worship of the past. Excavations show that the building has a basement composed of fragments of Roman monuments, portions of columns, huge Corinthian capitals, chiselled cornices, geometric bands which make us think that the church was built on a large Roman temple. The bell tower, square plan, overlooking the church and cloister, which is also the same historical period (fig. 11).

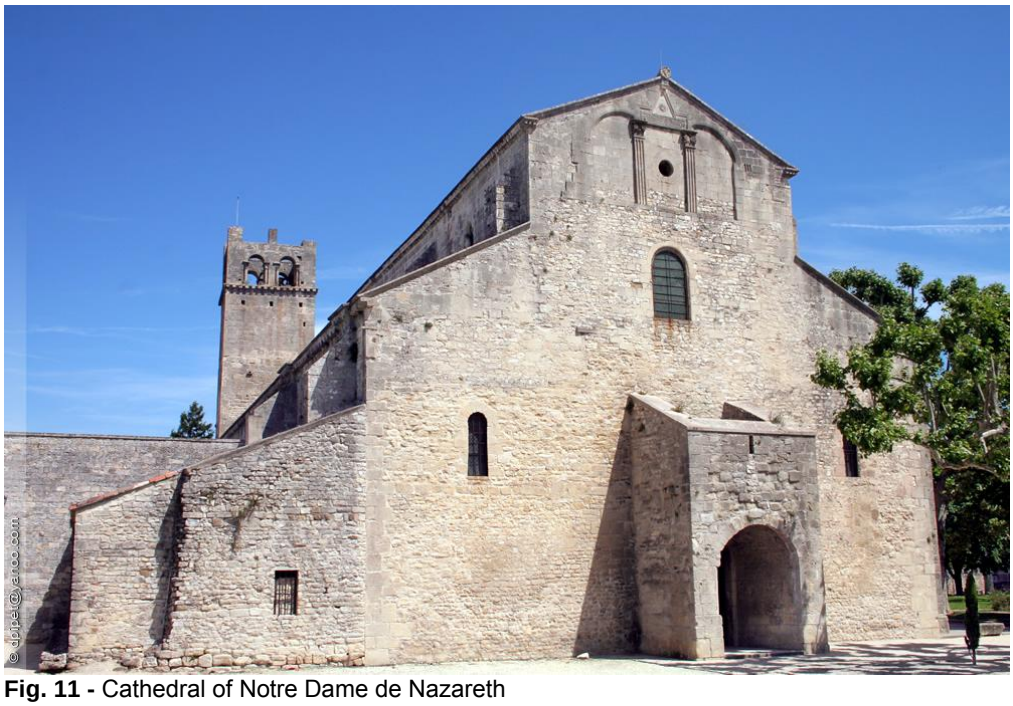

Fig. 11 - Cathedral of Notre Dame de Nazareth

2 The development strategies

The brief description of the huge archaeological-architectural-historic heritage of Vaison-la-Romaine, where each sector would deserve to be investigated in detail in its various aspects aims to contribute to the knowledge of the site and help us understand the development strategies based on complex and articulated system of tourism.

The modern part of Vaison-la-Romaine stretches from the archaeological digs and the medieval area further south. Like all towns of Provence is very lively and animated. Its economy is based exclusively on tourism and, consequently, has developed all forms of openness and incentives as a function of it. In fact, they were made choices related to cultural and social identity of the place. In this case, the residents have been working on a project for a tourist offer based on their own history, heritage and archaeological territory.

In this way it is also acted on agricultural production and craft, discovering knowledge, oral traditions at risk of permanent loss. Here we see an opening as prudent and sustainable tourism can serve as the catalyst for the revitalization of the community and the whole area. The roots in the values together with the need for new concrete relations between settled communities and territory, have stimulated the recovery of historical memory in the form of museums, infrastructure at the service of tourism, the recovery and restoration of monuments, commercial activities.

3 Conclusions

We can therefore say that local development, namely the development project of the local society, through the recognition and valorisation of the territory, fuels innovation reinterpreting this knowledge, characterizing them with the peculiar quality of the development, its individuality and differentiation. Along with these types of sediments are all the appearances of memories in the form of permanence invariants that constitute a repertoire of useful elements to understand the character of the place and the rules of its evolution by allowing you to recognize the singular traits and identity of the place (fig. 12).



Fig. 12 - Vaison-la-Romaine

Bibliographical References

[1] ANDREOTTI, G. *Riscontri di geografia culturale.*Trento: Edizioni Il Colibrì, 1994

[2] ASSUNTO, Rosario. Il paesaggio e l'estetica. Napoli: Editore Giannini, 1973

[3] AUGE', Marc . *Rovine e macerie. Il senso del tempo.* Torino: Editore Bollati, 2004

[4] BERQUE, Augustin. *La médiance de milieu en paysages.* Montpellier: Editore Reclus, 1990

[5] BONESIO, Luisa. *Geofilosofia del paesaggio.* Milano: Editore Mimesis, 1997

[6] BONESIO, Luisa. P*aesaggio, identità e comunità tra locale e globale.* Reggio Emilia: Editore Diabasis, 2009. ISBN 978 88 8103 491 8

[7] CHASTEL, André. *La notion de patrimoine.* Parigi: Editore Gallimard, 1997

[8] CLÉBERT, Jean-Paule. *Provence antique Vol. 2 L'époque gallo-romaine.* Parigi: Ed. Laffont, 1970

[9] COSGROVE, Denis. *Realtà sociali e paesaggio simbolico.* Milano: Editore Unicopli, 1990

[10] DUBY, G . *L'Europe aux moyenne Age.* Edizioni AMG, 1979

[11] LEHMANN, H . *La fisionomia del paesaggio.* Milano: Editore Mimesis, 1999

[12] NORBERG-SCHULTZ, Ch. *Architettura: presenza, linguaggio e luogo.* (tradotto da DE DOMINICIS A.M.). Milano: Editore Schira, 1996

[13] OLLIVIER-ELLIOTT, Patrick. *Au soleil du Ventoux.* Avignon: Ed. Aubanel, 1987. ISBN 2-7006-0122-X

[14] PANAROTTO, Sergio. *Chapelles de Provence.* Aix-en-Provence: Compagnie des editions de la lesse, 2009. ISBN 978-2-7449-0817-0

[15] PRIORE, Riccardo. *Convenzione Europea del Paesaggio. Il testo tradotto e commentato.* Reggio Calabria: Editore I Riti, 2006

[16] ROGER, Alain. *Court traité du paysage.* (Breve trattato sul Paesaggio tradotto da DE LOGU Maria). Palermo: Edizioni Sellerio, 2009. ISBN 88-3892362-0

[17] Referring Web Pages Web:

http://www.patrimoine-de-france.org/

http://www.var.fr/dispatch.do

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RECEIVING FROM THE PAST TO COMMUNICATE THE FUTURE: THE CASE OF S. MARIA DELLE MACCHIE IN THE MARCHE REGION

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Abstract
The Abbey of Santa Maria *extra moenia* is a historical complex located in the Marche region (Italy). It has undergone substantial transformations over the centuries. For this reason, the historical and critical interpretation requires a key capable of simplifying the understanding of all the modifications.
Starting from both an archival study and an architectural survey, we created different 3D models to help analyze and understand all the historical and architectural phases of the complex. The 3D-model reconstructions are based on metric and land surveys. The survey permitted us to identify seven main historical phases. In this way knowledge of the abbey becomes an elaborate history that needs an appropriate dissemination tool. The abbey is now abandoned due to its poor state and no action has been taken for its improvement or preservation. A first step in raising awareness of this forgotten cultural object is to foster better knowledge of its history through a new visual interface that is able to clarify all the events that have occurred over time. In order to explain the complex history of the abbey, we tested a new approach based on the use of a mock-up as a physical interface allowing access to different digital content. For this purpose we used open-source hardware: an Arduino-based microcontroller, named Makey Makey, connected to different parts of the mock-up through wired buttons. In this way, the computer processes the signal coming from the buttons using the mock-up like a keyboard to manage all the information related to the abbey.

Keywords: Communication for Cultural Heritage, Representation, Modeling, Data Integration, Conservation

1. Introduction

The perspective of the present contribution is linked to the world of cultural communication, which aims to transfer historical, architectural, artistic, and cultural knowledge to a public that may then enjoy the cultural heritage in an immediate and interactive way. Dealing with methodologies, contents, and themes that are related to history, restoration, information technology, and theories of communication, this research used a multi-disciplinary perspective capable of finding convergent solutions for a series of problems that at first glance seem very unrelated. The strategy used was to define common ground where the historical knowledge and techniques for representation come together in an interrogable model.
This area of study, which is relatively new, unites knowledge of the humanities with information-technology skills in order to study, conserve, improve, and communicate the cultural heritage through new digital technologies. From an epistemological point of view, the research centers on the definition of models and language appropriate for communicating historical content. Attention to historical/cultural data that can be transmitted is of fundamental importance in order to avoid superficial, inexact, or even incorrect information. It is therefore necessary that 3D models be based

on precise information deriving from the careful analysis of historical sources or direct (geometrical and material) readings of the ancient architecture.
In such a research field, it is necessary to adopt a rigorous methodology that produces detailed documentation, even if it is simple, in order to be able to communicate the data in an understandable way. It is therefore necessary to clarify such a methodology, fixing recognized standards, rules, and principles that render the reconstruction a rigorous practice based on the authenticity and accuracy of the cultural content. In 2005, the combined efforts of many sector entities such as research institutes, museums, associations, and foundations dedicated to protecting the cultural heritage produced the so-called *London Charter* [1]. The principles established are aimed at simple communication that is understandable to and assessable by different types of users. It is therefore essential to indicate the techniques used in collecting the representative data, the methodologies used in interpreting the data, and, obviously, the level of truthfulness of the historical/cultural simulation based upon them.
In light of the preceding considerations, we illustrate a case study used to experiment with new means of interacting with the cultural heritage, a new model to allow the knowledge and spread of information regarding an architectural object that has been “forgotten”, but is of great historical/artistic relevance. Technology is the vehicle through which it is possible to explore the complex levels of transformation, to optimize enjoyment and render the architectural object readable on many levels.

2. Case Study

The religious complex of Santa Maria, in the Macchie zone of the village of San Ginesio in the province of Macerata, Italy, presents itself as a palimpsest of various strata that over time have defined its form and function, despite having always been situated in a state of geographical marginality. It constitutes a work that is particularly significant for understanding the dialectics between abbey life and civil involvement over time. The first tests brought to light a series of events that have decidedly impacted the general image of the complex. Ample documentation was investigated from different angles to reach a wide level of knowledge of the architectural object.



Fig. 1: The religious complex of Santa Maria delle Macchie *extra moenia*.

Different levels of knowledge were expanded upon by interrelating bibliographic, archival, iconographic, and cartographic sources as well as by directly surveying the building, extending this to the various material and structural components, in order to decipher the complex evolution of its form. The information gathered was envisioned through an interrogable model, an instrument of technical/cultural divulgation for the research activity undertaken.
The dominant appearance of the abbey dates from its foundation, with subsequent modifications and expansions. To clarify the historical evolution of the complex, seven phases of development have been identified [2]:

2.1 The Phase Preceding the Structure, from the Romans to Religious Settlements

From the time of the Romans, a fundamental role was undertaken by the network of connections internal to the territory of Macerata. A series of archeological and epigraphic acquisitions attest to the existence of an important branch of the Via Salaria: the Salaria Gallica, which ran north/south through the entire region. The tract of interest to the Macchie zone was in use at least by the Triumvirate age and experienced prolonged use over time, undoubtedly for the better part of Late Antiquity. Such access therefore favored Roman settlements, with the foundation of the city of Urbs Salvia.

2.2 The First Building Phase

The initial core of the complex was built around the 11th century using *spolio* material, capitals, and column segments taken from the nearby Roman city. In the first building phase, the church with its Latin cross layout consisted of a crypt overlaid with a raised transept. Scholars have characterized the abbey as being typical of Benedictine architecture in the Marche region after the year 1000.

2.3 The Reign of the Counts in the 12th Century

At the beginning of the 12th century, the Prontaguerra Counts inherited a part of the goods from the Benedictine complex. It was still a totally embryonic period for the Macchie area; in fact, the church still had not taken on its role as an abbey, but thanks to the Counts, it began to enjoy a small economic stimulus, given its favorable geographic position. As a consequence, the original layout of the complex was expanded, with the addition of new buildings.

2.4 Transformation Phase – the 13th Century

The main building of the abbey dates from this period. After various events, the complex fell under the jurisdiction of the village of San Ginesio, which introduced the Cistercian monks. This order developed from the Benedictine order and emphasized greater rigor and rationality motivated by the search for a poorer, more genuine spirituality. In this century, the situation is of an abbey undergoing growth, with possessions and churches under its patronage. Such important growth produced a notable increase in monastic environments to satisfy the new needs of the religious community.

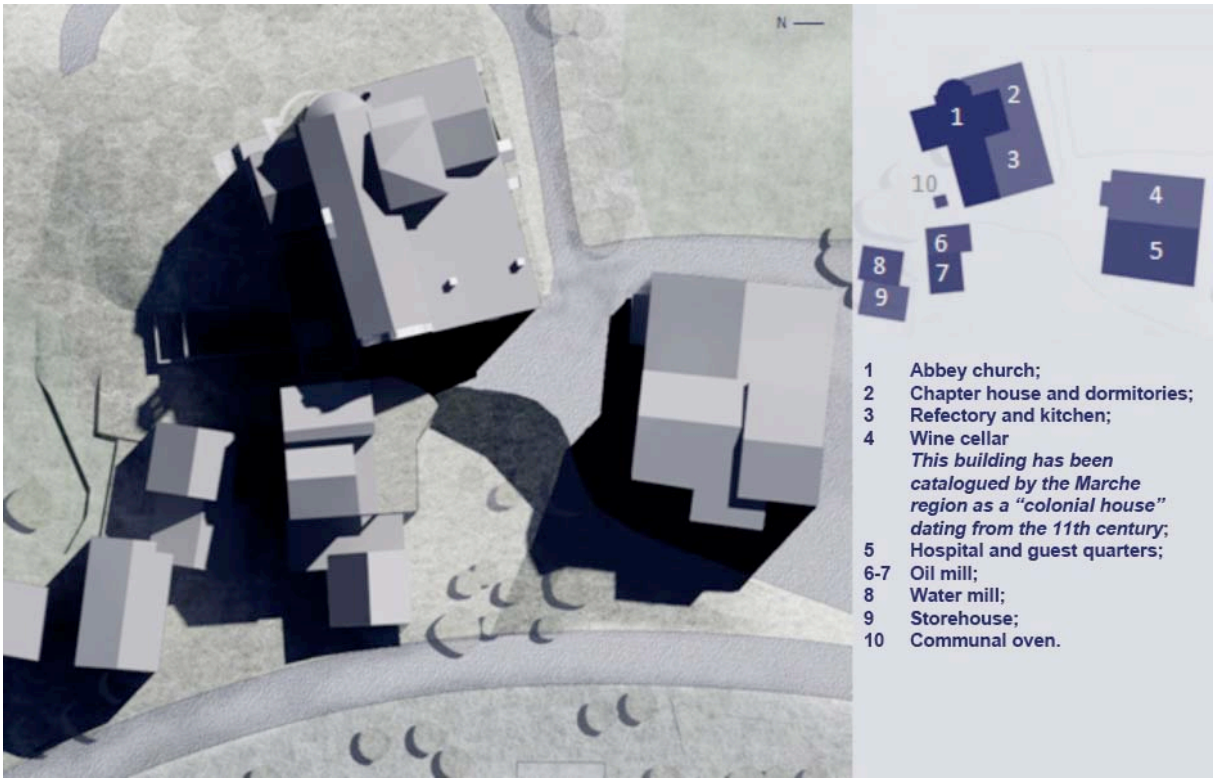

Fig. 2: The religious complex, illustrating the functions present in the various architectural buildings.

2.5 Expansions and Modifications in the 16th Century

The 16th century brought a raising of the church, with the creation of an upper environment where the monks could celebrate Eucharist. The abbey probably experienced a period of hardship after work was begun, and the work was left uncompleted. The main nave of the church was covered with a system of sexpartite vaults in stone. The presence of such vaults probably represents one of the most interesting aspects of the abbey. For centuries, it was believed that their construction occurred in a later period, and only through careful study of the construction and architectural characteristics of the church was it possible to determine the correct timeline of events that affected the complex, the signs of which remain in the form of fragments within the stone and brick walls.

2.6 Restorations and Embellishments in the 17th Century

Substantial transformations from the architectural point of view were undertaken in the 17th century under Cardinal Giovanni Battista Maria Pallotta and the Curia of Camerino. The cornerstone in the wall bears the year 1658 in commemoration of the work that Cardinal Pallotta, as commendatory

abbot, ordered to improve the complex. One of these changes affected the principal façade of the church, which was modified to be more agreeable to the tastes of the period.

2.7 Monastic Decline and Civil Ascent: The Last Historical and Restoration Events

The last phases of the complex are characterized by interventions that contributed to the degradation of the original character of the building, so much so that deciphering fragments dispersed in the walls has become almost impossible. Only by carefully reading the material traces through analytical work to record the different components can the evolution of the construction be reconstructed up to the current state. It is not possible to understand from the documentation what work was undertaken after the end of the 19th century, and the most recent projects reiterate the complexity of restoration interventions.

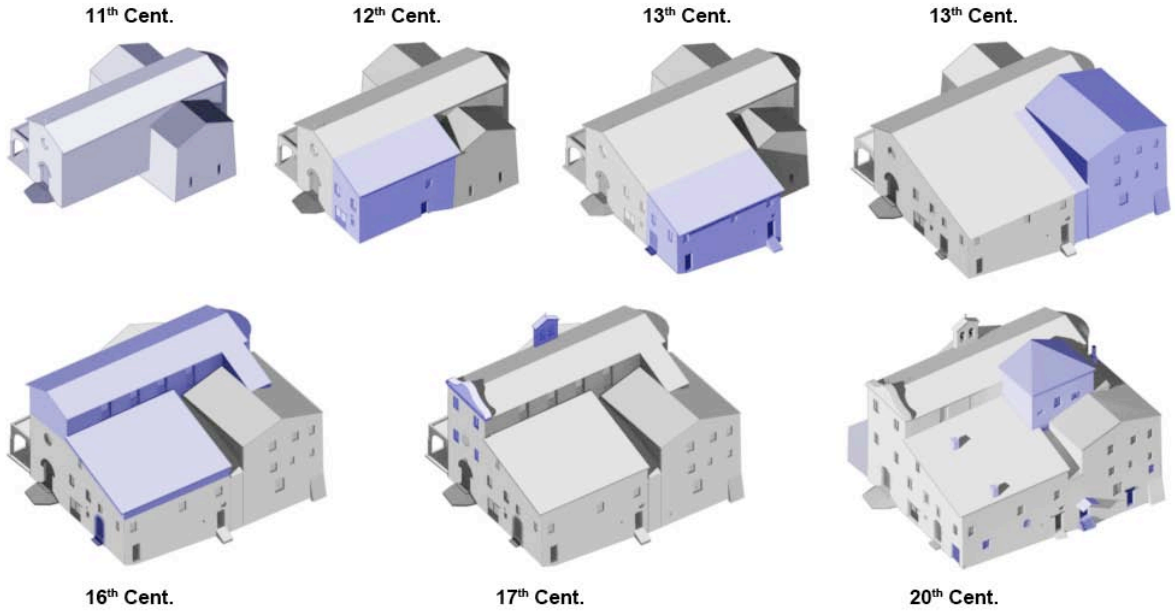

Fig.3: Analytical models for the different evolutionary phases. The principal architectural modifications are highlighted in blue.

3. The Survey

To complete the body of knowledge and move on to constructing the interactive model, surveying operations were made with the awareness that it is not a single perspective, plan, or cross-section that we wish to achieve, but rather the representation of the physical space, the architectural quality, and the transformations that the complex has undergone.

The surveying procedures were organized into three phases:

- in-field (architectural sketches, photographic survey, and measurements);
- site layout of the spaces;
- floor plan, elevation, and 3D drawings of the individual architectural object.

Creation of the initial sketches provided a way to identify the general layout of the complex and the main geometries. Due to the shape of the terrain, which is particularly steep, it was not possible to identify a single basic elevation, and we therefore proceeded using the method of breaking tape.
Traditional direct methods, triangulation in particular, were used for the planimetric survey. To identify the external perimeter of the complex, a series of support lines were constructed, which, when appropriately integrated, constituted the layout network. This network, when compared with the survey of the internal areas, gave the site layout, with an indication of the different wall thicknesses.



Fig. 4: Floor plans of the ground, first, and second floors.

In relation to the historical information, the survey presents aspects for further investigation, especially regarding the underground environments.

The crypt is arranged in seven small, slightly raised segmental arches supported by brick columns. Heterogeneous elements, reused without any apparent design or symmetry, alternate In the seven aisles. In reality, this is a true collection of *spolio* fragments arranged according to functional and aesthetic criteria.

The study proceeded with the creation of various geometric measurements, plans, sections, and perspectives which were then developed into a photo-rectifier study with *Archis* and *Tridmetrix* software. The next step dealt with developing the architectural survey by using the photo-straightened images in order to extrapolate and highlight the building materials and different construction details. This procedure was reiterated for all perspectives and for internal sections, treating the walls of each environment in a similar manner in order to create an overall reconstruction of the interior. Such steps expanded on the knowledge of the building, allowing acceptance of the past to be transmitted to the future.

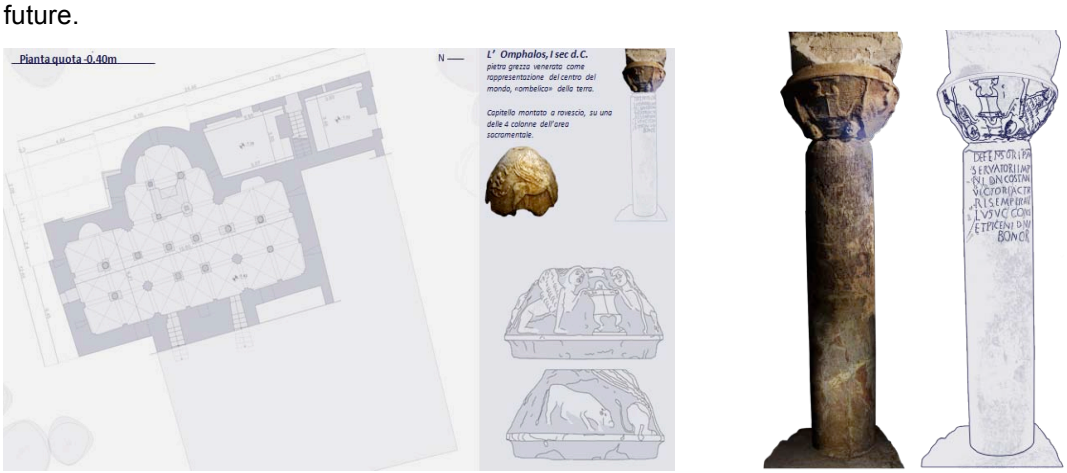

Fig. 5-6: Characteristic elements of the underground crypt taken from the nearby Roman site of Urbs Salvia. (Layout elevation -0.40 m. The omphalos, 1st Century AD, is a rough stone venerated as representing the "navel" of the world. Capital mounted upside-down on one of the four columns of the sacramental area.)



Fig. 7-8: Principal perspective and cross-section; the texture was processed in Autocad after photo-straightening was complete. Such a section of the transept highlights the three-level system: crypt, church, and upper environment.

4. Communicating the Data

To be able to illustrate the various evolutionary phases of the building and make them understandable, it was necessary to identify an expository method that allowed the data to be organized and presented in a way that expressed the available information simply [3].

The choice was aimed at constructing a tangible mock-up, that is, an interface to access informational content that can augment the model. In this manner, the observer can direct their own tactile and visual exploration. The purpose of a model constructed this way depends on the moment in which it is experienced. If it is explored before a visit to the site, it provides preliminary knowledge, anticipating some historical information. On the other hand, if it is explored after the visit, it can be useful in clarifying and expanding upon observations made during the visit.

4.1 The Architectural Mock-Up

Representing architecture with models constitutes an important step in understanding a building, both in its design phase and for the knowledge and analysis of its *de facto* state. As well, the ability to create digital 3D models together with the possibility of dressing them in astonishing photorealistic

material attributes certainly has not weakened their didactic and representative roles. In this vein, the need to create traditional architectural models has not diminished.
In fact, physical mock-ups do not insist upon a preferred viewpoint, and they are far from the hyperrealism of digital representations. Physical models are representational tools on par with digital models, and together they can and should be integrated to improve the cognitive process regarding the building.
The importance of physical mock-ups in communicating aspects of the architectural project is manifest in the model's capacity to facilitate understanding of the material/spatial elements of the project. The mock-up is thus delineated as a clarifying element in the building's morphology and as a tool for investigating the spaces.
In addition to simply portraying the building, representation via models therefore allows the relationship between the building and its construction history to be analyzed, reconstructing situations and layouts that have been lost, or anticipating possible new design configurations.

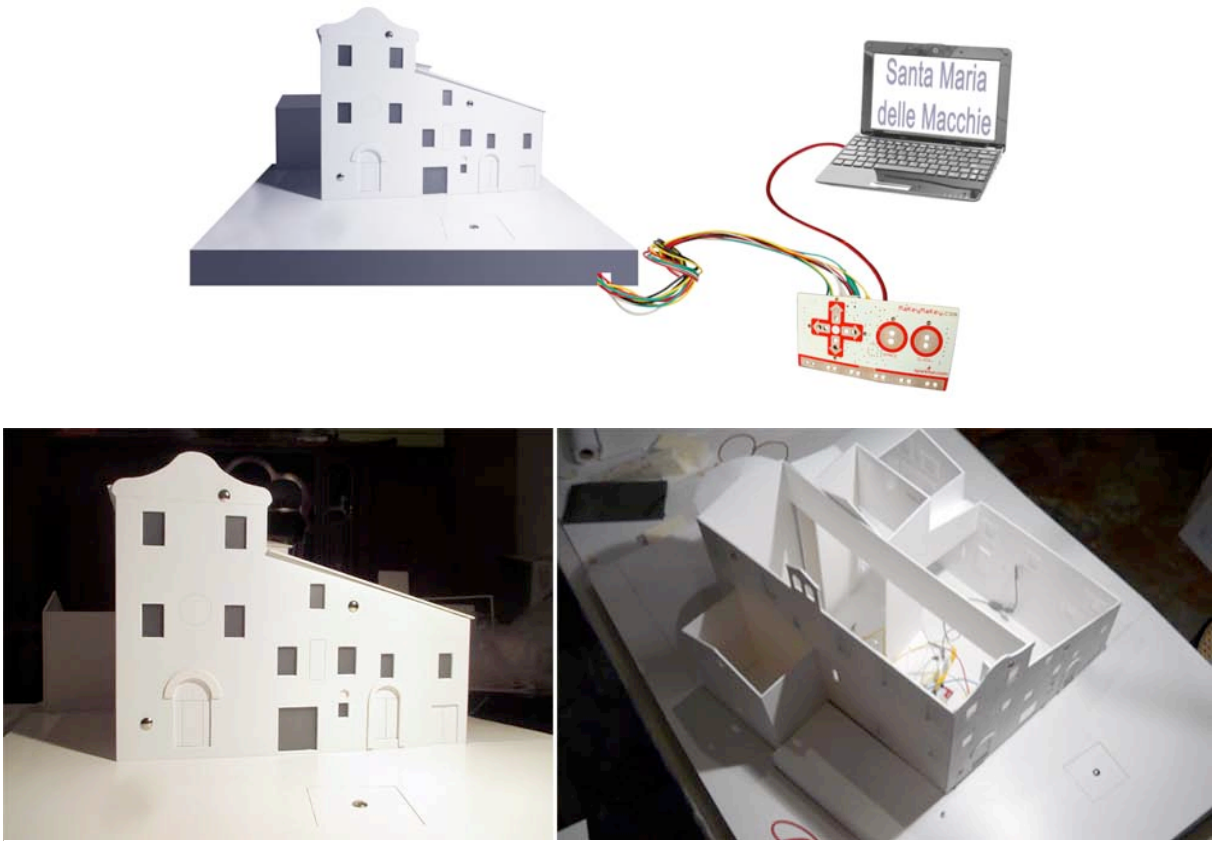

Fig. 9-10: Diagram of the tangible mock-up and construction of the architectural model. Note the metallic sensors/buttons on the faces of the model.

4.2 The Tangible Mock-Up

In the study of tangible environments in contemporary museography, a particular type of exhibition is implied that makes possible the interaction between physical elements and non-material dimensions, emphasizing the central, active role of the spectator/user in manipulating interactive technologies to "elicit" video and images.
A complete cognitive experience is thus realized. This occurs through the use of videos, animations, diagrams, and the most basic perceptual and sensory processes of the individual.
Along these lines, by tangible mock-up we mean a particular type of model that makes it possible to integrate and interact with the physicality of the architectural model and the non-material digital content.
For an architectural show, for example, 3D digital content can be used as valid illustrative support, even more so if this is combined with the traditional exploratory means of a spectator who is not used to reading traditional elaborate 2D graphics of architectural representations.
An architectural model becomes tangible through the introduction of interactive interfaces that transform the model itself into an exhibit in which spectators can start along free, evocative narrative paths, stimulating their sensory capacities beyond the visual dimension. In this way, the spectators themselves activate visual content that augments the model with information connected to it.

An augmented mock-up thus enables a learning process in which the use of the body and gestures becomes the principal means of exploring the space. The model becomes sensitive to the behavior of the user through the use of sensors that respond to human behavior and audiovisual output such as monitors or video projectors.
Those profiting from such smart architectural models can therefore be: experts that habitually use architectural models as tools for knowledge and investigation; and those lacking disciplinary knowledge, who can use the model as a tangible object, a natural interface without awkward technological aids, that responds to primary means of understanding such as tactile exploration.

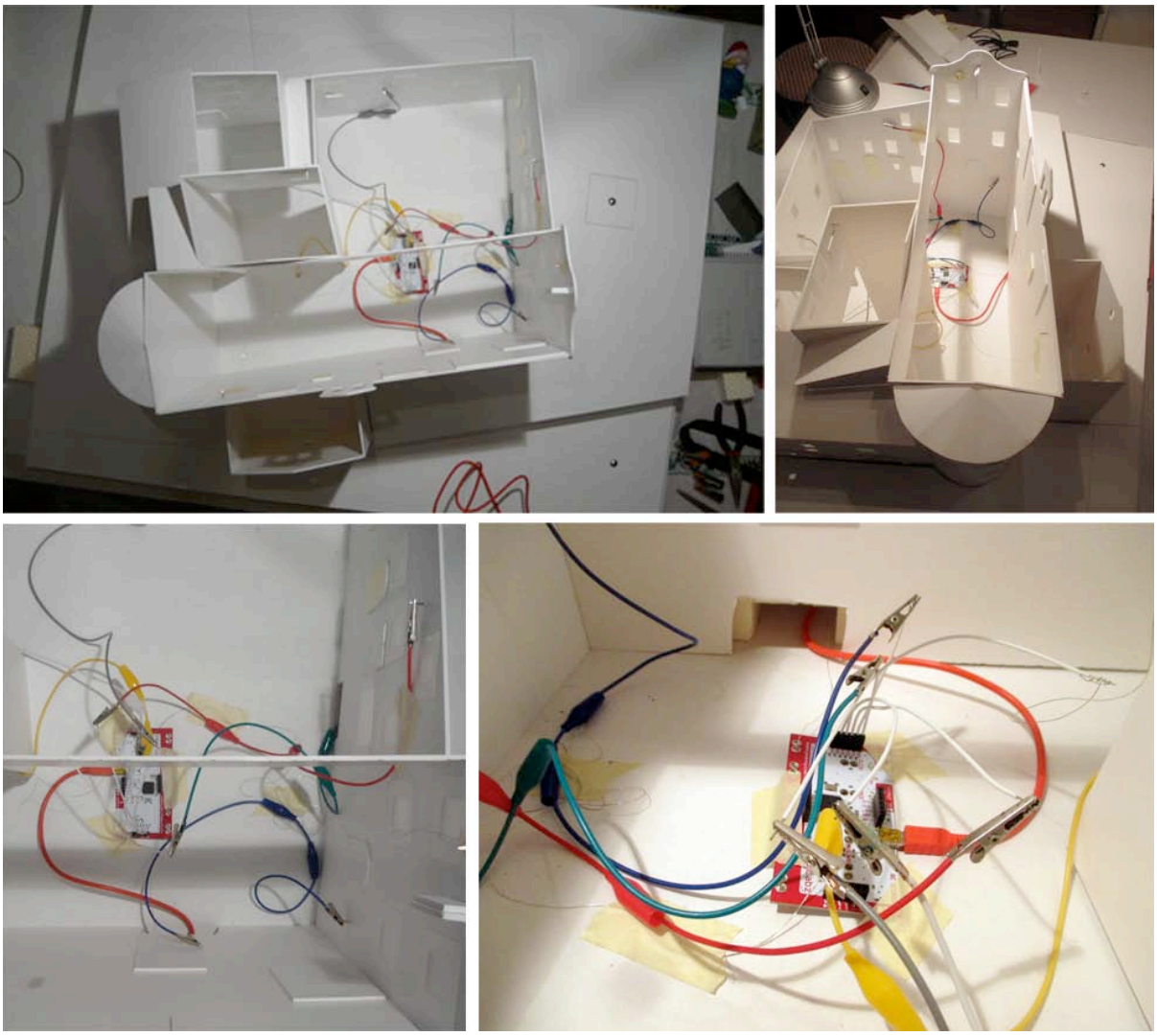

Fig. 11: The electronic apparatus hidden within the model. Each button/sensor is connected to the Makey Makey board with metal cables. The board is connected via USB to a PC that controls the activation of digital contents.

4.3 Technological and Audiovisual Contents

The technology that allows an architectural model to be intelligent is available at a low price and makes use of the resources available in Physical Computing, i.e., the science of the development of interactive physical systems through the use of integrated software, hardware, input systems (via sensors), and output systems.
Combining the use of sensors and microcontrollers, one can translate external requests into digital information that defines output in both the physical space and the digital environment.
There are different types of sensors. They may react to direct contact or proximity or they may “listen” and react to sounds or voices.
A large impetus in the development of this discipline comes from open-source, electronic prototype platforms, which provide enormous advantages in terms of simplicity and accessibility.
It is precisely the area of open-source physical computing that provides the hardware device used to technologically equip and make tangible the model of the Santa Maria delle Macchie complex.
In order to do this, we used the Makey Makey kit [4], which is capable of transforming any object that can conduct electricity into an input device, making such objects potential buttons.

The installation consists of a 1:50-scale model of the entire complex. The model reacts via metallic nails distributed throughout, which are connected to the board housing the microcontroller. Each nail senses contact with the user's hand and, acting as if it were a "play" button, sends an activation signal to a series of audiovisual contents that integrate and complete the knowledge process. The nails/sensors are located near areas that were the object of particular events in the building's history and which led to substantial changes in the formal or distributional layout of the building. The visualization sequence of the different phases is therefore not predetermined, but rather is chosen by the user, who, by exploring the model via the means mentioned above, transforms the model into a true hypertext narrative.
Each button gives access to an informational page visualized on an external monitor. At the top of the page, a timeline indicates the historical moment related to the phase "touched" by the user. The rest of the screen is dedicated to a non-photorealistic animation of the 3D model in which the architectural partitions subject to transformation are shaded within the overall spatial encumbrance of the architectural installation, presented as a wire-frame model. The right-hand part of the screen presents a series of images, diagrams, and renderings that expand upon the historical/cultural aspects.

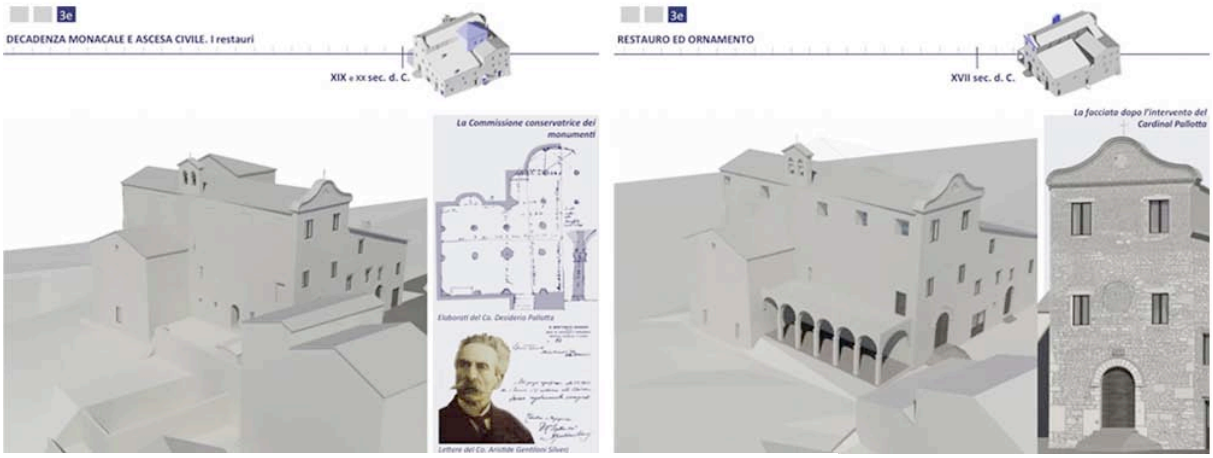

Fig. 12: Two informational screens activated by buttons/sensors on the model.

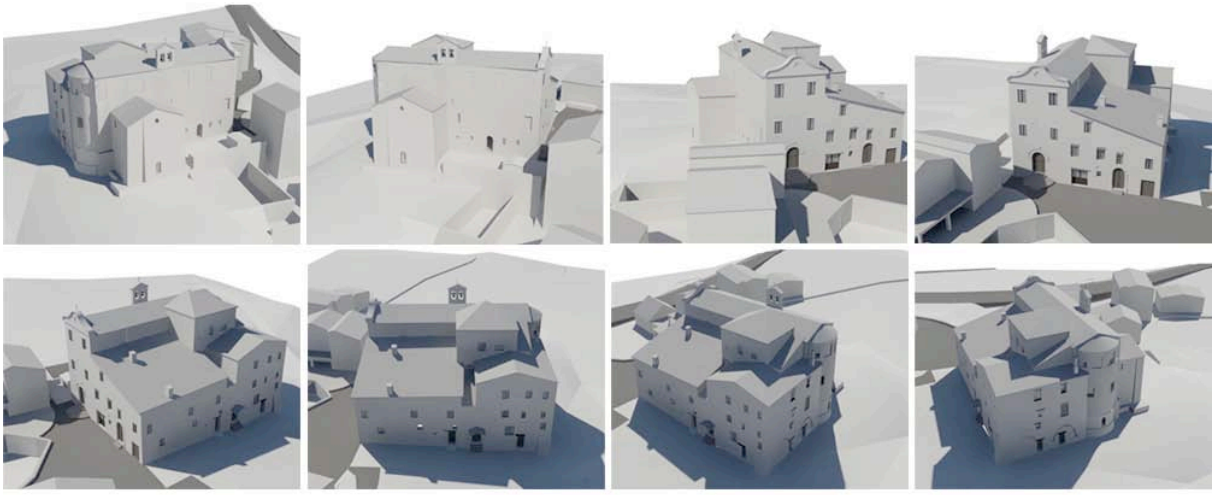
Fig. 13: Animation frames from one of the models corresponding to the *de facto* state of the complex of Santa Maria delle Macchie.

5. Conclusions

In the case study described in this article, we have aimed to analyze point-by-point the phases of development, which, through subsequent additions, have determined the current layout of the complex. An ideal ontological mock-up was thus developed, which is useful in verifying different semantic features in the management of cultural information. It has the double goal of allowing cultural enrichment through easy learning and full comprehension of the historical, artistic, and cultural themes of the place, as well as offering support for interventions since the information is organized on the basis of architectural restoration.

The development of an architectural mock-up not only constitutes a technical or visual procedure to complete the set of graphics or to understand the spaces in the building, but also allows an interface to be created to access other informative levels of knowledge. Together with 3D digital models aimed not at hyper-realistic representations but at simplifying the understanding of the different historical phases characteristic of the complex, the use of technology and sensors related to physical computing has led to the construction of a prototype for an interactive exhibit in which the spectator/user can experience the architectural object by touching a scale model to access additional levels of information.
Users are invited to explore the effects of their actions, interacting with the model and producing events that integrate and complete the cognitive experience, thus becoming both a spectator and an additional player in the exhibit.

Bibliographical References

[1] *The London Charter reiterates the need to combine virtual reconstruction with scientific methods recognized at the international level by various entities in the field of cultural heritage.* Cfr. RUSSO Michele, GUIDI, Gabriele. *The Role of Digital Models in Cultural Heritage Preservation,* in Proceeding of *Le Vie dei Mercanti*, *S.A.V.E.The Heritage*, 2011.

[2] Several sources were consulted in order to reconstruct the history of the abbey complex: RAININI, Ivan. *Antiqua Spolia. Reimpieghi di epoca romana nell'architettura sacra medievale del maceratese*, Macerata: Carima, 2011; FAVOLE, Paolo. *Architettura romanica nelle Marche,* Milano: Jaca Book, 1993*;* BITTARELLI, Angelo Antonio, *Ripe San Ginesio*, Camerino: S.Giuseppe, 1981. Various other archival sources were consulted, particularly those at the Diocesan Archives of Macerata relating to the Pastoral Visits in the 16th Century.

[3] ROSSI, Daniele. *Smart architectural models, spatial projection-based augmented mock-up*, In A. Addison, L. De Luca, G. Guidi, S. Pescarin eds. 2013, Digital Heritage International Congress. 2 Vol. Proceedings, IEEE 2013.

[4] www.makeymakey.com

[5] GAVINELLI, Corrado. *Storie di modelli esibitivi e critici*, Firenze: Alinea, 1993.

[6] LIBOW, Martinez Sylvia, STAGER, Gary. *Invent to Learn, Making, Thinkering, and Engineering in the Classroom*, Constructing Modern Knowledge Press, Torrance CA 2013.

XII International Forum Le Vie dei Mercanti
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Reflections on history and current operational safeguarding device in the Casbah of Algiers.

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Abstract

Since the enactment of Algerian law on the protection of cultural heritage (in 1998), including its implementing legislation, new regulatory and instrumental, are emerging to protect and enhance the historic urban groups considered as heritage.
At the same time, the further development of communication and mobility, provide actors and managers of planning a variety of approaches to be implemented to achieve goals. These objectives are to identify and to mature continually. Dealing with the issue of the role of government and services in support of urban heritage, this article analyzes the contribution of managerial approaches in this area.
The case study, namely Florence in Italy, is selected according to the size we wanted to emphasize throughout this paper. This is less the historic city center in itself, as actors, strategies and backup devices that are processed. Thus, the goal is not to seek to transplant models systematically, but rather to identify components of specific and relevant, meaningful and logical in relation to our urban heritage, including the Casbah of Algiers.
The aim of this work is to open a site for reflection on the role and organization of public urban action and on the importance of project management. The optimization of this link may be the trigger a virtuous process, benefiting the entire chain of actors involved in the preservation of the Casbah, which is listed on the World Heritage List of U.N.E.S.C.O.

Keywords: Urban Project Management, Casbah of Algiers, Safeguarded Area, Florence, Urban Strategy.

Nowadays, and all around the world, it is no use to prove that the historical urban centers have a value of identity and become, above all, an instrument of cultural valorization in a context of an inevitable globalization. This contribution deals with the case of Algeria through the Casbah of Algiers which is the first implementation of a new regulatory and instrumental device of safeguarding and enhancement of urban heritage in Algeria.

While the law n ° 98-04 relating to the protection of the Algerian cultural heritage [1] is starting up, altering the tools of intervention on urban areas with recognized and protected heritage values. it seems that Algeria has since been at a significant stage in acting on its historical urban centers. Indeed, following the country's independence, support of cultural property obeyed to the Ordinance No. 67-281, relating to excavation and protection of historical and natural sites and monuments [2], which was no other than the continuation of the law in effect during colonization. [3] After reading the article by Y. Ouagueni, we retain that no strategy could be taken under the order since it covered in its category definitions, only the concepts of archaeological and natural monuments and sites . As for the historical urban centers (considered in this text as monuments) was planned interventions specific to monuments, that is to say the restoration. [4]

Today, it is clear that the mode of intervention on a living historic center and characterized by its scale and its evolving nature, goes far beyond the single restoration action. [5] For more than thirty (30) years, the conventional planning instruments (PDAU and POS) [6] governed Algerian historical centers. These instruments showed deficiencies in their management of historic urban sets.

Among the novelties of the 1998 law, the recognition of the specificity of historical centers by introducing a new protection scheme, which is safeguarded sectors [7], with an assimilable instrument to the POS but with provisions and content appearing specific the particularities of historic centers.

Regarding the issue of project management, it should be noted that prior to the 1998 Act, and in the absence of urban instrument specific to historic urban centers, project management during development studies of the POS, including those harboring an urban heritage, was entrusted to the Directorates of Planning and Construction of the concerned Wilaya (province) , local authorities lacked budgetary resources and staffing to ensure it. Since the promulgation of regulations implementing the Act, including that relating to the Arrangements for the PPSMVSS (the algerian safeguarding plan), the concerned Directorates of Culture of Wilayas are responsible for project management during the development of the safeguarding plan. It remains unclear if these deconcentrated state services are able to perform this task.

The term "plan" referring to the "planning". However, the current trend in countries that have developed policy and procedures inherent to urban intervention is directed towards a so-called "Urban Project" approach and consequently a critical review after the relative failure of spatial planning [8]. It is clear that the approach of the Urban Project is not yet implemented in Algeria. [9]

This article seeks to examine the process of patrimonialization in the Casbah of Algiers and describes the current implementation of the safeguarding device and its management. Thereafter, it will browse the current florentine experience to detect relevant principles to adopt for the Algiers case.

1.The patrimonialization process of the Casbah of Algiers.

1.1. Historical overview.

What is called Casbah today constituted the entire city of Algiers intra muros in the early nineteenth century. The word Casbah referred then to only the Citadel [10] which crowned the top of the medina (city) at the Ziride era . [11]

This term was later extended to the whole of the medina which was a highly urbanized and delimited by a system of ramparts dotted with batteries, bastions and doors . Located on the Mediterranean coast, the site of the Casbah of Algiers was populated at least from the sixth century BC when a Punic counter was installed. [12] Since then, a combination of historical, political, and administrative conjugated to a particular geography have led to the development of Algiers. [13]

During the period of Ottoman Regency, development of Algiers was marked by a particular development.Its port and the fleet attached to them, became a major naval base in the Mediterranean.The cosmopolitan character of its social component, the various exchanges with various countries, and a system of governance introduced by the government in power, favored a certain prestige of the city and a level of management of different aspects of city life.At the end of the Ottoman period, Algiers consisted of a highly compact body tissue, located in a highly undulating area, according to a system that is complex, original and flexible. [14]

The capture of Algiers by the French in 1830, marks the beginning of major disruptions particularly in its urban dimensions. In fact, since the first years of colonization, significant demolition, construction, urban development sites and expansion ones were started under the control of the army. The construction of the city according to the design of the conquerors from the other shore of the Mediterranean, had been materialized first in the lower part of the medina, according to military imperatives, financial considerations and topographical criteria. However, an event can be noted at the beginning of the colonial era, which will save the upper part of the medina destruction of the French Military Engineers. N. Oulebsir in a book devoted to the history of heritage in Algeria, cites the intervention of Napoleon III in 1865 during his second visit to Algiers, opposed the demolitions carried out in the Upper Casbah so as to realize the *Boulevard de la Victoire*. [15] From the earliest years of

the French occupation, architects went documenting and inventorying the wealth of conquered territory. [16] In addition to Oulebsir's work previously cited ., and harnessing two important archives funds relating to these campaigns [17] two Algerian architects and academics in book published in 2003, resituated another dimension of colonialism and stressed the birth of a heritage consciousness. [18] A number of sites, palaces and mansions were classified as historical sites and monuments from the late nineteenth century by the colonial administration. Besides the heritage of the Roman era, a number of the production of the Ottoman period were also classified as such.

1.2. National classification of the Casbah of Algiers.

At the time of independence of Algeria, Algiers Casbah was not yet officially recognized as urban heritage. This could be partly explained by the fact that in France, the birth of an official recognition of heritage in its urban dimension was performed immediately after the independence of Algeria. It was not until 1973 that an order initiating proceedings of listing among the historical sites was issued in favor of the Casbah of Algiers. Nearly twenty years later, it was finally classified as a historical site in 1991. The period between these two dates saw the creation of a number of structures for the management of the Casbah in particular or the city of Algiers in general. For the Casbah, the literature reveals that although many studies have been conducted since the first interest was expressed by policy makers in the 1970s.

At first, the permanant committee of studies, development, organization and management of the Algiers region (C.O.M.E.D.O.R.) produces a schematic structure of Algiers on the horizon in 1985 and a General Plan of Orientation Plan (POG) for the year 2000 which was approved in 1975. Besides the development of the urbanization of the town, the POG includes a Plan of Renovation and Restructuring of the Casbah of Algiers. This instrument was developed by a structure created in 1974 by the C.O.M.E.D.O.R., Atelier Casbah (workshop of Casbah) which was composed of a multidisciplinary and international team. But in 1979, the P.O.G. was questioned, and thus the plan for the Casbah was not implemented.

The workshop of Casbah, after being dependent on the C.O.M.E.D.O.R. which was under the auspices of the Presidency of the Republic, was attached to the Central Bureau of studies, public works, architecture and urbanism (ETAU), which was at his turn under the Ministry of Urban Planning, Construction and Housing. With experts contributions from UNESCO, the workshop of Casbah developed the Project of Revalorization of the Casbah, which was completed in 1981. But once again, in 1983, the Workshop switched to depended on the office of studies of restoration and preservation of old neighborhoods (BEREP). Two years later, the workshop disappeared Casbah and was replaced by of the Office of Intervention and Control of Operation of planning on the Casbah of Algiers (OFIRAC) which was placed under the Ministry of planning, Building and Housing as well. A year later, changed his guardianship, to be placed under the authority of the Wali of Algiers. Set to standby status and without workload, this office will eventually disappear after the paradoxical decision to entrust the project management support for the work specified in the Casbah of Algiers to other bodies created at the same time of the OFIRAC Such was the case for the O. F.A.R.E.S. Yet created for the development and restructuring of an other area of the capital (Hamma-Hussein Dey).

Although the classification of the Casbah of Algiers, at the national then the international level, to be done in the early 1990s, the country context at that time had stopped all kinds of working on the historic center of Algiers. The introduction of the Governorate of Greater Algiers (GGA) in 1997, the development of the Grand Urban Project (GPU) and the swift of the Casbah into an urban district in 1998, did not change anything in the situation thereof, it continued to undergo a process of continuous and multifaceted degradation [19]. Besides the status G.G.A. was abandoned in 2000.

This period seems particularly characterized by a series of institutional decisions that led to instability in the definition of the actors involved in the Casbah of Algiers, which deprived it of studies carried out and possible funding; incessant degradation of the Casbah into its components: social, environmental and heritage in addition to the proliferation of so-called informal activities The absence of a specific instrument to historic centers legally established. Regarding this last point, the system of protection that is safeguarded sectors with PPSMVS.S. Introduced by the 1998 Act, will see the promulgation of inherent application text in this instrument in 2003 . The first PPSMVSS launched is that of the Casbah of Algiers which started in 2007 and approved by Executive Order in 2012.

At international level, expert missions took place in the Casbah before its registration in 1992. As soon as 1966, the year of A. Lézine's report, until today, UNESCO experts' reports have been produced on the Casbah. [20]

1.3. International classification of the Casbah of Algiers

During the application of the Casbah of Algiers, the registration was conditioned to the State party by: on the one hand, the existence of a specific regulatory framework for historic preservation andon the other hand, the establishment of a safeguard plan. [21] The first condition only existed in 1998 (6 years after enrollment) and the second condition has become a reality since 2012. This tells us about the ambiguity surrounding the process of classification of this site (conditions not gathered to its registration).

This "amputated" departure of a very important part, which is the basic component for the management of a historic urban center, that the Algerian state has already accumulated a delay from the initiation of the registration process. Despite this, in 1992, the Casbah of Algiers officially listed on the World Heritage List under criteria II and V. It seems clear that maintaining of the Casbah of Algiers on the World Heritage List requires maintaining values that have led to its inclusion on the one hand, and action on factors that threaten these values the other one. This should go through, first, the most accurate knowledge and most shared as possible from these values and, then, the most accurate and most shared knowledge as possible from the factors that threaten these values. I.e, the device management of the historic urban center should be designed and action organized according to these considerations.

1.4. The difficult implementation of the new device.

Practice has shown that, ultimately, only the Department of Culture of the Wilaya of Algiers was responsible for project management of the operation of preparing the PPSMVSS of the Casbah of Algiers on behalf of the Wilaya. Notwithstanding the relative seniority of the decentralized state services, staff of the directions of culture of wilaya is little expanded and more specifically on the task of project management in the development of a document such as the PPSMVSS. During the development of the P.P.S.M.V.S.S. the Department of Culture of the Wilaya of Algiers, included in its staff a majority of archaeologists and few architects. It should be emphasized here that no support contract to the contracting authority has been established as part of this operation. No supervision by experts, or targeted training was for the staff.

Before the selection of the engineering office (and his architect-project manager) who was the CNERU, a framing system of project management has been put in place to develop the PPSMVSS. It should be noted here that in the regulated content of the plan, there is a phase of study and implementation of an urban project (Phase I: diagnosis and draft emergency measures). This framing system materialized by a "Joint Committee" had been set up to coordinate the operation. This committee was chaired by the Minister of Culture and was composed of representatives of the Ministry of Culture, all decentralized departments of the State in the territory of the Wilaya of Algiers (Executive of the Wilaya) and Popular representatives assembled communal (APC) territorially concerned with the safeguarded area. A "Technical Committee" - chaired by an architect "qualified" in the monuments and historical sites, and composed of technical representatives of members of the Joint Committee - was established as the technical instrument of the Joint Committee. With this configuration, the engineering office (CNERU) had as interlocutor on one side the Joint Committee (policy and decision level), and on the other, the Technical Committee (technical level) including Directorate Culture (contract level). The Technical Committee is immediately proved to be a space for debate, exchange of information and knowledge, guidance and developed especially methodological during evaluation sessions of work. The frequency of meetings of the Joint Committee was less frequent than its agent of complementarity: the Technical Committee , and wanted to be the decision-making place (with their financial impact) and ensuring consistency of the implementation of sectoral policies and that, in order to safeguard the protected area of the Casbah of Algiers.

Working with this configuration finally lasted only little time, because the two Committees disappeared for reasons beyond our understanding. Therefore, the Department of Culture of the Wilaya of Algiers was left alone ensure the project management for the development of PPSMVSS and had the text as a unique reference for the accomplishment of this mission. In a context characterized by the absence

of statistical coordination where sectoral data differ according to their sources, and the coincidence of several projects and studies in the area of the conservation area (in addition to almost daily actions of the people on their living space), the CNERU began the study of P.P.S.M.V.S.S. in January 2007. Leaving the framing system, originally planned (Joint Committee and Technical Committee), data collection was done in an almost informal way between the engineeringoffice and the various sectoral and local structures overstepping the project manager. The processing of data was done in camera by the engineering office and the role of other actors, was more to give an opinion on the engineering office accomplished work (thus downstream) than in logic joint development. In addition, we noted the absence of instances of college type for the definition of basic concepts inherent to the specific values of the Casbah of Algiers (national and world heritage) on the one hand, and uncertainty assessment that affect the validity of the data processed by the engineering office on the other hand. Comments and concerns expressed by some stakeholders during the presentation sessions of the various phases of the safeguarding plan were supported punctually in the context of inexistence of clear and codified procedures inherent to this point.

Under these conditions, and on the basis of an initial diagnosis developed by the engineering office , a major operation fully financed by the Ministry of Culture was launched in late 2007. A dozen consulting firms (each with an architect and project manager "qualified") were engaged to carry out a project of emergency measures on a number of buildings (all types combined) located out in safeguarded sector. These interventions consisted of: temporary shoring (interior and exterior) of buildings and elements deemed threatening of ruin; the realization of reinforcement walls and temporary coverings against the infiltration of rainwater with repair and installation of a provisional system of stormwater drainage, spot repairs of various networks including those dl'alimentation drinking water and wastewater, cleaning interventions (including "empty" fields, wells and water tanks) and the sorting of different rubble and building materials. Although the safeguarded sector is a living and inhabited site, this operation was not systematically accompanied by a comprehensive program of temporary or permanent relocation. This has spawned a number of difficulties for interventions in buildings for the most part inhabited by a relatively large number of people.

Far from making an assessment, this operation was marked according to us, by a certain number of points, namely: the absence of an instance of coordination and organization of all stakeholders and actions undertaken , which led to the non-mastery of all interventions in safeguarded sector undertaken either by the various local and sectoral services either by the owners or private sector, deepening or correction of initial diagnosis by other offices studies, which were not involved in its development from the outset, the provisional nature of all actions; The lack of specific certification to work on a protected real estate complex to select the company carrying out the works; the lack of a systematic and accurate inventory of patrimony covered by tangible heritage located within the boundaries the safeguarded area; unilateral and centralized financing of the operation and a heaviness in contractual procedures and compensation, visits by experts of the World Heritage Committee to assess work in progress.

In February 2010, while the operation of emergency action was still ongoing, a decision moved the project management of this operation to the Office of Management and Exploitation of Protected Cultural Property (OGEBC) renewing, thus, with the unstable character in the definition of responsibilities relating to the management of the Casbah of Algiers. Officially completed in 2010, the P.P.S.M.V.S.S. was approved in March 2012 and that, following a public inquiry and the submission of the project to the assembly procedure wilaya. In January 2011 came a new executive decree creating a new player in the device. The National Agency of Safeguarded sectors which is not yet operational, is defined as a public administrative institution (EPA) under the Ministry of Culture. It has a primary mission the implementation of all the PPSMVSS in the national territory. What impact will it do? What mechanisms will be its roots in the context? And how will its integration into a device that is being implemented in Algeria?

This retrospective showed us the sequence of steps in the process of heritage in the Casbah of Algiers and the beginning of the institutionalization of the safeguarding device and management of urban Algerian heritage. Initially marked by instability configurations adopted for the management of the Casbah of Algiers, the device seems to benefit from a new regulatory framework established by the 1998 Act. What would be the perspective of organizational design able to save and to effectively manage this urban heritage? It is clear that the nature of the instrument is the logic of spatial planning. The only operational output of the P.P.S.M.V.S.S. as defined by the current regulations, an urbanistic project and not an urban project (emergency measures).

However, this exercise of implementation has allowed us to highlight failures including organizational level. The short experience of implementation of the safeguarding plan of Algiers (which is still

ongoing) has lead us to conclude that the PPSMVSS that are assimilable to land-use plans in their status and in terms of their establishment, are not carriers by their owns an urban project or strategic guidance. We noted also that no special measures (either regulatory or institutional or instrumental) govern the Casbah of Algiers as holding values that allowed international recognition.

Now observe how another city established its device of safeguarding and management.

2. Case example: The management plan for the historic center of the city of Florence.

The management plan of the historic urban center of Florence 2006-2008 appears as a successful experiment according to _ World Heritage Committee. [22] The historic center of the city of Florence has been included in World Heritage List in 1982 according to the whole criteria inherent in cultural property of outstanding universal value. The mission of coordinating the development and implementation of the management plan was entrusted to an office created for this purpose: the historic center office of UNESCO ((*il ufficio).* [23]

2.1. The context of the implementation of management plans for Italian sites inscribed on UNESCO list :

The U. N.E.S.C.O. has recently decided to increase its efforts to safeguard cultural and natural heritage by adopting active policies to protect property and to try to identify a new direction for the instruments enabing them to combine the requirements of conservation with sociocultural dynamics in continuous transformation in cities and landscapes. To this end, the U. N.E.S.C.O. Established in 2002, the inscription of new sites on the World Heritage List should necessarily be subject to the predisposition of management plans and successively in 2004, recommended the establishment of these plans for the sites already inscribed on the list. Because the U. N.E.S.C.O. established such obligations without providing a single management plan template, the Italian Ministry of Culture has established the Advisory Committee on Management Plans UNESCO sites by decree in 2003.

2.2. The approach to the development of the management plan:

The management plan has not been considered as a simple analysis document, but rather as an operational tool of strategic approach and that, setting goals and defining the actions and strategies to achieve them. In addition, the plan is presented as a dynamic instrument, able to evaluate the effectiveness of selected operational strategies _ capable of replacing inefficient projects by new actions (or projects) suitable for individuals and temporal needs of the site. This approach is in the guidelines established by the Advisory Committee on Management Plans UNESCO sites.

The management plan of the city of Florence was designed in four major parts, the first highlights the general framework of the plan including the reasons for the inclusion of the site in _ World Heritage values and recognition of values that make this site a unique one. The second part on the analysis of the territory in question is a preliminary phase to identify operational strategies. and action plans to be adopted for the safeguarding and protection of the site. This section provides an overview of cultural resources and landscape that distinguish the historic center. It emphasizes the production of tangible and intangible culture and conduct a socio-economic analysis of the territory, with particular reference to the changes that took place in the city and the risk factors and pressures threatening the historic center. It performs analysis of resources and protection plans developed by the administrative authorities for the conservation and enhancement of the site. And finally, an analysis S.W.O.T. concluded this part and starts the next one. The third part sets out the objectives of the plan whose main is to identify, protect and improve the site and transmit it to future generations. It is in this part that the strategy and action plans are set. The fourth and final part consists of monitoring and supervision of the Management Plan, provided by the historic center Office of the UNESCO.

Using an iterative approach, and following the definition of the strategy, it was available in four action plans that correspond to four themes. This is the Action Plan for the protection, preservation and enhancement of the heritage, the Action Plan for Research and Knowledge, the Action Plan for the Environment and Mobility Plan Action for Tourism. Each action plan is divided, in its turn , into projects (operational output).

The desire to achieve coordination among government agencies in the management of the site has been empowered by the Ministerial Decree of January 2005, which established the creation of a working group with the participation of the Italian Ministry of Culture, the region of Tuscany and the Municipality of Florence. To define a shared operational strategy, inter-directorate group is comprised of representatives of the Ministry of Planning, those of the Municipal Police, Ministry of Transport, the Office of the Metropolitan Region and Decentralization, those of the Economic Development, the offices of the Strategic Plan and the Ministry of Economic Development, in addition to decentralized State services in charge of Culture.

The existence of a strategic plan for the metropolitan area of Florence called "Florence 2010 pushed the office to take advantage of consensus on the key issues and the common vision of the city already acquired. Relying on the existing organizational configurations, public partners are the provincial government of Florence, the regional government of Tuscany, the Ministry of Culture, the University of Florence and the Chamber of Commerce of Florence. Private organizations are: Association of Manufacturers of the province of Florence, the National Confederation of Crafts and Small and Medium Enterprises, the bank Cassa di Risparmio di Firenze and the Foundation for the artistic crafts. The office has expanded this list to voluntary associations who live and work in the city.

Monitoring is done on two different levels of control: assessing the progress of intervention projects selected in each action plan in relation to agreed objectives. This assessment is done with the managers of each project subject to a quarterly audit of indicators. These evaluations are useful to highlight the validity of a project and whether it should be replaced and / or upgraded, the second level is the evaluation of the effectiveness of the Plan and its impact on the area in the middle and long term. To ensure joint and coordinated management of the cultural and landscape heritage, it was decided to carry out a check of its effectiveness every two years especially in the first stage of its implementation.

In conclusion

The existence of an outstanding universal value is the origin of the inscription of a site on the World Heritage List. Its alteration leads to the risk of its delisting. Therefore, the management of a World Heritage Site should be focused on the management of safeguarding and enhancement of this outstanding universal value. As we have seen in the case of the management plan of Florence, beyond the purely regulatory aspects, this management through operational outputs in the form of concrete projects under various action plans resulting from an approach that ought to be reflexive, global and strategic. The strategic approach, stability and sustainability of devices put in place seem to be a guarantee of success of the processes expected.

Reference notes

[1] Law n° 98-04 du 15 juin 1998, on the protection of cultural heritage. O. J. n°44 of june 17th, 1998, p 3 -15.

[2] O. J. n° 7 of january 23rd, 1968, p 50-58. And Decree n°81-135 of june 27th, 1981, amending this order.

[3] With the removal of all that infringe on national sovereignty. On the subject of the evolution of the legal protection of heritage in Algeria, read the article of Rachida ZADEM, *Contribution pour une mise en œuvre des plans permanents de sauvegarde des ensembles urbains ou ruraux d'intérêt historique ou architectural, organisation statuaire et modalités de financement. Constat et propositions*, in : *Réhabilitation et revitalisation urbaine à Oran*, proceedings of the international symposium held in Oran, Algérie, du 19 au 21 octobre 2008, edited by: Col·legi d'Aparelladors i Arquitectes Tècnics de Barcelona. Barcelone, 2008. P 71 et Yassine OUAGUENI, *L'état du Patrimoine - un Constat Mitigé,* published 2002, ICOMOS official site: http://www.international.icomos.org/risk/2002/algeria2002.htm (décembre 2010).

[4] Yassine OUAGUENI, op cit.

[5] Idem.

[6] Respectively : *Plan Directeur d'Aménagement et d'Urbanisme* and *Plan d'Occupation des Sols* according to Law n°90-29, modified and completed, on the organization and planning, O. J. n°52 of december 02nd, 1990, p 1408-1415.

[7] Term taken from the French heritage tradition and is still in effect in France since 1962 with the Malraux law on safeguarded sectors.

[8] See particularly the preface of Marcel RONCAYOLO, in : Patrizia INGALLINA, *Le Projet Urbain,* 4th edition, Presses Universitaires de France, Paris, 2004, 1st édition 2001, p3 ; Patrizia INGALLINA, idem, especially p 71-72 ; Jean-Yves TOUSSAINT and Monique ZIMMERMANN (dir), *Projet Urbain, ménager les gens, aménager la ville*, édition MARDAGA, Sprimont (Belgium), 1998, p 13 (text formatted by TOUSSAINT et ZIMMERMANN according to reports of Daniel PINSON and Dominique DHERVILLEZ) ; François TOMAS, *Vers une nouvelle culture de l'aménagement des villes*, in *Projet Urbain, ménager les gens, aménager la ville*, p 16-17 ; Marie-Hélène BACQUÉ, *Gouvernance et urbanisme de participation,* in : Véronique BIAU and Guy TAPIE (dir), *La fabrication de la ville, métiers et organisations,* PARENTHESES editions, Marseille, 2009, p19 ; and Alain AVITABILE, *La mise en scène du projet urbain, pour une structuration des démarches*, l'HARMATTAN editions, Paris, 2005, especially p17-22.

[9] For example, the short experience of the Governorate of Greater Algiers (GGA) with the Grand Urban Project (GPU) between 1997 and 2000 has not led to an actual Urban Project for the capital (be it by short-lived and / or inconsistency of approach?) read on this subject:, Ewa BEREZOWSKA-AZZAG, *La planification urbaine, orientations récentes*, in Jean Louis COHEN, Nabila OULEBSIR and Youcef KANOUN, *Alger Paysage urbain et architecture 1800-2000,* l'Imprimeur editions, Tranches de villes collection, Paris, 2003, p 266-277.As to the Development Project of the Bay of Algiers, whose studies were launched in 2006 and whose implementation is underway, a decline (especially time) seems necessary to attempt an assessment of this experience.

[10] read on this subject especially the preface of de Mostafa Lacheraf in : Ravereau, A. *La Casbah d'Alger, et le site créa la ville*, Paris : Sindbad, 1989. p 9-32.

[11] In 971, _ Sanhadja Bologhine ibn Ziri, son of Ziri ibn Menad, founded the Zirid dynasty reign over Ifriqiya (Eastern territory of Maghreb), read on this subject especially: Ibn Khaldûn, *Kitab al-ibar*. *Le livre des exemples*, (trad. Abdesselam Cheddadi), Paris : Gallimard, coll. « Bibliothèque de la Pléiade », 2002, 1560 p.

[12] The hypothesis of an earlier _ Phoenician presence to that of Punic has been issued as a result of investigations and archaeological excavations conducted _ _ by Gsell. S. quoted in: Le Glay. M., *A la recherche d'Icosium*. In: Antiquités africaines, t 2, Paris : 1968. p 7-54. Anyway, a chance discovery made in November 1940 at the headquarters of the Navy (Lower Casbah), confirmed the Punic presence in the site. There were 158 pieces of Punic coins discovered at a construction site of the Housing Management, with the inscription: Icosim. See : Leschi, L. *Chronique. L'archéologie algérienne en 1940*, In Revue Africaine n°85, Algiers : Société Historique Algérienne, 1941, reissued by : l'Office de Publications Universitaires : Algiers, 1982. p 137.

[13] Initially part of the Punic system scales , like countertops that gravitated into the orbit of the Carthaginian empire in the Western Mediterranean, the site was later annexed to the Berber kingdom of Mauretania under the reign of Juba II, then to the Roman Empire around the year 40 AD and became Icosium. After being under Vandals domination then the Byzantine until the seventh century AD, the tribe of Beni Mezghenna settled on the site at the dawn of Islam. Around the year 950 _ Zirid prince Bologhine founded the city of El Djazaïr Beni Mezghenna. The city came under the control of the Almoravids then the Almohades prior to the emergence of the three rival dynasties (Hafsides, the Marinids and Ziyanids), which disputed sovereignty. Towards the middle of the fourteenth the Arab tribe of Thaaliba which governed the city. After the fall of Granada in 1492, El Djazaïr received a large influx of population from Andalusia and was immediately besieged by the Spaniards. The three centuries of the Regency of Algiers began following the coming of Barbarossa brothers who helped El Djazaïr to defeat Spanish and annexed it to the Ottoman Empire.

[14] read on this subject especially, Missoum, S. *Alger à l'époque ottomane, La médina et la maison traditionnelle*, Aix-en-Provence : Edisud, 2003, 280 p.

[15] Oulebsir, N. *Les Usages du patrimoine. Monuments, musées et politique coloniale en Algérie, 1830-1930*, Paris : La Maison des Sciences de l'Homme. 2004, especially, p 120. Prior to this visit, René LESPES reports and quotes a long extract from an official letter from the Director of the Interior to the Minister of War 6 June 1840, in which he gives a negative opinion to a proposed project by the Military Engineering that would cause extensive destruction of the urban tissue of the upper part of the medina. Lespès, R. *Alger, étude de géographie et d'histoire*, Paris : Félix Alcan, p 273-274

[16] Focusing on the investigation of traces of Roman antiquity in a first step, a sensitivity to other times gradually developed thereafter.

[17] In French libraries: la Médiathèque de l'Architecture et du Patrimoine (numerous surveys and watercolor drawings of Edmond Duthoit and d'Albert Ballu) and, at la Sorbonne (seven albums of Adolphe Delamare).

[18] Koumas, A., Nafa C. *L'Algérie et son patrimoine : Dessins français du XIXe siècle*, Paris : Monum, 2003, 297 p.

[19] This period also saw the appointment of a "Wali delegate to the Casbah", the creation of a "cell Casbah", the creation of the Directorate of Planning and Restructuring Neighborhoods Algiers (DARQ) and launch in December 1999 by the CNERU a study of a safeguard plan and development for the Casbah of Algiers. In March 2004, the APW Algiers deliberation approved by _ plan developed by the CNERU however, this study was not consistent with Executive Order 03-324 on rules setting PPSMVSS and the boundaries of the study of CNERU did not correspond to the boundaries the safeguarded area as established in 2005.

[20] Y. Ouagueni, highlights the confused nature to judge the differences between the types of operations to be conducted for the preservation and enhancement of the Casbah from a report to another.. In : Y. OUAGUENI*, La Prise en charge du centre historique d'El Djazaïr, un chantier en devenir* , in D. PINI (coord.), *Patrimoine et développement durable dans les villes historiques du Maghreb : enjeux, diagnostiques et recommandations*, UNESCO, Paris, 2004, p 129.

[21] Report of the World Heritage Committee at its 15th session held in Carthage from 9 to 13 december 1991.

[22] SILIANI.S, in *Management Plan 2006-2008, Historic Centre of Florence UNESCO World Heritage*, édition Comune di Frirenze and the World Heritage Centre, Florence, 2006, p 10.

[23] Special office dedicated mainly to the sustainable management of the historic center through the development and monitoring of the management plan. it is also responsible for the implementation and coordination of effective links between skills and stakeholders, public and private, working in the historic center of Florence, the identification of guidelines and common actions projects included in the management plan, the preparation of periodic reports on the state of conservation of the historic center and bring the changes to the management plan and action plans, coordination of the funds allocated to the management plan and related action plans and promotion, the implementation of and coordination of studies and research on the history of the town territory and monumental heritage.

[24] It should be noted that two publications dating respectively in 2007 and 2008 focused on monitoring the management plan of the city of Florence. These documents have established adaptations consisted of the inclusion of new projects in the four action plans mentioned above. It was also an occasion to make assessments and an evaluation of the management plan.. *Management Plan Update and monitoring 2007*, *Historic Centre of Florence UNESCO World Heritage*, edition : The cultural administration office of the historical center world heritage UNESCO of the local authority of culture of the district of Florence, Florence, 2007, et: *Management Plan Update and monitoring 2008*, *Historic Centre of Florence UNESCO World Heritage*, edition : The cultural administration office of the historical center world heritage UNESCO of the local authority of culture of the district of Florence, Florence, 2008.

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ARCHITECTURAL ANALYSIS OF ARCHAEOLOGICAL CONTEXT - HYPOTHESIS OF RESTORATION OF THE DOMUS del Torello di Bronzo (reg.V, ins. 1, civ. 7) - ARCHEOLOGICAL SITE OF POMPEI

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Abstract

The archaeological site of Pompeii is unique for several reasons.
One of these is the need for a multidisciplinary approach to the analysis of the monuments present them.
The specific and unique mode of burial has meant that here more than anywhere else, you will not only preserve intact archaeological information, but also the perception of architectural spaces related to the lifestyle of the inhabitants.
In this sense, an architectural, spatial and cultural analysis, allows you to decode the monument with a new interpretation, highlighting aspects that are outside the ordinary course of archaeological investigation without replacing it but supplementing thereby providing a complete overview useful for design practice, maintenance, use and preservation.
Specifically, the monument under study, the Domus del Torello di Bronzo (House of the Bronze Bull) reg V ins.1 civ 7, in the archeological site of Pompei, it's organized along a prospective axis aligned with the entrance marked by fountains and water features.
This axis affects the surrounding spaces limiting concepts such as symmetry or module to a secondary role preferring a privileged perceptual axis closely related to life and the representativeness of the inhabitants of the house.
In this sense, the architectural analysis of the archaeological resource can be a guide for a correct restoration work also based on the creation of 3d models useful in the design.

Keywords: Survey, Archeology, Perspective.

1. Introduction

"We had done just in time to sit down when night fell, but not like when there is no moon or the sky is covered with clouds, but as a light off indoors. You could feel the dark desperate cries of women, the cries of children, the shouts of men, some with screams and tried to recall the cries were trying to trace the parents of the other children, others their spouses, each complaining about their woes , other than those of their loved ones for fear of certain death, he wished death, many raised their hands to the gods, in the majority, however, it formed the belief that the gods now no longer existed and that that night would be the last and eternal the world."

"Second Letter of Pliny the Younger to Tacitus'

The archaeological site of Pompeii is unique in the world.
Frozen by the eruption of 79 AD, it became a time machine able to travel information directly from the past to the present preserving not only tipical archeological information but also the traces of everyday life that took place there.
The amount of information that can be accessed by analyzing a shop, or a domus thermopolium are outside the purely archaeological practice and can reach any field of study of modern sciences, architecture, sociology, religion.
The multidisciplinary approach is, here more than elsewhere, fundamental because the understanding of complex dynamics can only occur through the decoding of various specific languages from different fields of inquiry.
Here the key proposed it's architecture, by which it will be possible to perform an analysis of the spaces useful to understand the relationship between form and function is always present in the ancient ars aedificandi. This analysis also brings additional considerations related to the lifestyle of the inhabitants, their habits their customs and traditions that have left traces in architectural structures remained.

2. The Domus of Bull Bronze.

The domus in question is located in the north east of the city, following the current classification, is located in the region V, insula 1, number 7, directly opposite the building of the Central Termae.
This location it's significant because it poses the house in an area not far from the Forum and the castellum acquae, which allowed the construction of a water system particularly spectacular.
It is one of the houses belonging to the earliest phase of the city, which probably belonged to the aristocracy Samnite, and so adopt in its conformation some architectural elements useful to enhance the prestige of the inhabitants.
The layout follows the classic Roman domus scheme articulated in the three canonical moments of the Atrium, Tablinum and Peristyle, using a particularly well studied perceptual axis alignment.

2.1 The Fauces

Starting from the outside can be seen as the main entrance, the Fauces, have a particular configuration. The main door has a size of more than four meters in height added to a wall in opus quadratum in blocks of gray tufa well worked that highlight the importance of the home. In the same space entry, has been made a secondary entrance to a much smaller size.
This solution, used in other domus, means that for everyday you can use a port (secondary) of conventional size, while opening the main door could be reserved for special events.

2.2 The Atrium

Pass the Fauces, you get into a tuscanic Atrium, characterized by the classic impluvium on which was erected a marble pillar which supported a bronze statuette in the shape of a torus (hence the name of the domus) which served as a fountain.
Here, too, the style is rigorous, the clean lines of the environment added to the size of doors of cubicula who enter here, two on each side all big greater than three meters, configure a strict space and inspiring respect. On the bottom there are two Ale, left and right, inside of which were made of wood cabinets, while the configuration is closed on the final prospectus consists of two doors of the same size as the other accompanying symmetrically space dedicated to tablinium, the appointed place to welcome the guests.
All the space of the atrium is configured in size and proportion, to center their the eye on tablinium who becomes the main space but not limited because it is completely open to the peristyle behind and separated from it by a step up from which served more likely by sitting than transition element.

2.3 The Peristyle

The peristyle was accessed through the door on the right (east) behind which is a gently sloping ramp can overcome the height difference with decking. Around this place a number of other environments, some minor but very representative qualitatively different from those of the atrium and certainly much more private, a triclinium, a large living area and access to the hot baths and the kitchen.
The peristyle is organized into three branches, while the fourth, to the north, was made a nymph that closes the perspective axis perceived from the entrance.
The realization of the Nymphaeum is to relate to the installation of a complex water system that has fostered a substantial change in the habits improving water quality and reducing the use of tanks as yet. The proximity to the castellum aquae has allowed us to take advantage of the pressure to produce

a series of water features which on the one hand absolved in functional tasks such as feeding the hot bath or kitchen, on the other hand allowed an increase in the space of representation 'atrium already appointed to this task.

2.4 The water system and the Nymphaeum

In most parts of the domus are traces of fistulae, lead pipes for water supply, but in this domus system appears to be more organic and organized that lets imagine one-step installation of the same.
Starting from the left side of the fountain, are visible three taps for the adjustment of the water or better for the closing or opening of the spouting fountains which is an interesting indicator for water management which could be interrupted for maintenance operations and cleaning.
The Nymphaeum is composed of three niches containing statues from the foot of which flowed a small waterfall.
This ended in a rectangular tank which incorporates all three niches. From inside starts two jets placed in two brickwork columns lower than edge of the tank. Closed the composition of a group of twelve fountains that poured from the edge of the still water inside the tank.
The water games then extended to a fountain located at the center of the peristyle and two jets coming out from two columns of the peristyle.
In fact, in correspondence of the tablinium window, a column is deleted, in the space generated have been positioned against the remaining columns two pillars useful to hold the lintel but also to hide the vertical ducts of two jets coming out from the columns and ended in two containers of lava rock.
Rests of fistulae are also present at the side of the ramp connecting the atrium, passing by the door jambs to feed the statue of the bronze bull nell'impluvio atrium.
From the traces on the columns, it is then deduced that there were fences around the perimeter of the peristyle.

2.5 Perspective and water games

The axis prospective often spoken is now evident as well as the quality and the shape of the spaces.
From the outside, we would have been before a two imposing door, if they were to remain closed, we would have gone through the back door, in a narrow corridor that exceeded the fauces and would have entered the atrium where the visual effect would certainly be undoubted, even more so just come out of that small space.
Lighting conditions in an atrium were limited, the light coming from the top and from the bottom of compluvium tablinium would dilated space, making it even more impressive, while the high gates of the side rooms and the jet of the fountain in the center would accompany the 'host up to tablinium suggesting respect for the hosts.
The vanishing point of light and water of the peristyle would complete the whole turning back the scene once in tablinium.
It thus appears that the space that you configure here is purely public and representation, even more so if you compare it with the second part of the house.
In the rooms around the peristyle, the perception of water games and the nymph becomes more intimate spaces are shrinking and the atmosphere becomes more domestic and especially, if you will, can be completely isolated from the atrium.

3. Analysis and conclusions

3.1 Analysis of Materials

he domus is in generally good condition, especially from the architectural point of view, while the same can not be said of the apparatus of painting and coatings. Therefore, the more detailed analysis which is given here aims to better identify the problems which the dwelling is subject for groped to propose an appropriate plan of action.
Therefore retrace the domus, starting from the entrance trying to focus on the most interesting elements.
The front of the domus presents with a characteristic monumental entrance into blocks of gray tufa, apparently does not appear to be any significant damage, but there are two interesting elements in the first place the color. In fact, in spite of gray tuff, the color of the material appears reddish.
From a fracture present on the front of the right side of the entrance, it is noted that this chromatic alteration affects one layer not just pushing inside surface of the material for at least 5 mm, beyond which the tuff resumes to its greyish coloring. It was not possible to understand the causes of this coloring, has suggested an alteration due to weathering combined with the natural aging of the stone, but on the one hand it is observed that the alteration affects the entire hanging in a compact wall

without a difference to both sides of the entrance and part of the interior, on the other hand are "reddish" other entrances (if not all) present in the archaeological area which suggests that it may or characteristics of the stone, or an alteration that has affected at the same time as the material in question could have caused the exposure of the stone to the heat of pyroclastic materials or their simple burial.
Another interesting point it's the backdoor on the right side.
Being the main gate of considerable size, over 4 m, is likely to prove more convenient in ancient use more frequently according to in its input. The lintel of the door has been created by carving a block of tuff large, and because of the damage is split and topped with a large lesion which also affects the upper row.
This injury has caused the detachment of a section of the lintel which is currently held on the spot by a shore-shaped gate that closes such access. The inner part of said wall, presents a series of holes, probably housings of old beams.
Static survey carried out showed that the causes of this injury is not to be sought in the rotation and consequent collapse of the facade of the house, but rather a failure in the bottom of the intermediate zone of the entrance. In fact, if it were a rotation of the front one would expect to find at least the external face off lead, so it does not happen while having occurred by means of a spirit level on the perpendicularity of the tuff blocks. Therefore, the slope of the lesion, the stagger the joints of the blocks and clear the modern reconstruction of the compartment wall lintel of the right side of the fauces provide enough evidence of a failure in the foundation of the middle section of the entrance.
It is also noted that the plaster of the last part of the fauces and in the space behind the secondary entrance, there are other injuries that are consistent with the hypothesis assumed.
The floor of the entrance is in excellent condition, given the presence of basalt, while that of the fauces and the atrium has several damages.
This floor is , in fact disrupted in several places , probably due to the infestation of vegetation that currently seems to be effectively kept under control in general is clearly visible warping the original fragments of marble and limestone drowned in the mortar , but the lack of adequate protection from the weather has meant that the mortar was washed away so that in general the fragments of stone emerge from the floor . In general the right side of the floor is the best preserved , and on the left some gaps and detect the presence of biological attacks , especially mosses and lichens, which also invade the floor of three rooms on the left side of the atrium and part of ' watershed in marble , the latter in particular being attacked by lichens. The greater presence of mosses in this part of the atrium can be explained by the absence of sun that does not beat almost never on this side .
The walls facing the atrium , as well as almost any environment here, keep a record of plaster , it is reported as being decorated by multiple sources, but at the moment looks completely white and apparently in good condition . In fact, by hitting , all the plasters are detached from the holder and it was possible to observe a particular phenomenon. Indeed , in several points of plaster bubbles are present , such as on the central sector of the left side of the atrium , in the environment at the right, indicated as lararium, and in the *ale* of the atrium on the right side than on the left where are the remains of a wall cabinet , some of these are broken and the underlying layers are visible which are completely pulverized and tend to collapse to the ground. The superficial part of the plaster , however, is compact for a thickness of a few millimeters and particularly flexible , which suggests the presence of a surface layer of material laid in order to compact the plaster , which if it has actually performed this function in a superficial way , however, is not able to avoid or detachment of the hanging from the media , nor the pulverization of the deeper layers .
The two environments are best preserved on the right side of the atrium on which was built a reinforced concrete pavement and whistled act for the protection of the walls with frescoes. The plasters are still well preserved, and they indicate damage to the roof structure. In the ceiling of the second room, there is a lesion from which in case of rain water enters, the damage does not look very old, but has already caused the detachment of fragments of the ceiling highlighting the reinforcing bars that have rusted and the 'percolating water has given rise to the phenomena of decay on the back wall of the cubicle as well as damage caused by dripping to the floor.
Same situation regard large fragments of plaster in tablinium , ale atrium and service areas to the right of tablinum , while in the latter and in the right ale of the atrium (the one with the remains of the cabinet) indicates the presence of vegetation on the floor , for the most part mosses .
With regard to the impluvium, it is noted that the bronze copy of the bull was stolen in the seventies leaving behind only small fragments of the stand on the podium near the impluvium .
The unique environment of the atrium to submit sectors walls a bit ' shabby is the tablinium .
Indeed on the two opposite walls which delimit it the mortar joints are most emaciated perhaps for a different technique used for their construction , which present two different textures walls, the upper most damaged , with a polygonal opus of variously square brick , the other lower, composed of volcanic rocks purple more irregular in shape but uniform in size and appearance more compact .

Are also in excellent condition also the necks of the walls, on which there is an area of sacrifice very compact , slim and seemingly very tenacious that is lying below the limit of some elements of the wall protruding from the inside.
More interesting is the second part of the domus which includes the peristyle and the neighborhood of small baths. Throughout the area , with the exception of the Nymphaeum , there are no large areas of plaster, those present , however, always have the same characteristics of compact surface , leaching of color and sound dull to percussion , while the plasters in the Ninphaeum are best preserved. To protect this , was made a coverage sloping inwards that has ensured the preservation of most part of the plaster that simulated marble on the sides of the three niches , and three decorative elements in " Fried Egyptian " present below the three fountains and trained by stucco and sea shells.
In general, the state of the plaster in this area is particularly good and compact, not excluding some sections in which the percussion was found a hollow sound characteristic of detachment. Most damaged are plaster decorated on the edge of the tub , perhaps because it is less protected by the cover , which are broken down into several parts, such as broken down into at least two points at the ends of the tank is the layer of earthenware which defines the surface
The floor of the porch is at the perimeter formed by cocciopesto and fragments of limestone , compact but extremely disrupted , while the central area of the portico particularly compact but the coloration varies from summer to winter because of revival of mosses present over the entire surface .
On the right side of the porch, in the central columns, had to be present the walls reported by Mau to hold the barrier to close the porch, but only one of these are still in place loosing the upper part of which was reported the recess for the barrier, the second is completely demolished and remains the only visible trace left in the right column, you have to say, however, that at the time of the survey there was a shapeless block of masonry near the column in question, perhaps what remains of the original wall.
The columns that make up the porch are plastered and there are no significant damages if we exclude the usual dull sound on percussion of the plaster.
Particularly interesting is the environment to the left of tablinium which is referred as a triclinium.
It is here a beautiful mosaic floor with black and white tiles depicting a highly complex draw on doorway while the interior space its covered by cards rotated 45 degrees.
In this environment there is only plaster on the front wall, too washed out and detached.
It remains to consider the last part of the Domus , the service areas that take place on the left side of the porch.
The latter are of particular interest not being completely devoid of decorations lost already at the time of the Mau , and the floor of every room is covered with moss, but the last three are interesting environments that make up this area.
Walking trough the corridor which is connected with the porch, you will reach a small hallway which owns the three environments . The first , the one in front, gives entrance to the kitchen of the domus, perfectly preserved, the floor is slightly lower than the floor level, we highlight inside the workbench on which to light the fire and the fire that has left a massive trail of his chimney in the north wall. The work plan , however, is a bit too low which suggests that the original floor is under the layer of moss to the exclusion this, all environments that are located here do not have a trace of further damage being even the walls undamaged.
The hearth , in particular also serves as praefurnium for the two environments one of them adjacent to the kitchen which is accessed along the narrow corridor turned to the right of the hallway mentioned.
In these two environments was built a small spa facility fully functional , in fact the room adjacent to the kitchen is equipped with a bathtub on the wall directly opposite the fireplace in the kitchen, and on the outer walls are visible tegulae mammate characteristics of the most famous bath, the floor of both environments is also built on the characteristics suspensurae. These environments are the only ones in the latter part of the domus to have preserved part of the plaster , in particular the first accessible environment , the tepidarium of the system , presents the decorations intact for the full height of the walls except for some small gap, most damaged the upper part of the plaster on the north wall , where the fracture line is very clear and does not seem very old since then also present fragments of the plaster on the floor. In general, the plaster of this environment is well preserved , but here seems to have a dull sound on percussion , the north face has a particular phenomenon , the whole layer of plaster is detached from the support of less than 12 cm , so that is could raise us an ivy plant of medium size, and this separation is visible next to the front door from the hallway to the environment , however the thick layer of plaster is very solid and compact, perhaps because it is made in a different way in order to support the humidity of the heated rooms.
In the following , however , the lining of the walls is only up to half height , but the stratigraphy, perfectly readable on the west wall , is different due to the presence beneath the plaster survivor of the above tegulae mammate . The hot here present, has lost the original plaster coating , while on the floor there is a soil mixed with fragments of plaster fell from the walls and moss , also the floors of both

environments are boarded because of subsidence induced by suspensurae that have lost their original alignment, apparently the floor shows no immediate signs of abating.
The last room left is accessed from the left side of the hallway corridor. The hallway gives access to an environment where there should have been a ladder and which today remains a sort of ramp being invaded by all the debris and mosses probably cover the original scale. From this ramp also leads to another room adjacent to the kitchen , but whose function is unknown not present anything remarkable or significant damage. The ramp then leads to a room that was originally to be below a triclinium which was accessed from the porch , this environment is divided into two sections by small wall that probably had to bear the beams that formed the floor of the environment above and the holes of these are perfectly visible in the walls.
The floor of such an environment , however, is not too high compared to the alignment of the beams resulting therefore impractical, then it is conceivable that the current one is not the original decking. Besides that this environment is also covered with moss and does not show any particular damage in the masonry or plaster which was not present in , except for the lintel of the small door.
This , in fact , as well as others in the domus , was made with a layer of cement and irons as armor , probably excess moisture led to the oxidation of the iron and then the consequent disintegration of the cement that here more than elsewhere is missing .
Even in the two areas covered atrium , above the two entrances that face the street and on the two openings on the sides of tablinium new lintels were made , and these are beginning to suffer the ravages of time, but not for damage except for a few small horizontal serious injury , which suggests that it is likely to be more patient in the iron content but in any case do not present serious problems.

3.2 Assumptions about the operation of the original shell

The analysis carried out so far, focused primarily on examining the quality of architectural spaces, from this and from the analysis of archaeological data still in situ it is possible to make some assumptions about the operation of the old shell that could confirm the spatial perception so far analyzed.
From here we proceeded to the construction of a three-dimensional model in order to have a confirmed space than assumed.
The main problem was that there are no traces of the housing in the atrium of the beams that were to support the ceiling.
Having to cover a light of almost nine meters, the beams had to have a section of some relevance, but in the East wall of the atrium, which is the one that retains a greater height, there is no trace.
It should be noted, however, that in the upper part of this wall has been realized coverage of cubicula left, it is therefore presumable that the top of the walls is not the original one, and that the upper part of the wall has been integrated with ancient material as it is not easy to locate the restoration.
It is observed that in the peristyle is perfectly visible the eaves line of the old shell, starting from these data it was possible to advance so the following hypothesis:
there is no doubt that we do not know the height of the beams sets the peristyle, but you can rebuild it starting from the eaves. The tiled roofs, in fact, to function properlymust have a minimum gradient of 30-35%, assuming a gradient of 35% on the side of the porch with greater light, can be seen a line of sets of beams that supported the entire roof whose slope increased in the other two sides in order to have a consistent junction in the corner of the roof. was assumed the same height for even coverage, almost certainly flat, of the tablinium, thus achieving a new level for the beams of the atrium.
Obviously, such a plan is completely random, but returning the same slope to the beams from which the beams at the sides tablinium reached of impluvium, determines a level for the beams at a height immediately above the east wall of the atrium, which could match with the information reported by the texts of the conservation of the total height of the walls.
In addition, as the medello 3d signals, the spatial effect built, appears to be consistent, as they seem to be consistent heights of the entrance rooms and the gate of the tablinium that create, with the two gates adjacent, an image already seen in other domus reconstructed inside the archaeological site. for which we can assume a greater conservation of archaeological evidence.

4 Conclusions

The observations conducted so far show that the field of investigation can take root in different ways and that the multidisciplinary contribution is crucial to Pompeii more than in any other archaeological site in the world.
The study may result in a list of the traditional measures of restoration and consolidation of the existing walls, with a proposal for construction of roofs to preserve what still remains a fundamental and basic observation.

The main problem focused is that it is impossible in Pompeii to stop the action of time and weather and at the same time leave the site with a picture of romantic ruin, what is to preserve and pass on to future generations? A consolidated picture of the archaeological site or the informations on the lives of its inhabitants that weathering systematically erased?
In this sense, the domus in question is is an emblematic example, excavated in 1836 has completely lost the decorations described at the time of the excavation and the question is what should have been done to prevent 178 years of rain, wind and sun to destroy everything ?
The restoration conventional are meant to salvage what they can, not for freeze what its found intact but exposed to the elements and if this application is expanded to the entire archaeological site we realize that are the doubts rather then the certainties to be successful.
I conclude with a challenge: Pompeii is not an archaeological site! (certainly not conventional)
It is a city without inhabitants or more where the inhabitants are just gone that contain a massive set of information about its inhabitants and that we have to preserve.
As long as we do not think in that size, in Pompeii any action strategy may not be able to solve the problems that from time to time will be reproposed.



Fig. 1: Domus of Bronze Bull - entrance

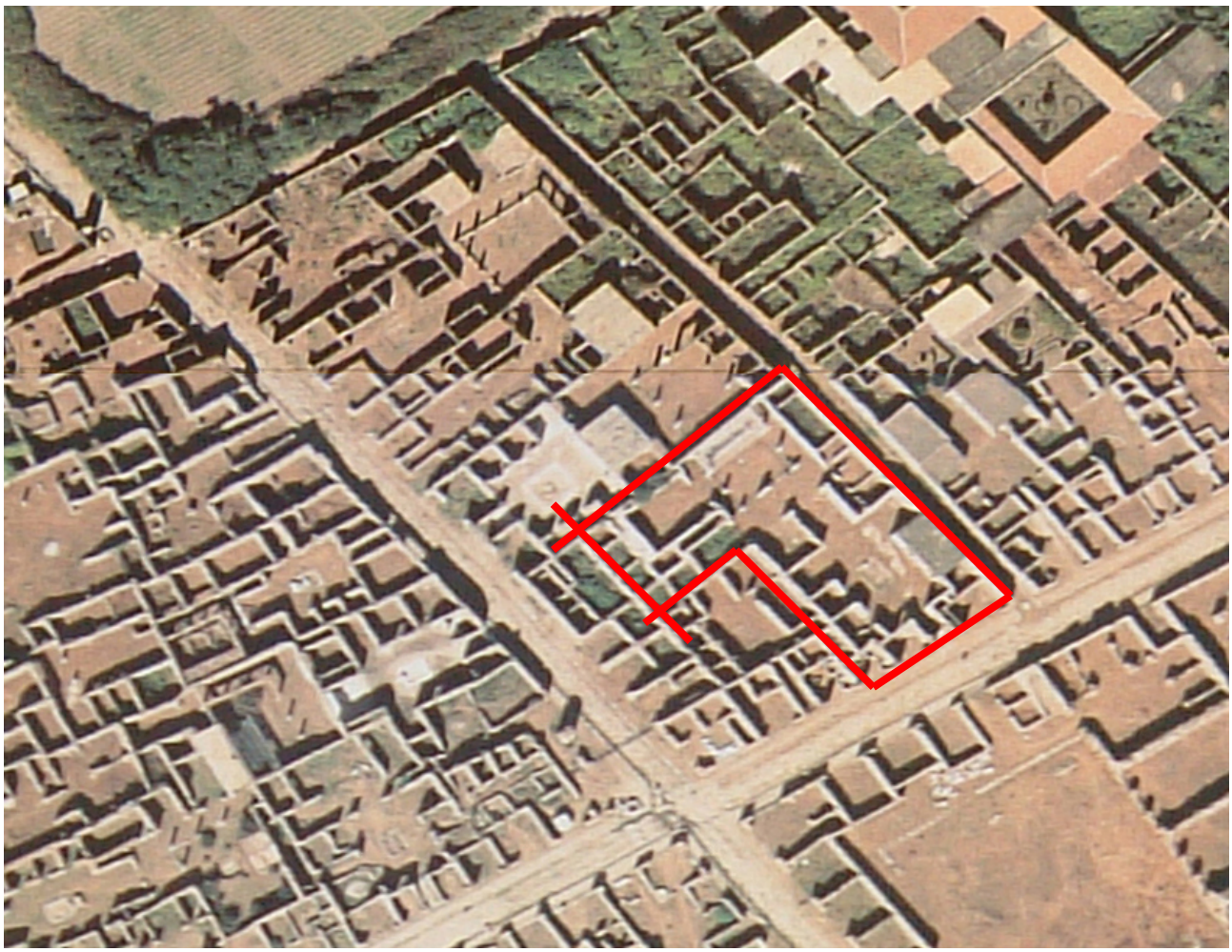

Fig. 2: Domus of Bronze Bull – Regio V, Insula 1, n° 7



Fig. 3: Domus of Bronze Bull – the Nymphaeum

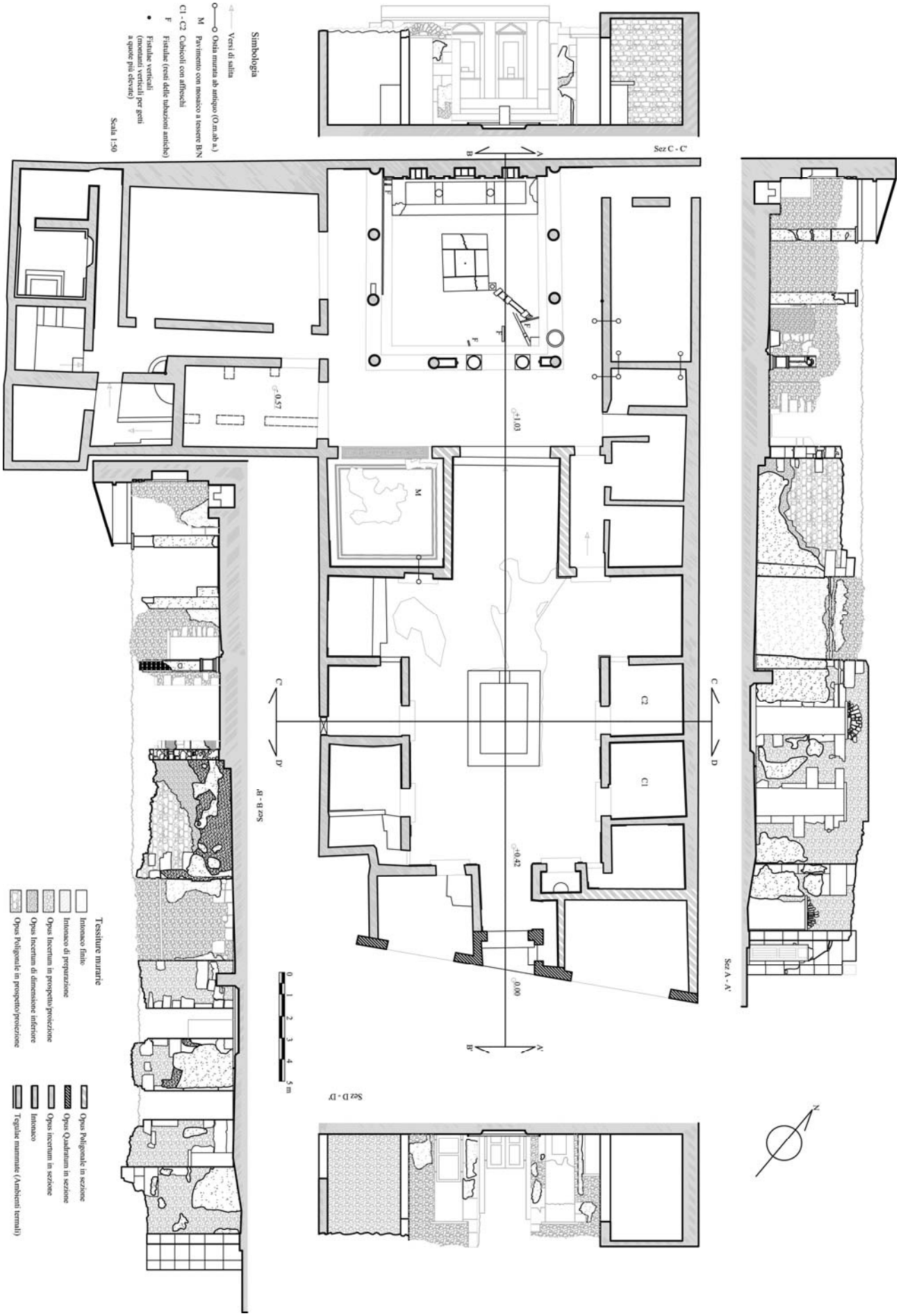

Fig. 4: Domus of Bronze Bull – Survey



Fig. 5: Domus of Bronze Bull – 3D Model – State of fact

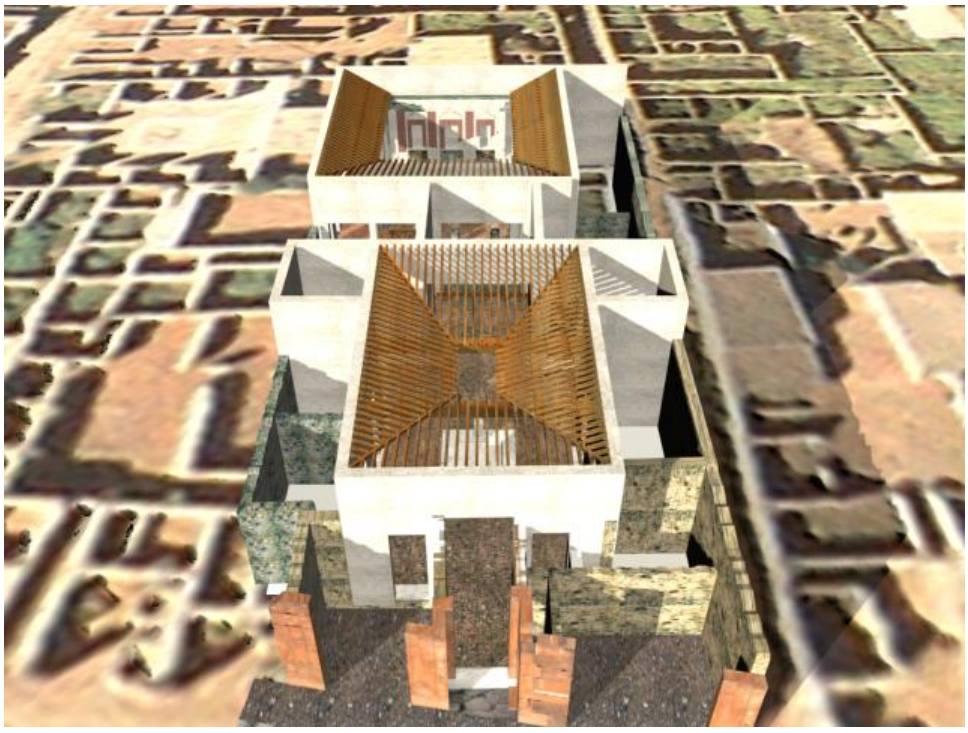

Fig. 6: Domus of Bronze Bull – 3D Model - Assumptions about the operation of the original shell

Bibliographical References

G. Fiorelli "Descrizione di Pompei" - Isole in parte Scavate – 17 Maggio 1836 – 1 Maggio 1838
W.Schultz "Annali dell'Istituto" 1838 - Rapporto intorno agli scavi pompeiani degli ultimi 4 anni
A.Mau "Bollettino dell'Istituto 1876 – 18772" - Parte posteriore della casa del toro.
"Pompei Pitture e mosaici" Enciclopedia Treccani volume 3 1991
PLINIO IL GIOVANE, Epistolario VI 20

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Interpreting structure through critical regionalism

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Abstract
Throughout history building has been guided mainly by structural and material simplicity in accordance to locality. However, in the last two centuries, through the process of industrialisation and modernity, along with the split of the architect and the engineer, architecture seems to have lost this sense of local simplicity. Local knowledge is lost and the builder is no more a craftsman.
This sense of locality seems prominent in the theory of critical regionalism. However, this theory seems to be mainly polarized on the functional and formal aspects of the building. Regionalist architects have mainly produced buildings that respect their surroundings using, however, structural systems incompatible to the previously existing regional schemes.
In search for the appropriate structure in a regional context, local empirical schemes and the anecdotal relationship between the architects and the engineers is used to prove the point that local approaches, long-lasting schemes and experimentation can be more beneficial for the output of small-scale regional projects.
The following paper concludes to a six point methodology towards a structural critical regionalism, advocating that in our world that faces today a crisis of the architect there needs to be a reconciliation of the discipline with local, long lasting schemes in order to produce a more influential and integrated architecture and advance forgotten techniques that can be used locally and generate more competitive buildings.

Keywords: Critical, Regionalism, Structure, Hooke Park

1. Introduction
Rem Koolhaas, the curator of the forthcoming Venice Architectural Biennale - titled “Fundamentals” - states in one of the paragraphs of this year’s theme description: “In 1914, it made sense to talk about a “Chinese” architecture, a “Swiss” architecture, an “Indian” architecture. One hundred years later, under the influence of wars, diverse political regimes, different states of development, national and international architectural movements, individual talents, friendships, random personal trajectories and technological developments, architectures that were once specific and local have become interchangeable and global. National identity has seemingly been sacrificed to modernity.” [1] In a similar way, Kengo Kuma states in one of his interviews: “Currently local character is being destroyed by mass standardization.” [2] The construction world, mainly controlled by contractor practices, focuses today on the international application of building systems that were introduced after the industrial revolution. The advent of structural engineering as an autonomous discipline in the 19th century has led to an institutionalization of the production of structure and a globalized so called “common practice” in building. In the short paragraph above, Koolhaas touches on one of the most challenging questions of today’s architecture: Where has the identity of Architecture gone?



Fig. 1: The regional identity: 1. Shinto Shrine, Ise, Japan 2.Windmills, Mykonos, Greece 3.Thatched cottage in Wool, Dorset, United Kingdom



Fig. 2: Ise Shrine, Japan. The two building sites of the Jingū shrine where every 20 years the buildings are reconstructed on the adjacent plot. The surrounding managed forest and factory produce and process the 12,000 trees needed per rebuilt.

The following paper revolves around a question focused on a specific aspect of Architecture: the structure. I will investigate how we can interpret locality in the local today, expressed through a consideration of structural needs in localized building practices, as opposed to the long-lasting fight between the architect and the engineer, generated at the split of the two disciplines. Looking into the history of the rivalry, through the theories of critical regionalism and using the Architectural Association's Campus in Dorset, I will propose a new way of looking into structural systems. In contrast to an architectural world where more architects care on how buildings look -a mentality prominent in the majority of the interpretations of critical regionalism- I will appose an approach to building that cares about what buildings are and should be made of in a local context.

One of the main terms in the following paper is the "local" or "regional". The idea of a region, as described by Liane Lefaivre and Alexander Tzonis "has gone through several shifts […]. While for ancient geographers it meant an 'objective', 'natural' division of the earth's surface, an area defined by boundaries, landforms, paths, zones of vegetation and climate, with administrative borders placed on top, by the end of the eighteenth century it had become associated with human rather than natural attributes, such as continuities and discontinuities of language, religion, ethnicity, and economy, or mental aspects significant for local people, aspects defining place, belonging, community." [3] In this framework, the regional is used in the next pages to define a place where people have a continuous application of one or more building systems through history, the access to specific building materials unique for a specific place and the existence of labour that practices specific crafts. For example, Ise Shrine in Japan - the most sacred Shinto shrine - that gets rebuilt every 20 years, is a unique local example due to a surviving technique and a managed forest that are only there to serve that purpose. Ise Shrine is only feasible and sustainable in Ise.

The localized approach is linked to a sense of scale. In order to perceive locality we need to isolate ourselves from the vast urban areas that have lost their regional identity and focus on areas where buildings do not need to shout, that are there to serve a purpose and cover needs. In small scale, localized projects, the need for a methodological approach to building is more evident since the economies work in a different way. In large urban projects where all technologies and expertise is available, the choice of a specific system linked to previous schemes could be beneficial, but the economies of scale in this context would not be really affected. On the contrary, in small projects that are essential to people and communities, as is for example housing, and even more specifically self-built structures, the output of a project depends on efficiency, materials, cost and simplicity.
A significant number of projects around the world have been designed through an architectural approach to locality, adopting features of the local mainly in a visual and functional way. These buildings have an excellent relation with their surroundings and landscape, incorporating, though, international modes and techniques of construction mostly foreign to the place where they were built. This approach has been widely known as critical regionalism and has mainly been interpreted in the last forty years through the work of Liane Lefaivre, Alexander Tzonis and Kenneth Frampton. A different interpretation, as seen in the work of Hassan Fathy in Egypt, relies primarily on the efficiency of the structure in accordance to the locally available structural materials.
In a period less than two centuries long the majority of architectural practice has managed to isolate itself from locality focusing on international styles and globalized methods, applied mainly on large-scale projects. Residential and smaller-scale ones are mainly driven from contractor practices and, sometimes, self-built approaches that rely on mass production of predefined and prefabricated systems. In this context, architects have managed to control less than 5% of the building development, [4] having less and less influence on the qualities of the built environment. The following paper will conclude to an interpretation of the structural system from a regionalist approach, proposing that in our mid-recession world the contemporary designer-maker needs to critically choose structural systems that are suitable for a specific place, based on the assessment of the available structural materials, the inherited local building knowledge and the available labour. This proposition will be based on an investigation on the theory of critical regionalism as expressed through the work of various architects and theorists around the world and the analysis of localized practice as experienced through the project in the AA's campus.

2. Building and structure

Structure is usually perceived by architects and engineers as a system of bearing elements that support a building. Fights between engineers and architects have been anecdotally documented, the one struggling for efficiency and the latter for the preservation of the features of his design. This "sibling rivalry" as described in the work of Andrew Saint [5] is a product of the evolution of building practices and of the advent of the structural engineer as an autonomous discipline in the last two centuries. In this time we, as architects, have come to believe in "The idea that architecture (which by dictionary definition includes design and construction, "has an autonomous aesthetic dimension"" [6]
The relation of the architect and the engineer is so unclear that it has led to controversial interpretations of their interaction and boundaries:

"The fight between architects and engineers derives from the urge of the first to build something infinitely rigid and of the latter to build something infinitely moving." Alain Billiard

"The architectural desire to build something that is in 'infinite movement' is one of the central desires of modern architects" Sigfried Giedion

Through history, we can identify an evolution on the relation of the building and its structural system. From the start of building history, the moment when the prehistoric man decides to leave the caves and grottos and move to his self-built house of local materials, to the classic buildings of the ancient civilizations, the medieval large scale buildings and the late 1800s, the structure is not thought as a different system than the building itself.
Across the world, there are examples of structures –from the primitive Neolithic hut to the Gothic cathedral- that have one thing in common: structural appropriateness and material simplicity in accordance to locality. The building is not supported by a structure but it is the structure itself. From the conception of the building to its final outcome, every detail is defined by structural and functional needs. Builders of that time generate buildings and, subsequently, structures according to what is the simplest way to use materials available in the vicinity of the construction site in order to produce a building that will respond to human and structural needs.

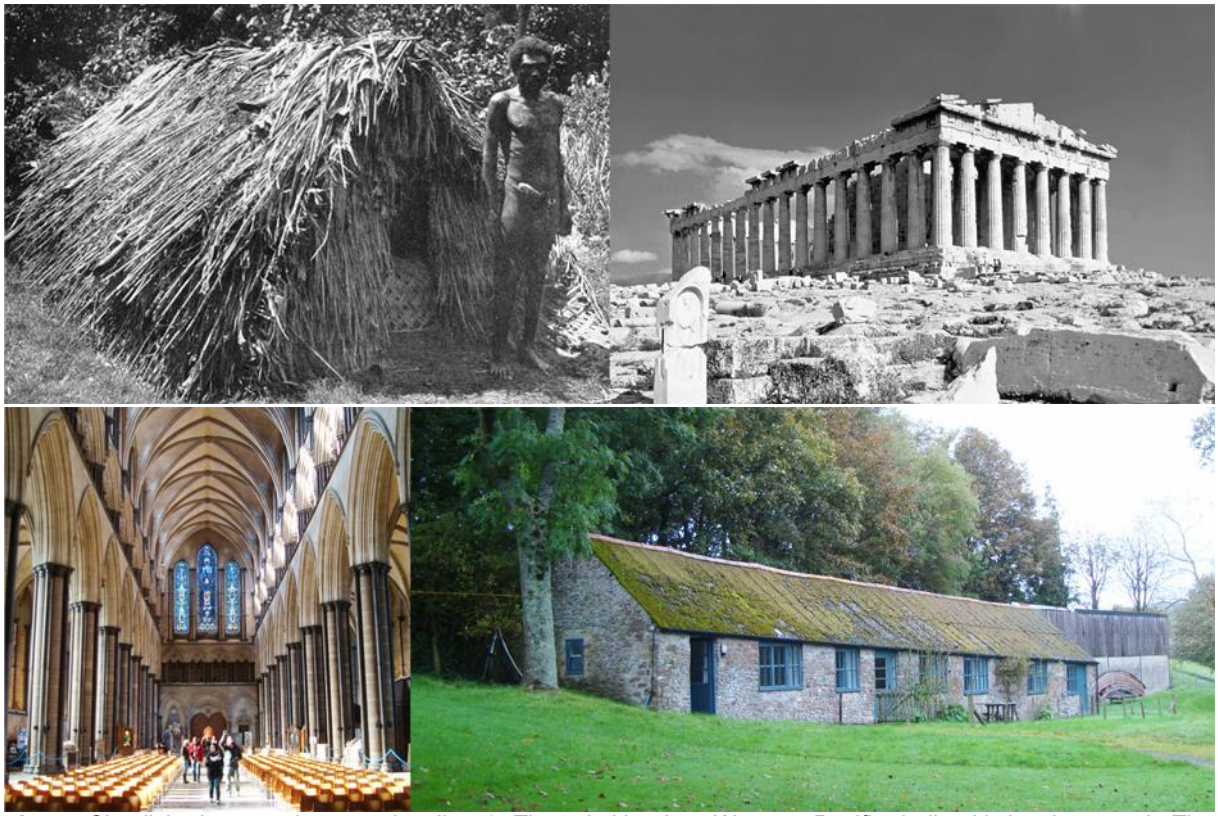

Fig. 3: Simplicity in accordance to locality: 1. The primitive hut, Western Pacific, built with local straw. 2. The Parthenon, Athens, Greece, built from local white marble. 3. Salisbury Cathedral, United Kingdom, built from local limestone. 4. Cottage in Dorset, United Kingdom, built from local stone. The building follows the natural slope, minimizing complexity in construction..

The architect of the time is the leading builder. He is the one that has a deep knowledge of construction that emerges from an oral tradition and a process of locality, temporality, trial and error and, sometimes, success. The building and structural practices of that time were also defined by the deep local knowledge of the natural phenomena that could compromise the longevity of the edifice. Data on geological movement such as earthquakes and landslides, and meteorological events were passed on from generation to generation informing designs and structural systems. This thousand year long lasting practice of building according to local availability and local knowledge produced numerous buildings that have survived up to these days.

In the mid-1800s the industrial revolution generates a need for speed, efficiency, maximum production, and optimisation: values that can be achieved only through thorough calculations and scientific studies. A new discipline is formed: the engineer. Engineers seem to discover the beauty of new materials, are given the opportunity to test them and produce bold structures that mainly serve the purpose of the industry: infrastructure, industrial buildings etc. In that era, where engineers talk about efficiency and optimum performance, architects represent plurality, ornament, richness and grandeur, borrowing and copying components and stylistic features from older buildings, generating styles such as, for example, the neo-classic and the neo-gothic.

The first world, especially in urban context, manages to discard any tradition in front of the new exciting process of mechanization and mathematical calculation, and the grandiosity of the neo-styles. The process of locality that was inherent to builders seems to vanish or is set aside by the fast growing industrial world. The vernacular becomes picturesque, a museum piece that has no other value than the aesthetic one, although produced in mass amounts in the non-urban areas.

In the mid-war period, architects discover the qualities of the engine and the factory, introducing to the world the modern movement. Machinery is at that time glorified as the ultimate expression of finesse and style:

“A locomotive…has its peculiar physiognomy, not the result of caprice, but of necessity. It expresses controlled power; its movements are gentle or terrible, it advances with awful impetuosity or, when at rest, seems to tremble with impatience…its exterior form is but the expression of its power. A locomotive, then, has style… A thing has style when it has the expression appropriate to its use… We who in the fabrication of our machinery, give to every part the strength and the form which it requires, with nothing superfluous , nothing which does not have a necessary function, in our architecture



Fig. 4: The industrial revolution: 1. Philip James de Loutherbourg (1801), Coalbrookedale at Night. 2. The imposing structure of the Forth railway bridge over the houses of North Queensferry, Scotland.

foolishly accumulate forms and features taken from all sides, the result of contradictory principles and call this art." [7]

The modern movement, based on "photographic evidence rather than on the ancient and previously unavoidable techniques of personal inspection and measured drawing" [8] produces buildings that were "purely formalistic imitations of structures that had never been studied at first hand" [9]

The ideology of the modern movement followed and adopted by a large proportion of the architect force of the time and its influence to architectural education lead to an absolute disconnection from the local and long-lasting building rituals and materials. Local vernacular practices were rejected as outdated and international new materials, mass produced by industry were considered the future of efficient and quality building, especially in the large scale.

According to Hassan Fathy, one of the most influential architects in Egypt of the last century: "Until the collapse of cultural frontiers in the last century, there were all over the world distinctive local shapes and details in architecture, and the buildings of any locality were the beautiful children of a happy marriage between the imagination of the people and the demands of their countryside".[10]

Unfortunately, the collapse that Fathy describes has led to interpretations of architecture as K. Frampton presents: "Today the practice of architecture seems to be increasingly polarized between, on the one hand a so-called "high-tech" approach predicated exclusively upon production and, on the other, a provision of a "pensatory façade" to cover up the harsh realities of the universal system" [11]

Today, we witness a strange relationship between the architect and the engineer, the building and its structure. And this relationship can mainly be perceived in large-scale projects. As described by Alan Colquhoun: "The purpose of the building is not primarily to satisfy the practical and economic needs of the client, but to celebrate the idea of technological progress and to suggest a technological utopia". [12]

In this large scale, architects and clients are trying to push form as far as possible aiming for extreme complexity that derives from a desire to create iconic buildings. In many cases the structure is ignored or totally misjudged. Trying to respond to this need, architects and engineers come up with extremely costly solutions that rarely take into account the local factor in form of materials and technical knowledge of the builders.

On the other hand, small scale projects are mainly based on contractor practices that just adapt international systems based on mass production economies and material efficiency. Architects seem to have minimal impact on these projects that lead to the degradation of the architectural value of the built environment.

All around the United Kingdom - but also in many northern European countries and the United States- we can see massive areas covered with housing projects of poor or no architectural value, mainly favoured by their cheap materials and the speed of construction. These developments, guided by a maximum profit policy, incorporate materials that could have been produced anywhere, all delivered as a kit of parts and assembled on site, as fast as possible. These contractor practices have tried to minimize errors through the ideals of the industrialized production.

Work that once would depend on the exclusive and deep knowledge of a specific craft has now been replaced by the mechanized process introduced through modernity. Builders in the past used to be artisans with deep knowledge of their craft. These craftsmen used to move in groups from place to place and carrying their trade's secrets, producing buildings of great quality and durability. Although these builders did not necessarily belong to a specific place, they used techniques and especially materials according to the building's surroundings. Buildings produced by these travelling and secretive construction crews can be found all around Europe. This practice of localized building, mainly known to us through the study of the Gothic Cathedrals survived up to the early 1900s.



Fig. 5: “the harsh realities of the universal system”: 1. Part of the Guggenheim Bilbao as seen from the exterior. 2. The structure of the above part. Architectural Design by F. Gehry and structural design by Skidmore, Owings & Merrill, 1997



Fig. 6: 1. Low-cost housing in the United Kingdom. 2. Low-cost housing in Belgium.

Since the modernization and industrialization of the building production, the builder has become a part of a huge mechanism where everything is synchronized to produce the same product again and again. Same international structural system, same walls, same floors, same cladding, same doors, same windows, same roof. Due to the above process, local quality craftsmen have become really rare and extremely costly. For example, in Dorset, thatched roofs made of local straw get replaced by cheap ceramic tiles, local stone masonry gets replaced by mass production timber framing and brickwork, since these trades cannot fight the competition of the massively produced components. The builder of our days, taking part in those mass production practices, does not require any special knowledge or craft, given the vast amount of standard systems that just need someone to assemble a puzzle.
In this framework of the “standard” practice, the structural system has become a feature that is sometimes not even thought of. Since the uncoupling of the building from its local references - through the advent of the structural engineer in the industrial revolution and the development of the contractor practices described above- the structural system today seems to be a feature of the building with no local roots, no regional identity.

Why is it important, then, to evaluate the local factor today? If we can use the “Think globally, act locally” theory - first introduced by Patrick Geddes- on town planning, environmental and business approaches, then why not on a building and more so on its structural aspect? An evaluation of the local knowledge and the previously used structural systems can help us understand structural needs in specific areas. Finding the most appropriate structural system is vital for the outcome and the longevity of a building project.

3. Critical regionalism

Critical Regionalism seems to be the theory that best suits the “Think globally, act locally” approach. As described by Liane Lefaivre and Alexander Tzonis in their book “Architecture of Regionalism in the age of Globalization”: “Regionalism always opposes centralization and universalization, and instead supports decentralization and autonomy”. [13] The theory of critical regionalism was introduced in the 1970s by Lefaivre and Tzonis has been commented and expanded by Kenneth Frampton [14] and Alan Colquhoun [15]. The theory was developed in order to “draw attention to the work of a number of young architects in Europe who challenged post-modernism, the fashionable tendency of the period, proposing an alternative approach to design”. [16]

The whole theory is based on schemes of architecture in an arrière-garde position “to cultivate a resistant, identity giving culture while at the same time having discreet resource to universal technique.” [17] The common ground of the architecture collected by Lefaivre and Tzonis lies on various aspects of a built project: the interaction and connection of the building to the topography, the material expression of the buildings, the relation of the form to the existing structure, the quality of light and the ventilation of the edifice and other long tested aspects of the vernacular. The buildings studied were “’embedded’ in the landscape ‘through discovering, adjusting and restoring’ the ‘relationship and texture’ of ‘the past and the future’”. [18] “By way of general definition we can say that it (regionalism) upholds the individual and local architectonic features against more universal and abstract ones. In addition, however, regionalism bears the hallmark of ambiguity. […] critical regionalism is a bridge over which any humanistic architecture of the future must pass” [19].

In this context Lefaivre, Tzonis, Frampton and Colquhoun draw examples of “the architecture of resistance” [20] from all around the world and throughout history, identifying the qualities of the critical regionalism in works among others of Jørn Utzon [21], Josep-Antoni Coderch, Mario Botta, Tadao Ando, Dimitris and Souzana Antonakakis, Dimitris Pikionis,[22] Alvar Aalto, Oscar Niemeyer, Renzo Piano [23] etc. The work presented is centred on the principle that “Architecture should grow as a tree and become one with the landscape”. [24] This approach “goes beyond the objective of just minimizing the disruption of the landscape or hiding or blending the new structure, methods known since the picturesque, but engaging in a critical ‘dialogue’ with the site, foregrounding its particularity.” [25]

The paradox in the critical regionalism theory as presented up to today is that it focuses mainly on the visual and the functional aspects of a built project: topography, materials, form, light, ventilation totally disregarding matters of structural systems and cost. Even in the latest book by Lefaivre and Tzonis their interest seem to navigate towards an ecological architecture, avoiding the issues of the bearing structure and the financial aspect of the buildings. In his 1983 essay: Towards a critical regionalism- Six points for an Architecture of resistance K. Frampton seems to “forgive” Jørn Utzon for the use of a “relatively uneconomic mode of construction” in his 1976 Bagsvaerd Church in Copenhagen for its “direct associative capacity […] and second for its multiple cross-cultural references”. [26] Later on, in the same text, Frampton seems to be contradicting himself by saying that “the primary principle of architectural autonomy resides in the tectonic rather than the scenographic”. [27] Scott Paterson wrote in his critical analysis of the above text: “the effect of this is to direct ones attention away from the critically regional [...]. The kind of situation where one asks themselves what is he really saying.” [28]

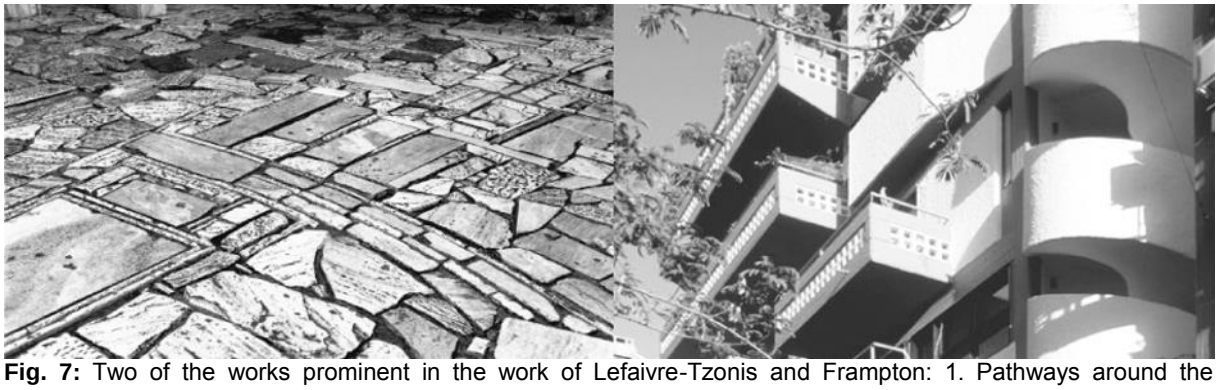

Fig. 7: Two of the works prominent in the work of Lefaivre-Tzonis and Frampton: 1. Pathways around the Acropolis of Athens, Greece by D. Pikionis. 2. Apartment building in Athens, Greece by D. and S. Antonakakis.



Fig. 8: Bagsvaerd Church in Copenhagen, Denmark by Jørn Utzon.



Fig. 9: Exterior view and structural detail of the Tjibaou Cultural Centre in Noumea, New Caledonia by Renzo Piano

In the latest work of Lefaivre and Tzonis the example of Renzo Piano's Jean Marie Tjibaou Cultural Centre in Noumea, New Caledonia is used as an example of architecture focused on a "critical and not regressive" [29] regionalism where Piano pays "homage to New Caledonia's culture, traditions, and history, while putting European technology and expertise at the service of this goal, a synthesis between local and global. He used the shape of traditional Caledonian huts, regional materials and building methods, and local beliefs about wind, light and vegetation". [30] Again, most technological and structural systems are imported from Europe, getting stylized in order to manage the desired blending with the local culture. Glue-laminated timber sections and steel connections are morphologically treated in order to come closer to the way that the New Caledonians build.

Given that critical regionalism is an architectural approach that emerged as an opposition to post modernism and practiced initially by architects trained as modernists, we can identify a common ground in the use of typically modernist structural systems such as reinforced concrete and metal structures, as well as composite materials and prefabrication techniques, inventively combined with cladding materials that lead to the desired 'blending' of the building in its natural and built environment. However, the use of structural systems incompatible to the previously existing regional schemes has led to built examples that seem to be in contrast to the core of the critical regionalism. As Frampton points out about the work of Aris Konstantinidis, whose work has been used to support critical regionalism: "In all of Konstantinidis's public work, a tension appears between the universal rationality of the trabeated reinforced concrete frame and the autochthonous tactility of the native stone and blockwork which is used as infill." [31]

Critical regionalism seems to be trapped to the mentality of the superficial. As John Cotman once stated: "Three quarters of mankind, you know, mind more what is represented than how it is done". The way that Lefaivre, Tzonis, Frampton and Colquhoun have interpreted critical regionalism has always revolved around the functional, formal and morphological and lately to the ecological. However, the term 'critical' on its own gives us a flexibility of interpretation, meaning that critical regionalism as a movement can continue evolving, adapting to new data, accepting new perceptions and incorporating other aspects of the built project, depending each time on the architect and or the builder and his consideration towards the architecture he/she wants to produce.

In this framework, we could identify in the work of Hassan Fathy, a regionalism centred on the structural system and its applications in the most suitable way taking advantage the local knowledge and workforce. "Here (in Egypt), for years, for centuries, the peasant had been wisely and quietly exploiting the obvious building material, while we, with our modern school-learned ideas, never dreamed of using such a ludicrous substance as mud for so serious a creation as a house. But why not? [...] Why not use this heaven-sent material for our country houses? And why not, indeed, make the peasants' own houses better? Why should there be any difference between a peasant's house and a landowner's? Build both of mud brick, design both well, and both could afford their owners beauty and comfort." [32]

Fathy realizes that modernity has set aside a traditional system, that was then considered as cheap dirty and lower class. However, the financial reality of the times leads to the application of the system given the scarcity of the engineered materials of industrialization: "Soon afterwards the war started, and all building stopped. Steel and timber supplies were completely cut off, and the army requisitioned such materials as were already in the country. Yet, still obsessed by my desire to build in the country, I looked about for ways of getting round the shortage. At least I still had mud bricks! And then it occurred to me that, if I had mud bricks and nothing else, I was no worse off than my forefathers. Egypt had not always imported steel from Belgium and timber from Romania, yet Egypt had always built houses." [33]

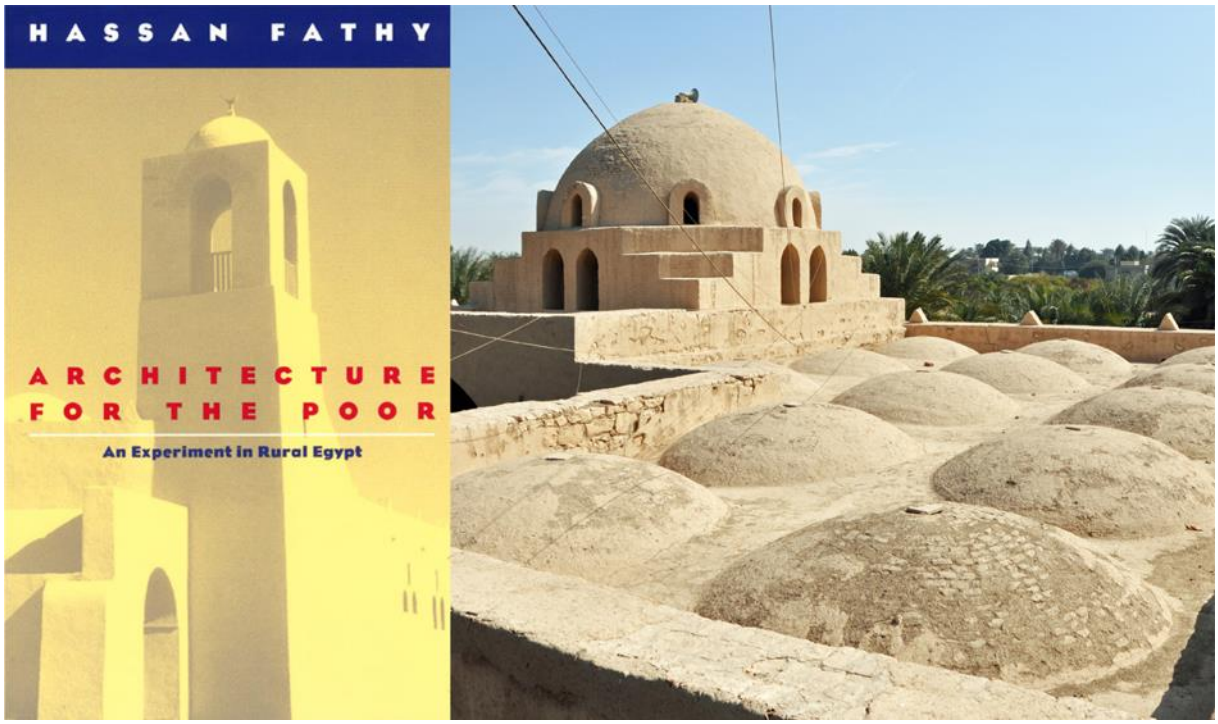

Fig. 10: The architecture of H. Fathy is mainly driven by locally available materials and long practiced structural schemes.

Apart from the systems and the materials, Fathy recognises the value of the local knowledge and values the abilities of the labour he has available: “They worked rapidly and unconcernedly, with never a thought that what they were doing was quite a remarkable work of engineering, for these masons were working according to the laws of statics and the science of the resistance of materials with extraordinary intuitive understanding.” [34] The designs of Fathy do not impose a system; instead they are adapted to the local existing structural systems and take maximum advantage of the local knowledge, labour and materials, creating an architecture that is feasible and cost-effective, even being considered nowadays sustainable.

4. Interpreting structure through critical regionalism

As seen on the previous section, a vast amount of works of architecture around the world can be considered an expression of the theory of critical regionalism. This expression has been mainly focused on the way that these buildings link with their surroundings in means of forms and cladding materials. However, one cannot overlook and disconnect a building from its structure. A technocratic and/or capitalistic approach would easily discard structural locality as irrelevant to a globally developing construction sector that should be based - as introduced by the modern movement - on a mass production. This mass production is based on fast and simplified techniques that make use of industrially processed materials.

On the contrary though, especially in small scale projects, finding the appropriate structure can be a major factor on the output of the project and its feasibility. In the last forty years there has been a movement for the developing world called appropriate technology. Based on the book by E.F. Schumacher: “Small is beautiful: a study of economics as if people mattered” [35] “The goal of Appropriate Technology (AT) is to increase the standard of living for the developing world without condescension, complication, or environmental damage. Typical AT inventions are more labor intensive, require fewer resources, and use low cost or readily available materials wherever possible. Special attention is paid to the social, cultural, and ethical aspects of the communities the technology is intended for” [36] The immediate question is: why is appropriate technology only applicable in the developing world? In our so-called developed world we have come to consider that since our problems are supposedly solved, we are allowed the luxury to spend massive amounts of money in complicated building techniques and structures, no matter the place, no matter the people.

Appropriate technology should not and cannot be only an investment for the developing world. We saw in the work of Fathy, how the scarcity of materials led him to the use of previous schemes. In the same way, in areas where materials are abundant, and the local knowledge is of some sort, the critical perception of the architect and the engineer needs to produce systems that would ensure the continuity of building practices in a specific place. Local schemes are considered boring, simple, non-experimental, non-revolutionary, not worth looking into. The first world is bombarded with images and costly ambitions for revolutionary buildings, a product of architects dreaming of a high-tech future. As Denise Scott Brown once said, “Basically, the idea is that with everyone striving to be revolutionary, you will be most revolutionary if you try to be ordinary”. [37] This practice of a revolutionary, globalized high-tech system that is being glorified by the international prizes has led to interesting articles with amusing titles like “I’m in a Stirling prize winner … get me out of here!” [38] or “Dear architects, I am sick of your shit”. [39]

In a total contrast to the globalized and complex architectural practice, the buildings in Hooke Park stand as an example of appropriate technology and a down-to-earth approach to the buildings’ structural systems. The buildings seem to follow an interest in the maximum use of the locally produced timber in various structural configurations, based on local experience and labour, and a self-built approach equivalent to the practices of the pre-industrialized world’s master builders. As seen above in the example of the newly built Student Lodge 3, we can identify a methodology towards a structural critical regionalism. In this methodology the structural system derives from the input of six parameters.

First of all, there is an identification of a need and the development of a building intent. The building intent is the one that will define the level of structural complexity, depending on the formal ambition and the desired architectural, in means of functionality, output. Secondly, there needs to be a thorough research on locally practiced structural systems. This research should include systems even if these are not traditional in the long term, but can be considered embedded to the local culture through the longevity of their application in a specific place. A third point is the materiality of the system. An evaluation of the locally produced and available materials is important for the financial feasibility of the project and the contribution to the local economy. Another very important point is the available local labour, from the most skilled to the least. A careful assessment of the workforce available can generate systems that can be adaptable to the capabilities of each member of the team. The next point lies in the systems that need to be developed, calculated, assessed and tested in order to meet the skills of the available workforce. The last and more important point lies in the time-scale available for the above process and the construction of the project, as this parameter can define many of the

decisions. The designer-maker can spend unlimited time in defining the strategies that he/she will use and unlimited amounts of time refining the systems to be used to suit his/hers own powers. However, in a tight schedule, compromises need to be made in order to move the project forward.
A locally influenced structural practice as described above can have a significant positive effect to the local, small scale application of architecture in any part of the world. In a short-term scale, the cost of the building can be significantly reduced by use of locally available techniques that have been practiced for a significant amount of time combined with materials and labour that have a specific experience in these systems and schemes. In the long-term, the building can be repaired and undergo maintenance more easily without need for expensive specialists and analysis processes. The structural system, which is the core for the survival of the building being based on already known techniques and materials can be extended and modified according to the user's needs through the user's own means or other locally available workforce.
Bearing in mind all the above, we can summarize the structural interpretation of critical regionalism in six questions that can be used as a methodological guideline:
1. What do I want/have to build?
2. What is the available local common structural practice?
3. What are the available structural materials and resources?
4. What is the available local knowledge?
5. What systems do I need to develop?
6. What are the timescale/other restrictions?

5. An example: Hooke Park

Hooke Park is a 350-acre working forest in Dorset, owned since 2002 by the Architectural Association. The Hooke Park campus is in constant development since its early beginnings as a woodworking school in the 1980s. As described on the Architectural Association's website: "The existing buildings at Hooke Park, designed by collaborations between ABK, Frei Otto, Buro Happold and Edward Cullinan, are remarkable demonstrations of an intelligent approach to maximising the resource provided by the forest – by using green round-wood poles provided by forest thinning, a silvicultural waste product. The future projects at Hooke will aim to resurrect the ambition of that approach to building." [40] Although small in scale, for the standards of Robert Mark's theory described in the previous section, the first buildings of Hooke Park are an excellent example of the appropriate structure.
Having a young forest, the developers of Hooke Park had to find an inventive way of using the thinnings produced by the forestry operation - timber of minimal value and low structural quality. The two initial buildings in the campus, the refectory and the workshop were built using small section round-wood in tension and in compression, taking advantage of the flexibility of the whole tree. In the refectory building built in 1987 the small section roof members (around 70mm in diameter) support in tension the secondary structure of the roof. In the workshop, built a few years later, the 150mm in diameter members form arches, supporting in compression the light buildup of the roof.
The urge for the maximum use of the resources of the forest in the above buildings led to an interpretation of the structure through locally available schemes and materials. In their urge for experimentation and maximum efficiency, the architects and the engineers of these first buildings instinctively acted as the primitive builder, taking advantage of the locally available timber and its poor quality. Armed with the privilege of the knowledge of the industrial revolution and the rationalisation of the structure, they managed to produce two buildings that stand as a perfect example of structures and structural systems that are embedded to their surrounding resources.



Fig. 11: Building with forestry waste: 1. The workshop building during the bending process 2.The workshop's arches nearing completion 3.The building of the refectory under construction.



Fig. 12: Continuing the tradition: 1. The Big Shed 2. Student Lodge 1&2 3. Student Lodge 3 4. The Timber Seasoning Shelter.

In 2002, the Architectural Association acquired Hooke Park and since then the campus has turned into an exciting playground for architecture students and their tutors, experimenting with forms and structures, creating a collection of prototypical buildings in various scales, sizes, materials and technologies. Design and Make students, visiting units, workshops, summer schools etc. all have produced through these ten years a vast collection of permanent and temporary structures, sculptures, and installations scattered in the forest.

The Design and Make Masters Programme undertook in 2010 the design and construction of the buildings needed for the development of Hooke Park as a fully operational campus, trying to continue the “Hooke Park building tradition”. Since then four buildings have emerged through the Design and Make process: The Big Shed, Student Lodge 1&2 (SL1&2), the Timber Seasoning Shelter (TSS) and Student Lodge 3 (SL3). All four buildings are totally different in means of structural system, form, conception and output. However, one can identify common ground in their materiality (Hooke Park timber) and an approach to design, structural system and construction that is linked to local practices.

As a cohort of five architects of totally different architectural backgrounds (Curacao, Greece, Panama, US) we were given the task to deliver a student lodge of 60 m2 of enclosed area that would house two full time students and that would cover all the building code requirements of safety, energy and performance (CDM, Code for Sustainable Homes etc.). SL3 was designed as a two-part building, the bedrooms/bathroom and a so called social area divided by an exterior deck. The building would be a demonstration for the creative use of recycled and salvaged materials, combined with the maximum use of the resources of Hooke Park and its surroundings.

The structural system was one of the first parts of the building to be designed. When designing a house through a tight budget, architects sometimes fall into the trap of the “common practice”, especially when it comes to structure. Looking into common practice in the UK, we can see a vast use of brick and block cavity walls, prefabricated insulated panels of natural timber studs and structural plywood sheathing, combined with beams and trussed rafters of defined dimensions. The immediate question was how to transform this system so that it could be used in Hooke Park. Given our time and, mainly, money constraints we had to come up with a structural system that would work in three ways: first, make maximum use of the available resources of the forest, second, provide the necessary load bearing capacity as defined by our structural engineers and third be easily constructible with the available people, tools, infrastructure and materials. One of the main drivers of the decisions on the system was budget and time. As per the first parameter, given that all natural timber that came through the forest would have a minimal cost to the Architectural Association we decided that we should minimize or even eliminate the use of any imported and moreover processed timber (e.g. OSB,

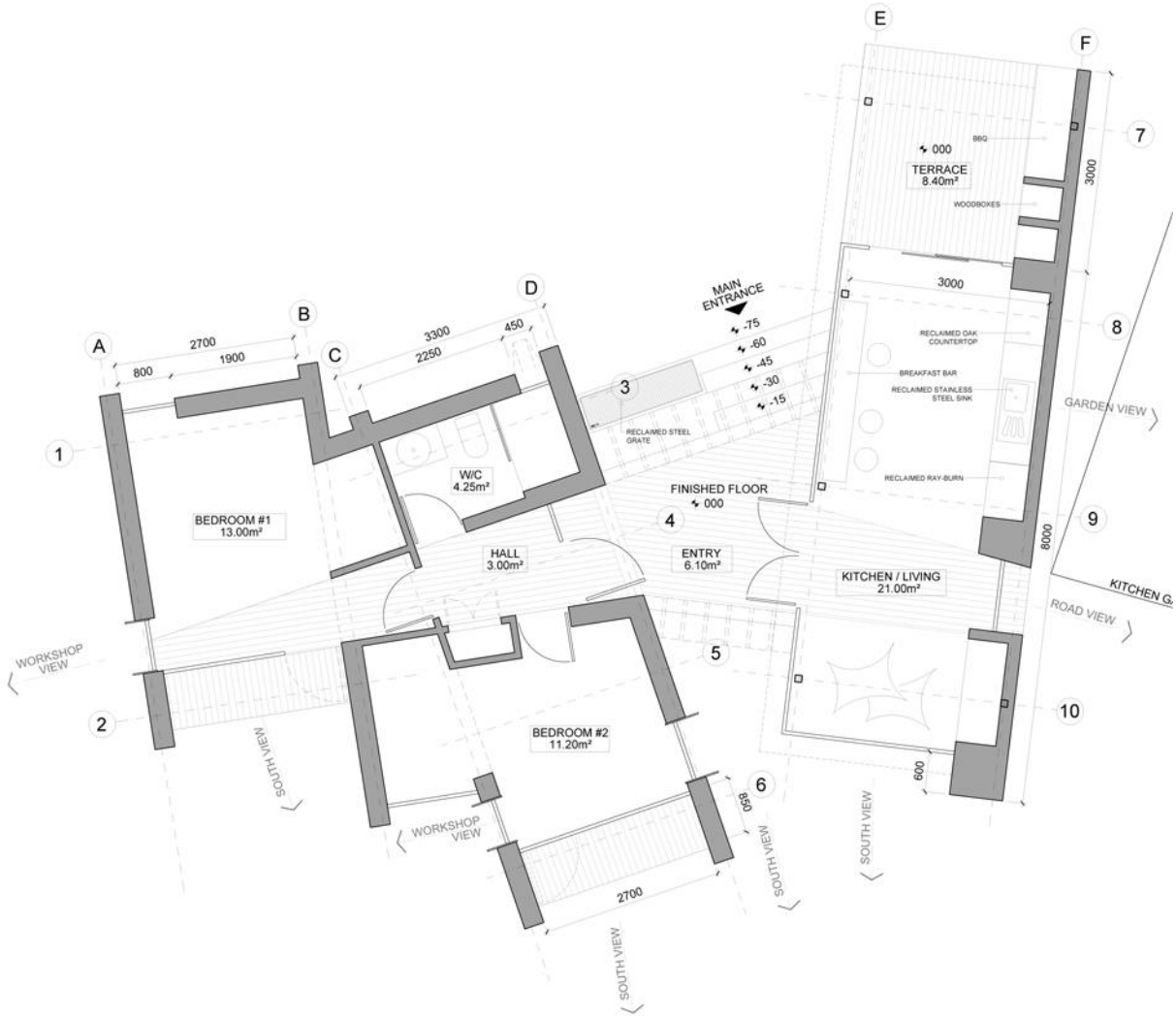

Fig. 13: The floor plan of Student Lodge 3. The layout of the building is defined by views and levels of privacy.

plywood etc.). The goal of the elimination of the sheathing materials became one of the main goals of our group. However, all timber produced up to this day in Hooke Park is used green and is unofficially graded at a structural quality of C16 - whereas the ideal would be C24 - meaning a significant increase to the bearing sections. As per the second parameter, we generated a mock-up of our proposed structure and load tested it in order to reach the necessary loading, by simple means available in Hooke Park. In order to cover our third requirement, all members of the system developed would have to be cut and processed by the available machinery and tools, assembled in the Big Shed and be easily movable by hand or the telescopic forklift. Also important in the whole process was the fact that the building would have to be constructed by the available labour which consisted of five unskilled students of various backgrounds with a six month experience in small projects in Hooke Park, one skilled timber framer with long experience on traditional timber framing and a group of unskilled summer volunteers. This meant that the systems developed would have to rely on simple connections and a simple assembly scheme.

The first system we came up with was a lattice wall of 100mm in thickness that would work in the same way as a Belfast truss, comprising of a spruce frame and diagonal lattices at 40 x 40mm. We constructed a mock-up wall of 2.00 x 3.00m and it was tested to a load of 1500kg (500kg/m of wall). The wall proved that it could work although its whole design (sections of timber, distance of the lattices etc.) came out from pure instinct. The reluctance, however, of the engineers and their fear for the unknown and uncertified quality of the timber combined with the need for the accommodation of a large amount of insulation (245mm) lead to a redesign of the bearing walls. This time the design – which was used in the final build-up of the lodge- comprised of 245 x 50mm vertical studs braced by diagonal battens on the interior and the exterior that would also serve as the supportive structure for the cladding. Although the new design used a significantly larger amount of timber, this had a minimal effect on the cost of the building, given that it all came from the forest around the construction site; it

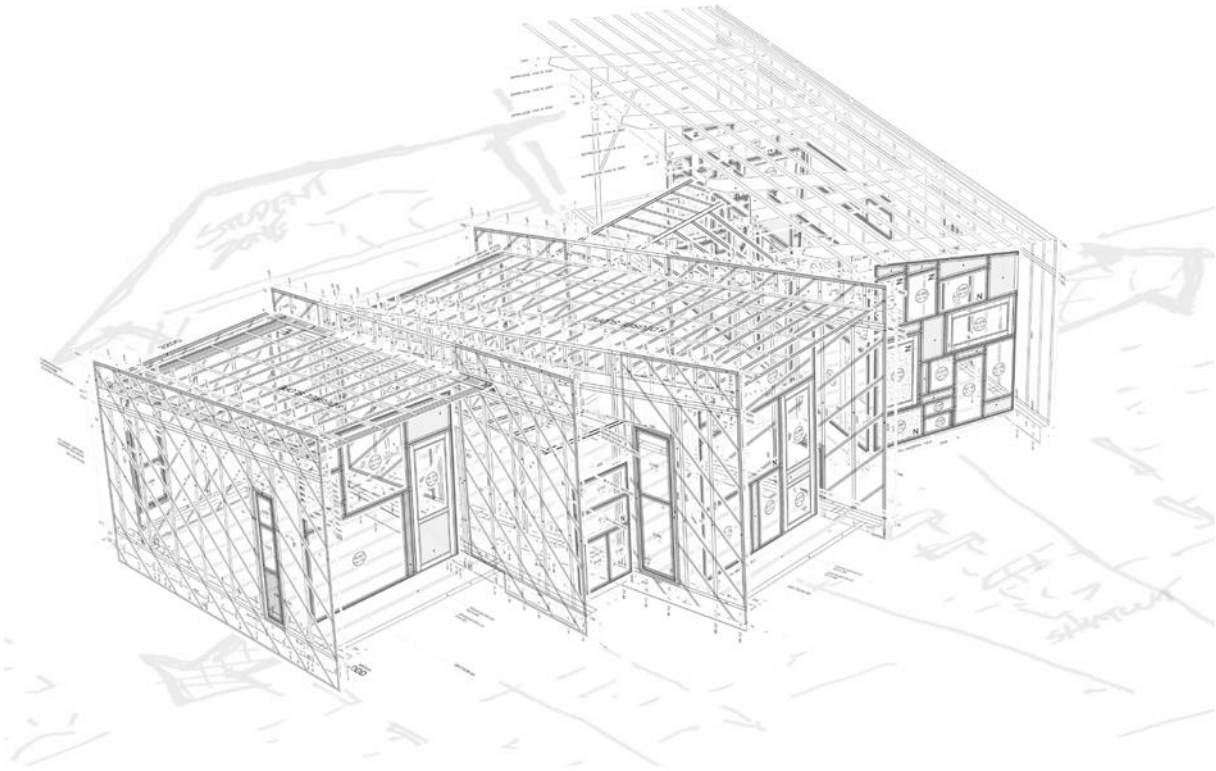

Fig. 14: The structural system developed for the Student Lodge 3 building.



Fig. 15: Student Lodge 3 nearing completion

was blessed by the engineers and was consistent with our goal regarding the minimal use of processed timber like plywood. Any part needing diagonal bracing usually provided by sheathing materials, was replaced by natural timber members: diagonal battens on the walls and diagonal boards on the floors and the roofs.

Another part of the building that serves as a great example of the paradox between the experimentation in making, the local practice and the mathematized way of the engineers was the debate for the trusses of the roof of the social area of the building. The social area was planned to be covered by a single-pitched roof supported by four trussed rafters that had to be made of green spruce, the only species already available in Hooke Park at the time of the design. The engineers, uncomfortable with the use of non-graded, green timber came up with calculations that seemed exaggerated to our minds, as our tactile experience up to this point had shown that we could achieve the same things with smaller sections. This feeling of exaggeration was corroborated by the long experience of the timber framer that worked on site with us and the puzzled looks of an engineer

visiting the construction site of the Timber Seasoning Shelter. The time needed, however, for redesign and negotiations with the firm in London seemed at that time not feasible, so we continued as calculated. The trusses came out bulky, disproportional and heavy, adding an extra risk when handling them on site.
Later on, during the design of a different part of the roof, seeing that the given dimensions were ridiculously big, we decided to negotiate with the engineers the size of the beams. The short exchange of e-mails is interesting:

"- Engineer:
Same section sizes for the entrance area. Will resend the calcs next week
Regards,[…]

- SL3 team:
Could you check the calcs to see if we can use 200x50 roof rafters for the social area building rather than 250x75?
Also, for the entrance roof. We sent a proposal showing 250x150 beams for the main beams and 150x50 for the transversal rafters. If we follow your suggestion and place the rafters on top of the main beams, could we look into the smallest size we can use? We are currently running low on big timbers and are struggling to get anything bigger than 150x150
Best, […]

- Engineer:
I have reviewed the calcs for the roof rafters and the engineer seems to have left some 'fat' in the rafter design due to uncertainty of loading. You have clarified the roof loads so yes happy for you to reduce the section size to 200x50.
If you want me to see what I can do with the entrance roof then can you send a revised drawing showing the final arrangement and the final cladding details on this roof. I'll then see what options we have."

Although all the above seem anecdotal they are perfect examples to prove the point that local approaches, long-lasting schemes and experimentation can be more beneficial for the output of projects. The disconnection of the engineer from the primary application of his work which is the construction site and the depreciation of the deep experience of the local labour and the knowledge that is produced through experimentation have led to an institutionalization of the production of the structure. Common practice, worldwide standardized materials and systems are used with no questioning for their efficiency and adaptation to local needs. "At the moment, global or multinational corporations, global networks and alliances, as well as global institutions, dominate the making of buildings, cities and landscapes. They promote universal, centralized design models, manifesting their creative but also destructive force on the environment, on cultural heritage and on human community." [41]

6. Conclusion

Interpreting architecture - and furthermore structural systems - through critical regionalism can be sometimes risky and controversial. Given that the term on its own - critical - has a level of subjectivity embedded in it, one could argue that structure is not the core of architecture, going back to the fundamental question: What is then architecture? A question that could not be answered on such a short text.
In the above presented paper, structure is considered as the part of the building that defines the most crucial decisions of the architect. Architectural practice and moreover structural needs have been affected throughout the latest history by the advent of the structural engineer as an independent discipline and from the sprawl of modernism and industrialization. After the 1900s, industrialization and modernity represent the ideal for a globalized world of maximum efficiency and maximum profit, setting aside an evolution of construction of some thousands of years, where structural schemes and building techniques developed smoothly, proving through time their successes and failures. The industrial revolution brings an abrupt change to the perception not only of construction, but also of the world. Through this process of mechanization and mathematization we have witnessed a disconnection of the architect and the engineer from traditional and locally applied schemes of construction, losing the touch for the most appropriate structure.
In Hooke Park, since its beginnings, appropriate structural systems have been the core of the park's building research. Thirty years ago, the waste of the forest - thinnings - generated a revolutionary set of buildings, launching a discussion on covering structural needs in conjunction to the surrounding resources. Through the process of the Student Lodge 3 project and the anecdotal relation of the team

and the engineers, we saw how the cohort developed a structure based initially on intuition and then adapted it gradually in order to satisfy the structural requirements.
Using the examples of Hooke park as a paradigm, we can see a strong relation of the structure with locality, expressed in the low grade timber of the forest. In the last forty years, locality has been the core of an approach to architecture called critical regionalism. Some architects around the world, characterized as regionalists, have tried to find a way of adapting their design methodology in order for their buildings to be consistent with the area in which they built. The majority of them, though, focused on the visual and programmatic aspect of the building, relying on international structural systems to support their edifices.
On the contrary, we saw how the building process of Hassan Fathy, a product of necessity due to lack of materials, and the approach of Hooke Park based on a tight budget and locally available materials can generate a different approach to regionalism that focuses primarily on how the building is supported and secondly on how it looks. Structural systems that rely on locally available materials and technical knowledge are embedded in the culture and collective identity of a specific place. The majority of an architect's clientele doesn't need complex structures. People need buildings that they will understand, that will provide the necessary feeling of safety that will be affordable and easy to maintain with the locally available labour.
The connection of structural system and locality generates a methodology that is based on six basic points: needs, common practice, local materials, local knowledge, development of systems, and, restraints.
The above presented approach to regionalism does not see locality in a romantic or authentic way. The locally long-tested schemes, individual to each place, cannot be considered a picturesque but a set of systems that can improve the senses of economy, longevity and versatility.
In our world that faces today a crisis of the architect there needs to be a reconciliation of the architect with local, long lasting schemes and techniques in order, firstly, to produce a more influential and integrated architecture and, secondly, advance forgotten techniques that can be used locally and generate more competitive buildings.

Bibliographical References

[1] http://www.labiennale.org/en/architecture/news/25-01.html

[2] BROWNELL Blaine, *Matter in the Floating World: Conversations with leading Japanese Architects and Designers*, New York: Princeton Architectural Press, 2011), p. 42

[3] LEFAIVRE Liane, TZONIS Alexander, *Architecture of regionalism in the age of globalization, peaks and valleys in the flat world*, London and New York: Routledge, 2012, p. ix

[4] http://architizer.com/blog/architect-builders/

[5] See: SAINT Andrew, *Architect and Engineer, a study in sibling rivalry,* Yale University, 2007

[6] MARK Robert, *Light, Wind, and Structure, The Mystery of the Master Builders,* Massachusetts Institute of Technology, 1990, p. 175

[7] Ibid

[8] Ibid p. 13

[9] Ibid

[10] FATHY Hassan, *Architecture for the poor, An experiment in rural Egypt,* Chicago and London: University of Chicago Press, 1973, p. 19

[11] FRAMPTON Kenneth, *Labour, Work and Architecture, Collected Essays on Architecture and Design,* New York: Phaidon, 2002, p. 78

[12] COLQUHOUN Alan, *Modernity and the Classical Tradition, Architectural Essays 1980-1987*, Massachusetts Institute of Technology, 1991, p. 211

[13] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. ix

[14] See: FRAMPTON Kenneth, *Modern architecture, a critical history,* 4th ed. London: Thames & Hudson, 2007, p. 314-327

[15] See: COLQUHOUN, *Modernity and the classical tradition*

[16] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. viii

[17] FRAMPTON, *Labour, Work and Architecture*, p. 81

[18] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. 193]

[19] FRAMPTON, *Labour, Work and Architecture*, p. 81

[20] Ibid, 77

[21] Ibid, 84

[22] See: FRAMPTON, *Modern architecture*, p. 314-327

[23] See: LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*

[24] http://bloggerkm2009.blogspot.gr/2011/04/blogpost_18.html

[25] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. 186

[26] FRAMPTON, *Labour, Work and Architecture*, p. 83

[27] Ibid, 88

[28] http://home.earthlink.net/~aisgp/texts/regionalism/regionalism.html

[29] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. 182

[30] Ibid, 183

[31] FRAMPTON, *Modern architecture*, p. 326

[32] FATHY, *Architecture for the poor*, p. 5-6

[33] Ibid, 5

[34] Ibid, 10

[35] See: SCHUMACHER E.F., *Small is beautiful, Economics as if People Mattered*, New York, 1989

[36] http://listverse.com/2010/06/12/10-cases-of-appropriate-technology/

[37] DUSHKES Laura, *the Architect says*, New York, 2012, p. 58

[38] http://www.theguardian.com/artanddesign/2013/sep/23/stirling-prize-architecture-past-winners-problems

[39] http://images.sub-studio.com/process/2007/07/annie-choi-dear-architects-open-letter.html

[40] http://www.aaschool.ac.uk/AALIFE/HOOKEPARK/hooke.php

[41] LEFAIVRE, TZONIS, *Architecture of regionalism in the age of Globalization*, p. ix

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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A comprehensive approach to the protection of Dougga Tunisia

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A comprehensive approach to the protection of Dougga Tunisia

Archaeological heritage is part of the national identity of Tunisia. Since 1994 Tunisia had voted a national Law related to Heritage.
To allow for the development of its heritage the Tunisia government had organize to reinforce its legal and institutional framework for the management of its heritage.
In this context, Dougga, one of the major heritage site in the Mediterranean basin was made a national archaeological park in 1994 and listed in 1997 on the UNESCO world heritage sites

"The archaeological site of Thugga/Dougga is located in the North-west region of Tunisia, perched on the summit of a hill at an altitude of 571 m, dominating the fertile valley of Oued Khalled. Before the Roman annexation of Numidia, Thugga had existed for more than six centuries and was, probably, the first capital of the Numidian kingdom. It flourished under Roman rule but declined during the Byzantine and Islamic periods. The impressive ruins which are visible today give an idea of the resources of a Romanised Numidian town.
The archaeological site covers an area of approximately 75 ha. These ruins of a complete city with all its components are a testimony to more than 17 centuries of history. They are an outstanding example illustrating the synthesis between different cultures: Numidian, Punic, Hellenistic, and Roman."[1]

After a competition run in conjunction between Tunisia and France, our team[2] was selected to conduct the study for the development of the Protection and Enhancement Plan (PPMV) for the site, as defined by the Heritage Code of UNESCO.

Following a detailed study including all the parameters, which constitute the historical, geographical, landscape and legal environment[3] of the site in its context, we proposed a Protection and Enhancement Plan and an Action Plan.

I propose to present the following aspect of our work:

1. **The archeological park, the general rules for its protection and enhancement with their legal implications.**

This part will describe the various services that can be used within the adjacent areas. It will also note the areas where new "craft and tourist area" could be developed with proper relationship with the archaeological park. The pedestrian path around the park and the equestrian possible promenade leading to the park surroundings were also investigated.

The archaeological park itself was subdivided in areas corresponding to various level of heritage status:

[1] From the UNESCO description of the site
[2] Our team was made of Amira Nouira, Pascal Prunet, Marc Baraness, Ruth Cawker, Sophie Besson, Sana Ben Achour, Co-Managing, Christiane Garnero Morena, Jean Luc massy, et Simone Ricca.
The client was the Tunisia National Heritage Institute
The study was made between 2007 and 2009
[3] Only a few of the topics are noted in this abstract

Heritage area for archaeological investigation and research (these were principally areas, which had not yet been investigated).
Heritage area for archaeological delicate investigation; these were areas were significant fragment of the city had been found, which had also been described epigraphically
The rest of the park was subdivided in relationship to: the state of the ruins; their importance in the hierarchy of the city and the roman society; their position within the possible promenades within the site; their potential use for contemporary events. And area for visitor centre was defined with a potential bus parking and tourist amenities.

2. The proposal for the management of the archaeological park

An overall organisational chart was developed with its staffing. All staff positions were described to allow for a direct staff search. All the existing staff on site had been interviewed and most of them were repositioned within the chart. Of course additional management positions were to be created and staffed.
A second layer of staff management was even proposed in case of high development of the park activity.

3. The proposed visitors paths and signage

Sets of promenade within the archaeological park and its context were proposed. The started with the approach arrived at the interpretation centre, crossed the formal gate, linger on the promontory edge, enabling the visitor to comprehend the importance of the context of the site, move into the hart of the city and to the theatre itself open on the overall landscape and closed on the “souvenir“ gift shop.
This was the “minimal“ promenade, which could be enhance with three other thematic paths crossing heritage areas further from the centre of the archaeological park.
A detailed signage system was developed respecting the ruins. Each sign position was carefully studied to ensure appropriate relationship to the heritage and the context.
A specific promenade was developed for physically challenged visitors.

4. The proposed security principles for the buildings and the site

Area and system of temporary shelter from the sun were designed.
Each part of the physical quality of the site were inventoried and classified in respect to their security for visitors. Principles for securing each part of the site were investigated, drawn and illustrated in detail. They range from displacement of blocks to three types of handrails, protecting fences and enclosed areas.
Methods of constructions were proposed to ensure total respect of the heritage nature of the site.

5. The proposed landscape plantation and management plan

Three levels of landscape refurbishment and development were proposed.

6. The proposed functioning program

Two phases of creation and development of the archaeological park were proposed.
The first one secured the park itself and legally preserved the surroundings. It also offered minor transformations within the park allowing the visitors to have more appropriate amenities.
It put in place the various promenades and dealt with the security measures that were the most significant.
The second proposed to bring the archaeological park to an appropriate UNESCO standard with all the services and amenities for such a heritage site.

Although this program was cultural under the umbrella of the UNESCO co funded by the Tunisian and French governments, it got lost in the “Arabian spring“.
After the last presentation at the director level in the presence of the highest French client representative, some team members have tried to get the project implemented unfortunately without success.

A comprehensive approach to the protection of Dougga Tunisia

Archaeological heritage is part of the national identity of Tunisia. Since 1994 Tunisia had voted a national Law related to Heritage.
To allow for the development of its heritage the Tunisia government had organize to reinforce its legal and institutional framework for the management of its heritage.
A first attempt to ensure protection of its heritage was made around the site of Carthage. In light of various interest and political pressure this attempt did not succeed.
In this context, Dougga, one of the major heritage site in the Mediterranean basin was made a national archaeological park in 1994 and listed in 1997 on the UNESCO world heritage sites.

"The archaeological site of Thugga/Dougga is located in the North-west region of Tunisia, perched on the summit of a hill at an altitude of 571 m, dominating the fertile valley of Oued Khalled. Before the Roman annexation of Numidia, Thugga had existed for more than six centuries and was, probably, the first capital of the Numidian kingdom. It flourished under Roman rule but declined during the Byzantine and Islamic periods. The impressive ruins which are visible today give an idea of the resources of a Romanised Numidian town. See Figure 1

The archaeological site covers an area of approximately 75 ha. These ruins of a complete city with all its components are a testimony to more than 17 centuries of history. They are an outstanding example illustrating the synthesis between different cultures: Numidian, Punic, Hellenistic, and Roman."[1]

After a competition run in conjunction between Tunisia and France, our team[2] was selected to conduct the study for the development of the Protection and Enhancement Plan (PPMV) for the site, as defined by the Heritage Code of UNESCO.

The team necessary to respond to all the parameters are very large, complex and made of extremely qualified people. However the coordination is a very difficult and subtle task, which in the case of this project was even more delicate. We had two governments who did not really have the same objectives, and the temporary head of the project, although a very learned scholar on her specific subject (epigraphy) was not a very astute manager.

The study of the area with all its historical, geographical, landscape and environmental parameters in its context could be consider as rather straightforward. The understanding of the political dimension of the legal framework was a more delicate parameter, we wanted to put in place a framework that would protect Dougga, that would include potential plan of action respectful of its heritage, but we wanted to ensure that it would not be dismissed for political reason.
After too many presentations to various committees we proposed a Protection and Enhancement Plan and an Action Plan.

In this paper I will outline some of the most significant aspect of our work, detail two of them and conclude on the impact of the "Arab spring" on its implementation.

1 The archeological park, the general rules for its protection and enhancement with their legal implications.

See Figure 2

The part of Dougga that was originally included in the proposed UNESCO park was of 62 hectares. The areas were we knew were other significant archaeological ruins were at least 30 times larger. They included land used for local agricultural farming. But these lands were also the potential sites for tourist-centre, bus parking and other difficult facilities.[3] And by the end of our studies parts of the context was also the site for some petroleum digging (luckily for Dougga this was not successful)

[1] From the UNESCO description of the site

[2] Our team was made of Amira Nouira, Pascal Prunet, Marc Baraness, Ruth Cawker, Sophie Besson, Sana Ben Achour, Co-Managing, Christiane Garnero Morena, Jean Luc massy, et Simone Ricca.
The client was the Tunisia National Heritage Institute
The study was made between 2007 and 2009

[3] If tourism had originally a good impact on heritage sites, the large number of visitors has often now become a threat to heritage on this see CHOAY F. *L'allégorie du patrimoine*. Paris: Seuil,1992.

We divided the 62 hectares archaeological park in 4 areas corresponding to various level of heritage status:

1.1. Heritage areas for archaeological investigation and research (these were principally areas, which had not yet been investigated).
1.2. Heritage areas for archaeological delicate investigation; these were areas were significant fragment of the city had been found, which had also been described epigraphically
1.3. The rest of the park was subdivided in relationship to: the state of the ruins; their importance in the hierarchy of the city and the roman society; their position within the possible promenades within the site; their potential use for contemporary events.
1.4. An area was dedicated for a visitor centre with a potential bus parking and tourist amenities.

But we also provided protection for the immediate context
Indeed a very large context of almost 2 000 hectares was place under “agricultural“ bylaw. This designation placed all future developments under the approval of a regional committee (This committee was large and varied to protect it from political interferences). Within this large land we designated

1.5. Areas for local arts and craft display and sale;
1.6. Areas for small tourist housing with strict design rules;
1.7. And 4 pedestrian or equestrian paths.

We hoped that the effect of creating “promenades“ by foot or by donkeys or horses in the larger surrounding of the park, will establish the site at large as a heritage site.

2. The proposal for the management of the archeological park

One part of our team conducted a rigorous questionnaire with all staff present on site. From our experience on such archæological park of this nature, we proposed a chard for the structure of the park in this final stage (with its expected full potential). We also propose a transitional structure that would allocate all the existing staff within the overall organisation.

The acceptance of the proposed administrative structure of the park was one of the most difficult part of our work. Researchers specialised in restoration of heritage items suck as mosaics, are often not the best in management structure. We had many sessions to explain where we started from, what were the parameters we included and why, in light of their demands and our knowledge, we proposed such a management structure.

We also gave a job description for all the position existing or created so that it would be very simple to put in place. Our expert in this domain Jean Luc Massy who has had a senior position in the French archæological administration and who knew very well the Tunisian context had extreme difficulties in getting this part of the work understood. Two of us had to literally do detailed presentation of every step of our thinking process to enable the guiding committee to accept and appropriate the proposed management organisational structure.

3. The proposed visitors paths and signage

From the beguining of our encounter with the site of Dougga we were moved by its magical beauty. Imagine an almost complete roman ruined town, where the the limits are fields moving in the wind, where the horizon are clear but distant low montains on the other side of the plain, where the light is clear as there are almost no poluttion, where the wind is the only music that wisper at the rythm of yours steps on the roman large paving.
At night the stars and the moon gave Dougga an other atmospher which had to be respected and revealed.

But the keepers of the site were interested in music, in artcifical lights, they had seen too many sound and light in places like Versailles. They might have even liked a “Dougga Disneyland”

So our first task was to reveal to them the intrinsic significance and beauty of Dougga. Walks through the site where we stopped and listen to the wind, promenades around the site to feel its presence in

the landscape were some of the exercices we had to go through to raise the consciousness of what they were the keeper of.

It seems that starting from the world as it is with a fine understanding of its qualities is often difficult as we all arrive with our bagage.

Following this raising of consciousness phase, we proposed sets of promenade within the archaeological park and its context.

3.1. The arrival from the adjacent town of Téboursouk with a road that would need minor modification allowed an understanding of the large landscape and after a curve offered a view of the cliff reason for the site of Dougga in the first instance as a high point dominating the plain. At that point, on the right, the silhouette of the cliff surmounted by columns of the temple of Saturn, is cut on the lipid blue sky. On the right a first fountain tells how on the side on the nourishing plain, the cliff and the promontory offer view and protection while the numerous sources have allowed human establishment.
See figure 3

3.2. At the interpretation centre models, didactic documents give the keys to a better understanding of some of the elements that the visitors will encounter during their promenade.

3.3. Crossing the formal gate the view is directed towards the mausoleum with fields in the background.

3.4. The path on roman roads linger on promontory edges, enabling the visitor to comprehend the importance of the context of the site. The first houses and their gardens can be visited.
See figure 4

3.5. The roads lead the visitor into the monumental hart of the antique city. Majestic ruins that face the landscape surround him. Traces of the various cultures that have occupied the site are present: a forum, a bath, a roman temple, a mosque.

3.6. A curve to the North-West part of the centre get the visitor closer to the cliff and lead him to the top of the theatre. There he discovers the perspective that opens from the theatre to the landscape. Nature and culture, which are so present here, can again be seen in a new light.
See Figure 5

3.7. The visitor is back at the “souvenir“ gift shop.

This described the basic promenade through the centre of the Archæological Park. This promenade could be enhanced with three other thematic paths meandering through further heritage areas, each could be related to a more specific theme.

To guide the visitor, with respect of the ruins we developed a detailed signage system. It included directional signs See figure 6. It proposed interpretation panels, and referential panels. On figure 7 one ca see an illustration of one of the proposed entrance sign, which use stone found on site as well a large copper plate that could be worked in the adjacent town, while the panel itself would have to be done away from the site. It was not possible to found anyone able to engrave illustration on metal or stone.
Each sign position was carefully studied to ensure appropriate relationship to the heritage and the context.
A specific promenade was developed for physically challenged visitors.

4. The proposed security principles for the buildings and the site

As a first level of amenity we designed a system of temporary shelter from the sun. They were inspired by local tents that are used by the sheep keeper as shelter from the sun.

Each part of the physical quality of the site were inventoried and classified in respect to their security for visitors. Principles for securing each part of the site were investigated, drawn and illustrated in detail with relationship to their hierarchy on site.
See figure 8, 9 and 10
They range from displacement of blocks to three types of handrails, protecting fences and enclosed areas.

Methods of constructions were proposed to ensure total respect of the heritage nature of the site. All of these were illustrated with details and photomontages
See figure 11

5. The proposed landscape plantation and management plan

Three levels of landscape refurbishment and development were proposed.
The surrounding landscape of Dougga is also its raison d'être. It was molded at the numibian period around the agriculture of cereals. Today the plain is still a very viable economical area with good healthy farming the preservation of these lands as agriculture was paramount and was suggested in the immediate surrounding of the archæological park.
The other significant landscape elements are the olive trees, which are numerous directly around the site. They constitute a splendid frame to the park and we have requested their preservation.
See figure 12
Beyond these are of preservation we suggested the rehabilitation of roman garden as part of the restoration of the major houses.

6. The proposed functioning program

To ensure an appropriate transition from the "raw" state to its final archæological park in line with UNESCO guidelines we propose two phases of creation and development.

6.1 The first one secured the park itself and legally preserved the surroundings. It also offered minor transformations within the park allowing the visitors to have more appropriate amenities. Those mentioned earlier for sun shelter.
It put in place the basic elements of the signage system and secured the major parts of the ruins. This would allow for the main promenade to be safely open to the large public with appropriate amenities and explanations. We also recommended a subtle promotion of the archæological park, to ensure that it would be appropriately included in the interested visitors trip to centre Tunisia.

6.2 The second one proposed to bring the archaeological park to an appropriate UNESCO standard with all the services and amenities for such a heritage site.

This project was based on cultural understanding of the site under the umbrella of the UNESCO co funded by the Tunisian and French governments. The French government had allotted funds to put in place some of the security elements and some of the signage. Many "final" presentations were made to the Tunisians authorities in presence of the highest French representatives. However although they had follow step by step the whole process and had approved and often complimented us on the work the Tunisian members of the guiding committee could never decide to move to the implementation phase. After many months of frustration, the French government did not want to have funds marked for a project that did not seem to progress. In 2010 the "Arabian spring" gave a definite brake to the implementation of the project

After the last presentation at the director level in the presence of the highest French client representative, some team members have tried to get the project implemented unfortunately without success.



Fig. 1: View of part of Dougga in the overall context of the plain it dominates

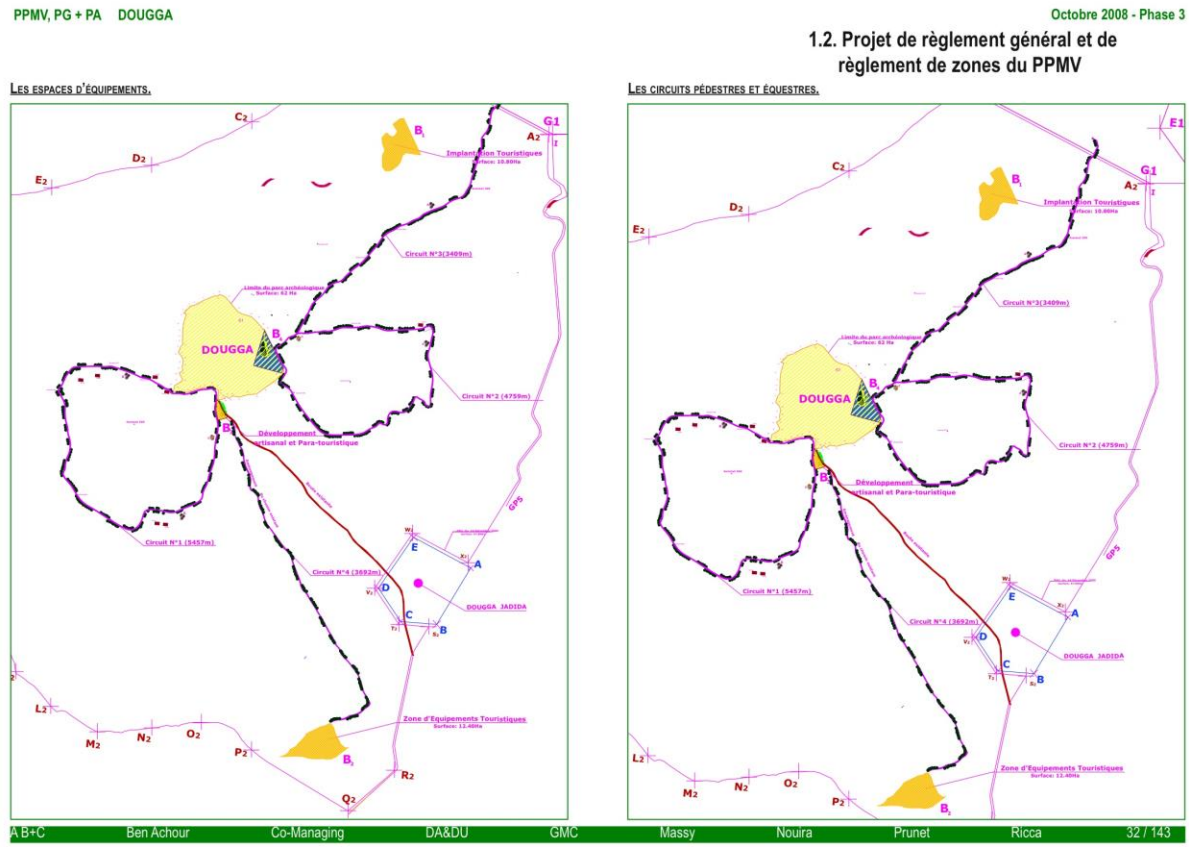

Fig. 2: Maps of proposed areas for the legal framework of Dougga and its context



Fig. 3: The silhouette of the cliff surmounted by the ruined columns of the temple of Saturn against the blue sky



Fig. 4: The paved roman roads of Dougga



Fig. 5: From the top of the theatre looking at the landscape beyond the proscenium

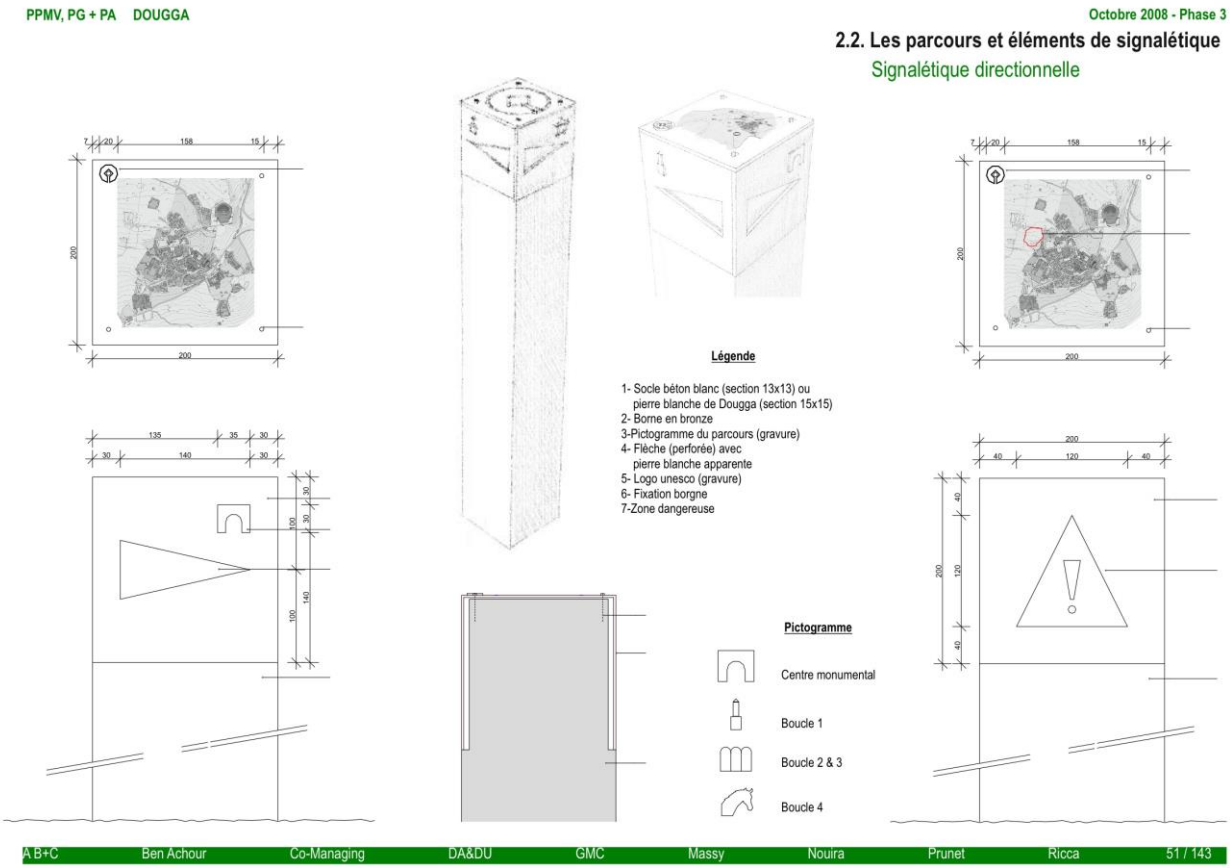

Fig. 6: One of the proposed directional signage

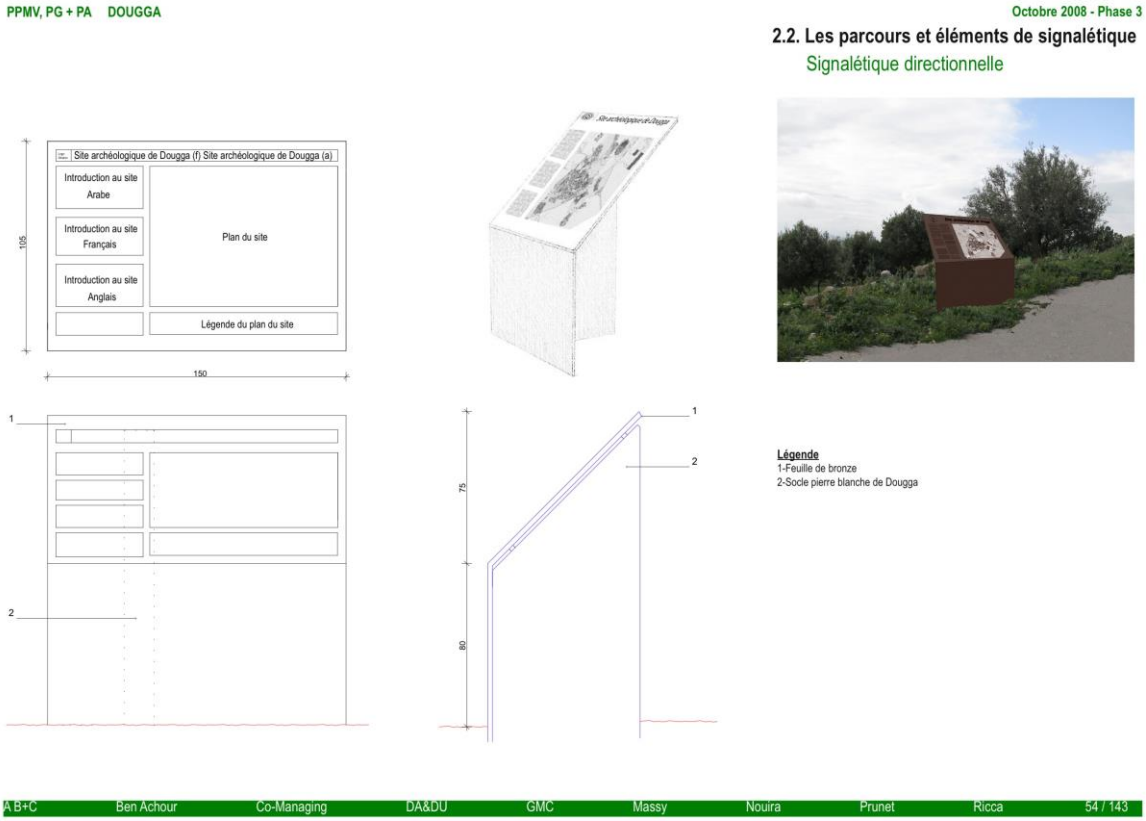

Fig. 7: Proposed sign for the entrance of the site

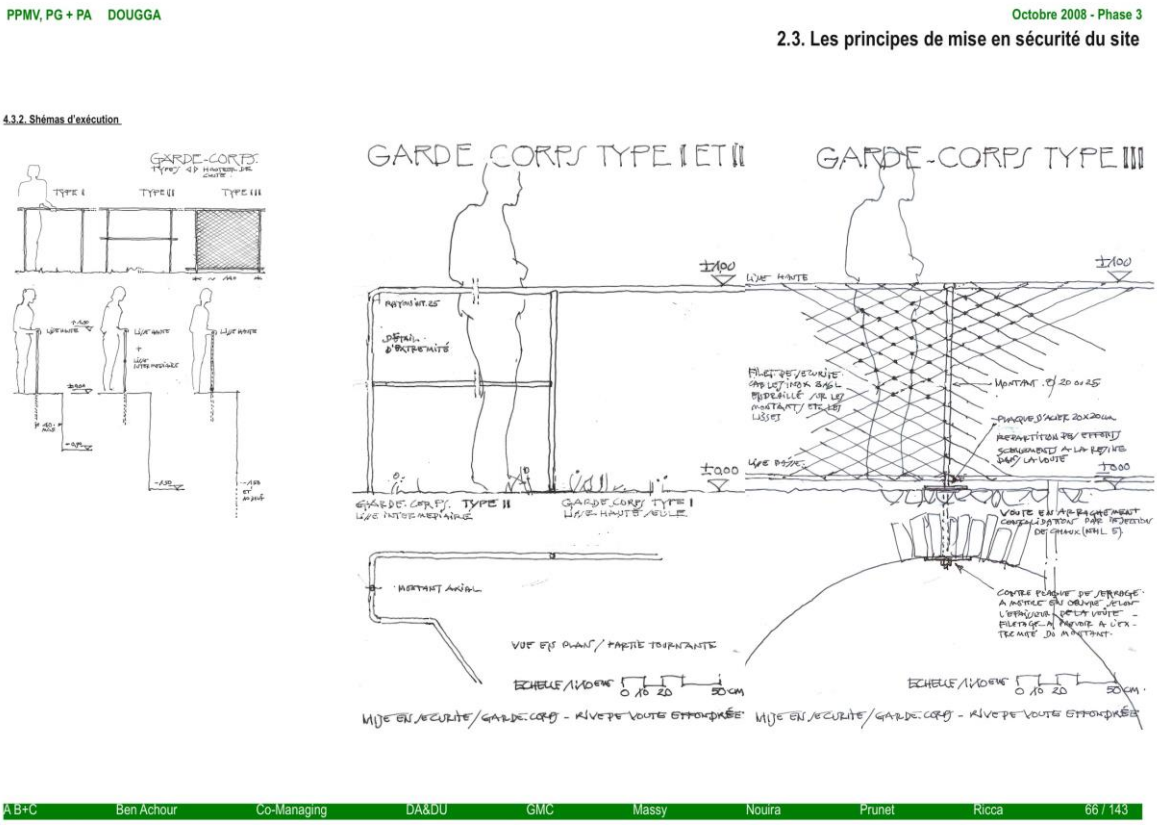

Fig. 8: One of the proposed security principles that have been proposed for handrails 1,2 and 3

4.3.2. Shémas d'exécution

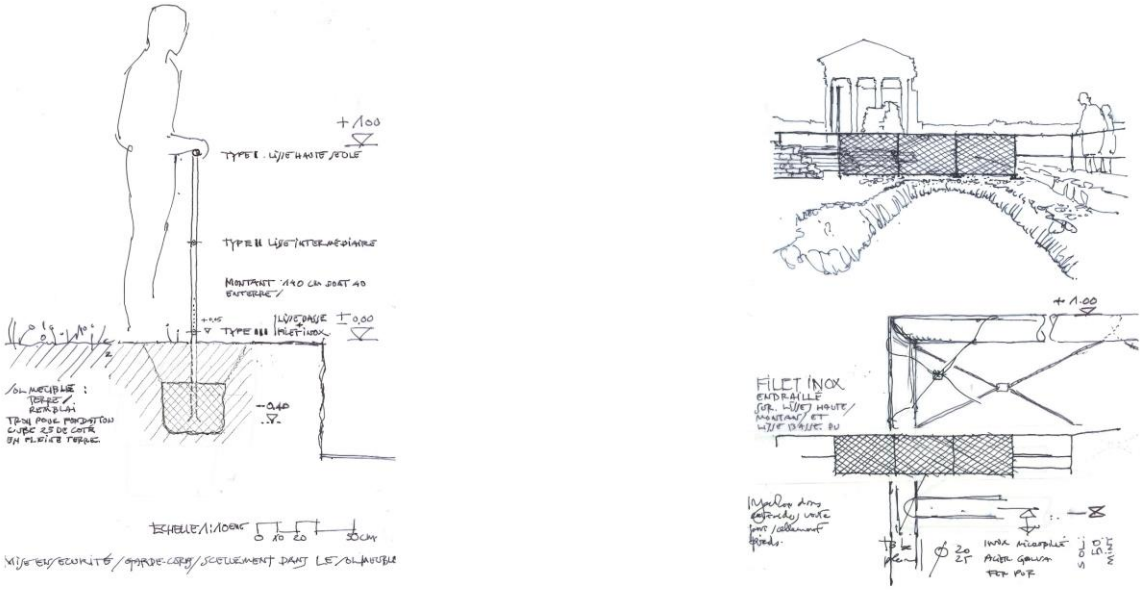

Fig. 9: One of the illustrations of the security principles that have been proposed for small handrails

4.3.2. Shémas d'exécution

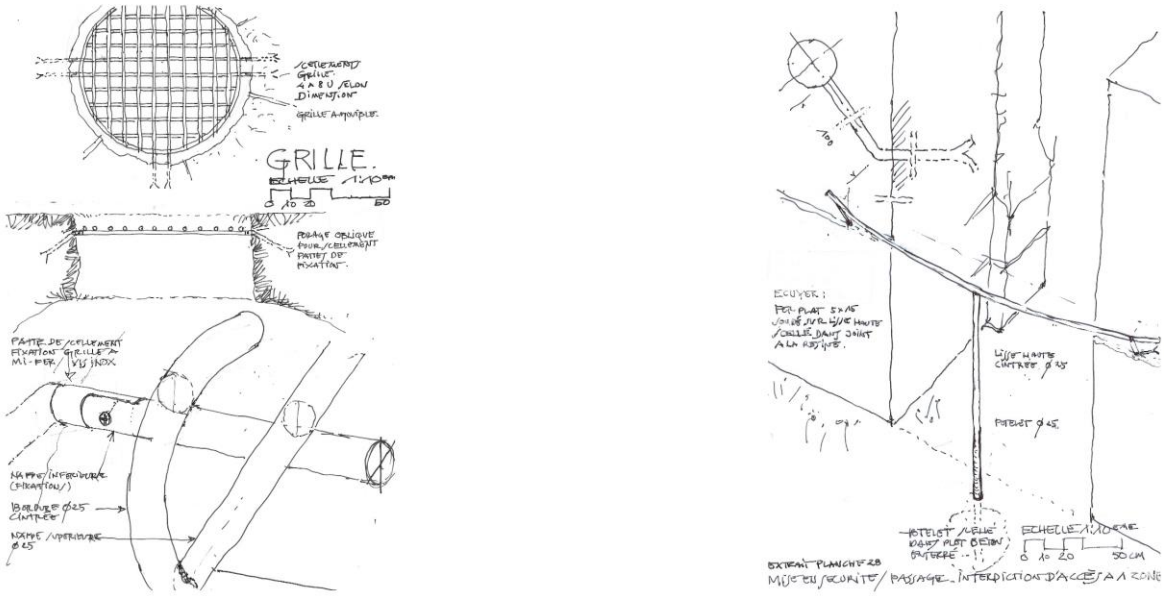

Fig. 10: One of the illustrations of the security principles that have been proposed for small areas

4.3.2. Croquis Graphiques



Fig. 11: One of the photomontage that was made to indicate the insertion of the security principles



Fig. 12: The landscape of Dougga

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The importance of anthropological analysis in the comprehension of the cultural heritage. The study case of Rocca di Cambio (AQ).

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Abstract
This intervention wants to highlight the importance of the anthropological analysis in the field of archeological work, through the specific case of the study of a medieval cemetery, excavated in the years 2008-2011 in Rocca di Cambio (Abruzzo, AQ) by L'Aquila University-Chair of Medieval Archeology, director Prof. Fabio Redi.
The cemetery, that is opposite the Santa Lucia Church, was placed exactly above the leveled walls of a previous building, probably a Monastery related to the control of transhumance in the Appennini mountainous land.
The archeological excavations discovered 33 burials that date to the middle of the XIII century to the middle of the XIV century; the grave goods, consisting of metallic object and jewels of good quality, are the statement of a good social position of the people buried. Also the anthropological analysis on human remains were concordant on this point. But anthropology was also able to recognize and identify some important pathologies – not so commonly found in archaeology – such as echinococcus, rheumatoid arthritis and brucellosis. It is possible that brucellosis, typical in human groups hat fed on infected dairy products, was the triggering event for rheumatoid artritis . The bacteria of the same morb was found found in Herculaneum, not just in osteological reports, but also in contaminated remains of cheese.

Keywords: Archeology, Palaeopathology, Abruzzo, Brucellosis, Life Reconstruction

1. Introduction
Talking about archeological excavations, is really impressive to note that a great part of them is concerning ancient necropolis or cemeteries: approximately the half part of archeological excavations dig up human bones.
At this point, it is natural to point up that human remains are one of the commonest archeological material in the world. But, for the reason of their particular *status* of testimony of human body, bones were for a long time interred a second time, without the option to be studied like all the others archeological materials.
Actually, a good part of burials are dug up and studied by professional figures that have the specific task to understand ancient life from human remains from archeological contexts.
It is really important to introduce the fact that the osteological and taphonomic study of burials could really light up some important cultural and material facts.
One of the most important information we can have about ancient times could be extrapolated by bones: in fact physical anthropologists do not have just the assignment to determinate the individual data for every individual studied and his biological profile, but they could have a picture of the way of life and works in ancient times.
This is possible because bones are an extraordinary biological archive: in fact, a great parts of the facts that happens to human body are reflected on bones. In particular, a great part of the important stresses that happens in life have a direct consequence on skeletal and muscular system.

Muscles and ligaments have a really close connection with all the skeletal apparatus and their development is strictly mirrored in the signs that they might leave on bones.
So, one of the work of physical anthropologist is to record the development of all the MOS or Markers of Osteological Stress [1] and to construe ancient life from them.
Another way to reconstruct ancient behaviors and way of life is to conduct an accurate paleopathological analysis: in fact, a great number of pathologies are direct consequence of environment, climate, occupations and habits. There is a branch of medicine, called paleopathology, that is delegate to study development of illness through the ages.
Unfortunately, not all the diseases leave traces on bones, but just some of those: the ones that could damage the osseous substance. In the number of those disease there are some called zoonosis, from the fact that are produced by an interaction between man and animals, in particular some kind of cattle.
As things stand, we have to state as anthropological and paleopathological analysis are included in the best practices in archeology. The use of the knowledge descending from biology, medicine and history, crossed together, could be a great way to understand the results of a great number of excavations and to increase the research potentiality.

2. The study case of Santa Lucia in Rocca di Cambio (AQ)

In this writing we want to demonstrate the importance of good anthropological and palaeopathological analysis through the specific case of Santa Lucia in Rocca di Cambio (AQ).
Archeological excavation were directed by Prof. Fabio Redi, holding the chair of Medieval Archeology in L'Aquila University, in the mountainous area of Abruzzo, in the years 2008-2011 (with a stop in 2009 after the terrible earthquake who seriously damaged both L'Aquila and the small city of Rocca di Cambio).
The choice to start an excavation in the area just in the opposite of Santa Lucia Church – that is one of the most beautiful churches in L'Aquila landscape, by virtue of the beautiful frescos inside, dated XII-XIII century a.C. [2]– was taken after the unexpected discovery of some ancient walls in front of the façade of the church.

2.1 Introduction to archeological excavation results.

The burial periods were found directly on the dejected walls, no longer in use. The exact moment of the shutting down of the first monastery is still not certain, because of the fact that the work on stratigraphy and on the materials are still in progress.
But actually there were recognized three periods of burials, with a little time within them: all together, they seems to cover the time between the half of the thirteenth century and the half of the fourteenth.
Finally, in the site were fond 33 burials, not so much to reflect the real mortality of the town: all were single graves, with the exception of burial number 31 and 32, double (male and female), and burial 27 and 28, where burial 28 removed part of burial 27 [3].
All the graves are canonically oriented West-Est, and are characterized by a long ellipsoid pit with a remarkable depth; the considerable depth of the grave was interpreted by the archeological and anthropological team as a solution to protect the corpses from wild animals.
One of most characteristic data regarding this cemetery is the unusual wealth of grave gods, that were present in a great part of burials and were composed by jewels and clothes accessory, both functional and ornamental, signs of the good economic conditions of the people buried. [4]

2.2 Anthropological analysis

All the human remains were studied in the laboratory of LAMIA (Laboratorio di Archeologia Medievale, Informatica ed Antropologia pertaining to L'Aquila University – Chair of Medieval Archaeology), in range of a Research Fellopship titled "*For a paleobiological approach to knowledge of Medieval human groups from archeological excavations in Abruzzo area*"
All the bones were cleaned, restored and measured, instead to recognize the most important physical characteristics of the human group interred in front of Santa Lucia Abbey.
In this way it was possible establish that the buried human groups was composed by males and females individuals but - except burial number 30 - there was no presence of child. There was a good number of adolescents, in the quote of 15% of the total, but just from 10 to 17 years old. The interpretation of this fact was that maybe there was a specific cemetery for children in a not excavated area, probably near the adults one.
To confirm the good economic *status* of this population, the calculated mean age at death is 42,3 years for males (37,8 including *juvenes*) and 34,25 years for females (26,5 including *juvenes*), that is a good value in Medieval Abruzzo. The sex variability is explained by the fact that women are more vulnerable in front of some moments in life, like pregnancy and childbirth.
The most important results are extrapolated by the analysis of the muscle stress observed on bones: all the factors induced to consider this group as a group of rich farmers, because of a series of

stresses that were registered. In particular, the greater part of the female individuals of the group presented the evidence of ischiatic bursitis (75%), that is commonly considered as the results of long sitting on hard seat or stools [5]; there is also a good use of shoulder girdle, in an asymmetrical way that suggest the use of horizontal loom, in which one arm is used to guide the spool and the other – the left one – to move part of the instrument. The dental situation confirms this suggestion, because of the fact that on teeth were detected grooves dues to the passage of filaments, during the act of weaving [6].
Other interesting trace of working activities were found in the male individuals skeletons: were recognized a really important load of muscle and ligament work on shoulder girdle, heavier than in females and with a different distribution: in a great part of them there was also a form of inflammation in carpals and in correspondence to flexors muscles in association with a form of thumb arthrosis (45,4 %). It is credible that this kind of inflammation is to be related to the use of the shear scissors.
Furthermore, some of them showed the evidence of trauma lesions probably dues to interpersonal violence (63,6% of the male adult skeletons).

2.3 Paleopathological analysis

The analysis of human skeletal remains were able to highlight some common diseases in population . Those illness seems to be not specific, but they could be important to create a differential diagnosis.
A lot of little factors were talking about little diseases, especially inflammation, localized in some body regions more than others: in particular, the vertebrae and the joints of pelvic girdle, hands, legs and feet.
Moreover, there was an unusual trend in this population to an extraordinary lengthen of some blood vessel reflected in endocranical surfaces, and a strong persistence of endocranial anomalies as an abnormal presence of Pacchioni depressions and granulations (16,12%)
There were also a case of a so visible disease that the diagnosis is really credible – but the medical corfirmation with x-ray, DNA extractions and thin sections are actually still in progress -: in burial number 5 was visible, still during excavations, a great cist in the place of right lung. This ossified cyst was inside another bigger half-ossificated one, with the dimension of about 10 cm.

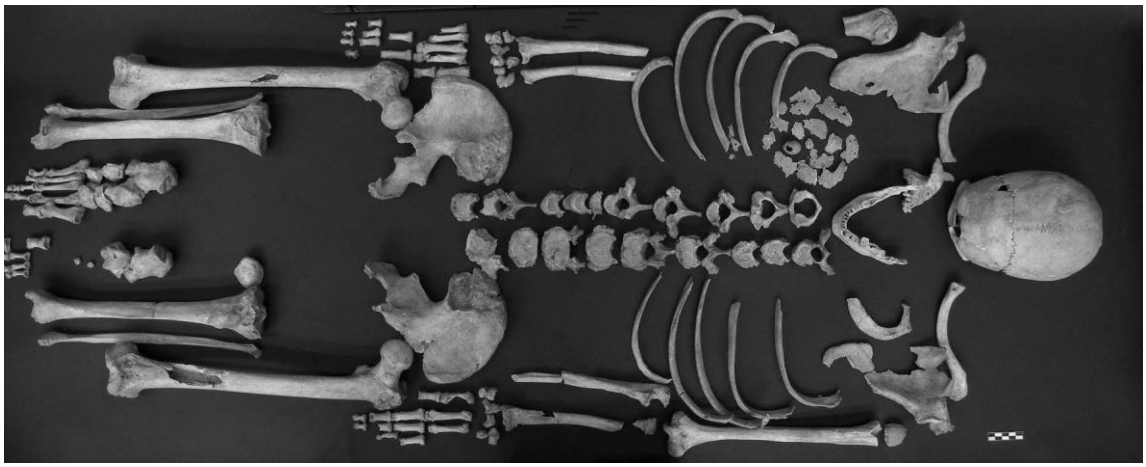

Fig. 1: Burial number 5: it is evident the double ossified cyst at the place of right lung.

The morphology and expecially the presence of a cyst inside another bigger one (daughter cyst) led to the diagnosis of hydatid cysts, that are due to echinoccosis, that is really a uncommon disease to find in paleopathology – the greater part of cysts do not ossify - , but there is another proven case from the same territory [7] [8].
Even now this pathology is considered sign of sheep farming and evaluated as a professional disease. The reason is the fact that in the life circle of the Echinococcus Granulosus needs a intermediate host (sheeps), and a definitive host (dogs); man is just an occasional host, and the infection is deriving by handling infected dogs. For this reasons this is a typical zoonosis, considered as sheep farmers disease.

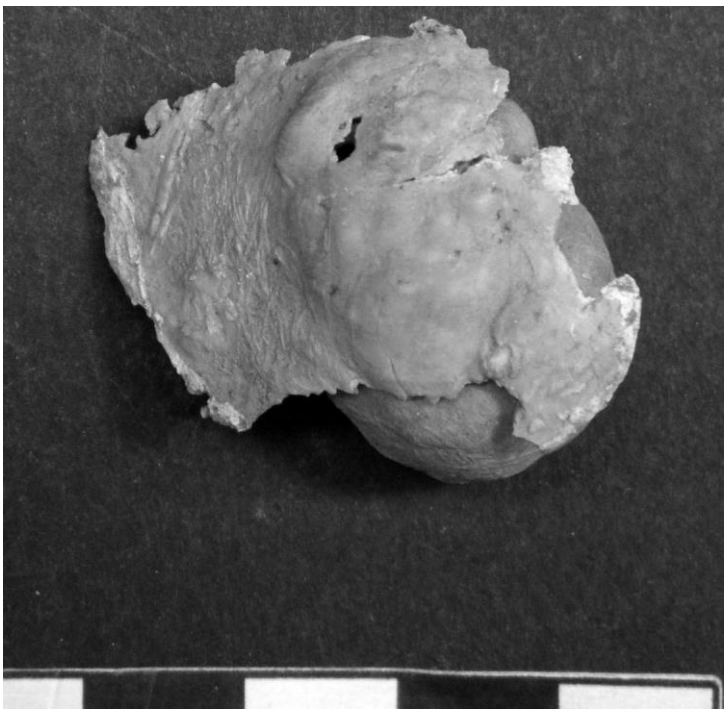

Fig. 2: Burial number 5: particular of the double ossified hydatid cyst



Fig. 3: Burial number 29: Pedro Pon's sign, marker of Brucellosis, on 4rth lumbar vertebra.

As things stand, It was not so surprising to find another zoonosis, quite rare to find because the just one sign to detect it is a little lytic lesion on vertebrae (generally last thoracic or lumbar ones), called Pedro y Pons sign [9].
In Rocca di Cambio population there were 4 trusted cases (12,9 %) of this typical sign of brucellosis or Malta fever, that is an illness deriving from the consumption of milk and cheeses made from the milk of infected animals, primarily goats and sheep, infected with Brucella melitensis. It is rare but possible also transmission from human to human, through sexual contact from mother to child.
This percentage is really high, but it is intended to increase because of the fact that there are some cases of probable brucellosis, identified by a considerable loss of osseous substance in the abdominal part of vertebral bodies: this happens in particular in young individuals, in which the skeletal grow was not concluded, in one of them there was the coexistence of both the signs (Pedro y Pons and bone thinning): this was visible in other 4 cases. In Albania [10] it was identified a similar case in

morphology as certain brucellosis using DNA tests to search the pathogen. In some of those young adolescent individuals there were significative signs of infections in correspondence to the main articular joint of hips and legs, but also in hand and feet. It could be an unspecific independent illness. But in two cases it was associated to a typical in-cup deformity in proximal epiphysis of hands and feet, deriving specifically from juvenile reumathoid artrithys. This disease could derive from brucellosis, and may be a symptom for identification of a disease so difficult to discover.



Fig. 1: Burial number 6: typical in-cup deformity in proximal metatarsal epiphysis.

At the same time the Malta fever could case also acute or chronic meningitis, that could be the reason of the detected lengthen of blood endocranial vessels, in particular the ones referred to the middle meningean artery. In this case, the brucellosis case could increase up to the 48,3% of the population buried in our area. The consequence of this fact is that brucellosis was an endemic disease, and maybe the most common one and the main cause of death in individuals aged 10-17 years.
This would confirm both the implication in transhumance of those individuals and the possibility of supply of food resources in a rich hight-proteic diet , that was accidentally the cause of those endemic infections.

3. Herculaneum site

The best palaeopathological results regarding zoonosis and brucellosis in particular were led regarding the site of Herculaneum, by virtue of the extraordinary degree of conservation of both the sites. In particular, in the last years of XX century, there was an extraordinary anthropological study led on the “Herculaneum fugitives”.
For a long time the absence of human skeletal remains inside the Herculaneum city suggested the idea that the citizens were more lucky than the ones from Pompeii, and they could leave the city before the ruin arrived. But excavation conducted in 1984 discovered on Herculaneum beach the skeletons of more than 250 persons, victims of eruption that could not move out.
The anthropological analysis were conducted in 10 years and bone lesions throws light in life conditions in Roman period. There were reconstructed also the alimentary habits and the main diseases affecting the population.
One of the most common pathologies that were found was precisely brucellosis or Malta fever - in 17,4 % - of adults [11], as testimony of the consumption of contaminated food and the strict contact with animals that was so common in ancient life [12].
The test case of the presence of the Brucella was founded in a single carbonized cheese that was in a great state of preservation. The analysis led to the discovery of a variety of bacteria, included cocco-like forms. Those really seems to be morphologically compatible with Brucella [13] [14]. Infortunately, it was not possible to proceed to a molecular analysis because the cheese was exposed to a too high temperatures to allow this kind of investigation.
Also the historical sources confirms the fact that in the roman diet of Herculaneum and Pompeii there was a prevalence of cheeses from sheep milk, confirming the fact that in the roman world it was really rare to use cow milk for dietary purpose.
All the truly roman cheese were made with sheep milk, and the cow milk ones were imported from Alpine area. It is really unconvincing the idea of a brucella contamination from sheep flesh, because of

the fact that romans used to slaughter old animals (more than three years old), and they cooked or boiled flesh before consuming [15].
The evidence of this kind of bacteria bring life to a great part of little known details of life in ancient world, and in particular in the area of Herculaneum and Pompeii.

4. Results

So we can understand why is so important to consider anthropological and paleopathological analysis as essential for the study and comprehension of ancient site.
The comparison between the roman sites from Campania and the medieval site of Rocca di Cambio highlight how much different were the condition of life compared to present time: pathologies that now are really rare were diffused in all the population. In the specific case of Santa Lucia, the illness was the direct consequence of a relative prosperity, and helps to understand that also the high social classes suffered of now forgotten pathologies.
On the other hand the extraordinary case of Herculaneum, the first one in which the presence of Brucella bacteria were detected in food, was the start point to investigate on this epidemic so hard to detect, that could be unnoticed.
An accurate analysis of skeletons from archeological origin could be one of them in heritage practice to carry out in archeological excavations: there is no management or conservation without knowledge.

Bibliographical References

[1] WILKZAR C.A., KENNEDY K.A.R. Mostly Mos: technical aspects of the identification of skeletal markers of occupational stress, in REICHS K.J. *Forensic osteology II: the next generation*, Springfield, Illinois, 1997

[2]Web:http://www.regione.abruzzo.it/xCultura/index.asp?modello=pitturaAq&servizio=xList&stileDiv=monoLeft&template=intIndex&b=menuPiMe2116&tom=116

[3] REDI F., FORGIONE A., SAVINI F., AMORETTI V., DI PIETRO T., PANTALEO M., SIENA E., CIAMMETTI E.. S. Lucia di Rocca di Cambio (AQ), campagna di scavo 2010. *Archeologia Medievale* 2011,XXXVIII. Firenze, All'Insegna del Giglio, 1974-2013, 2011 p. 255-277.

[4] REDI F., FORGIONE A., AMORETTI V., SAVINI F., CIAMMETTI E., DI PIETRO T.. Linee di ricerca e primi risultati di archeologia nelle chiese dell'Aquilano, *Proceedings of VI Congresso Nazionale di Archeologia Medievale (L'Aquila, 12-15 Settembre 2012).* Firenze: All'Insegna del Giglio, 2012, p. 501-510.

[5] CAPASSO L., KENNEDY K. A. R., WILCZAK C. A. *Atlas of occupational markers on human remains*, Teramo, 1998.

[6] CANCI A., MINOZZI S. *Archeologia dei resti umani. Dallo scavo al laboratorio*. Roma, Carocci, 2005. ISBN-9788843032006.

[7] D'ANASTASIO R., VITULLO G.. Un caso paleopatologico di cisti da echinococco. International Journal of Anthropology, 2008, numero speciale. *Proceedings of I XVII Congresso AAI, Cagliari*. Pages 414-418. Angelo Pontecorboli Editore - Firenze ISSN: 0393-9383 (Print).

[8] D'ANASTASIO R., VITULLO G., PAOLUCCI A., MICHETTI E. A paleopathological case of echinococcus cyst. *Journal of Paleopathology*, 2008, 20 (1-3), pages 67-73. Elsevier, Ltd, Amsterdam.

[9] MAYS S.A. Lysis at the anterior vertebral body margin: evidence of brucellar spondylitis? *International Journal of Osteology*, Volume 17, Issue 2, pages 107–216. John Wiley & Sons, Ltd., 1991-2014, Online ISSN: 1099-1212.

[10] http://msutoday.msu.edu/news/2012/msu-scientists-crack-medieval-bone-code/

[11] CAPASSO L. Brucellosis at Herculaneum (79 AD) *International Journal of Osteology* 1999, Volume 9, Issue 5, pages 277–288. John Wiley & Sons, Ltd., 1991-2014, Online ISSN: 1099-1212.

[12] CAPASSO L. Infectious diseases and eating habits at Herculaneum (1st century AD, Southern Italy) *International Journal of Osteology* 2007, Volume 17, Issue 4, pages 327–436. John Wiley & Sons, Ltd., 1991-2014, Online ISSN: 1099-1212.

[13] CAPASSO L. Bacteria in two-millennia-old cheese, and related epizoonoses in Roman populations, *The Journal of infection*. 2002 Aug; 45(2); pages 122-7. PubMed: 12217720.

[14] D'ANASTASIO R., CAPASSO L. Microbiological food contamination and status of health at Herculaneum (1st century AD, Southern Italy). *European Journal of Inflammation*, 2007, vol. 5, no.3, Biolife s.a.s., Silvi Marina (TE) ISSN: 1721-727

[15] CAPASSO L. *I fuggiaschi di Ercolano. Paleobiologia delle vittime dell'eruzione vesuviana del 79 d.C*. Roma, L'Erma di Bretschneider, 2001.ISBN/ISSN 88-8265-141-X.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Traditional building technique of military architecture in Veracruz, Mexico and Cartagena de Indias, Colombia for conservation

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Abstract
Military architecture is a cultural heritage that emerged and developed between the sixteenth and nineteenth centuries, with economic - commercial purpose, in a place that was known as the New World. The fortifications had the role of ensuring the stability of colonial trade and protect malls port smuggling, privateering and piracy, which is exercised through the sea.
During this period many fortifications, military representative of classical modern architecture were built. Permanent bastioned fortresses were the most relevant. Their building codes reflect the principles of the Italian Renaissance, dominating the ideal of perfection, the perfect and shapely traces, geometric, harmonic, balanced, monumental and functional.
These forts functioned as main bastions of cities , which are communicated interact with other complementary works as military strongholds , coastal batteries and campaign platforms , towers , ramparts , trenches and magazines , establishing a maritime defense system and campaign .
This culminated in military device walls of earth and sea, which became commercial cities in solid strongholds.
In this paper the original technique for processing old for the conservation and restoration of the fortifications of San Juan de Ulúa in Veracruz, Mexico and San Fernando de Bocachica in Cartagena de Indias, Colombia supplies were investigated. The analysis of the materials used in its construction, has the purpose to determine its composition. Considering the problems presented landmarks , just point out the results of the analyzes carried out by the analytical techniques of X-ray diffraction and scanning electron microscopy , experienced the stone material used in construction , give us important information propose specific treatments for preservation.

Keywords: Restoration, Conservation, Architecture, Fortifications, materials.

1. Introduction
Scientific studies currently occupy an important role in the field of conservation and restoration of cultural heritage historic role. The monuments of military architecture of defense, built with coral stone, so far not been studied scientifically in order to achieve good conservation and restoration. This research tries to solve the problems presented building materials from the Fortress of San Juan de Ulúa in Veracruz, México and Fort San Fernando de Bocachica, in Cartagena de Indias, Colombia, considered as one of the most important fortifications of México, Colombia and the Caribbean, as well as the most renowned throughout the history of the Americas.
The analytical study of the materials used in construction, has the purpose to determine its processing technique and state of disrepair.
Referencing the problems presented landmarks and the results of the analyzes carried out by the analytical techniques of X-ray diffraction and scanning electron microscopy performed on stone materials used in construction , a treatment for preservation and restoration is proposed.

2. Historical Background

2.1 Fortress of San Juan de Ulúa, Veracruz, México

The fortress of San Juan de Ulúa is one of the most important and renowned throughout the history of the Americas. It is a colonial fortification that still exists in the Caribbean route, where many important events took place. It was built on an island off the port of Veracruz, is the only official port of the Viceroyalty of New Spain, and has been linked to the lives of our people very significantly, not only in the historical aspect but also in the economic and cultural. The place was built the fortress was the initial starting point for the conquest of the American Continental, from the start of construction of the tower and the wall of the Rings where the loading and unloading of the Spanish fleet was made from XVI century, became the key link in the system of ports and defenses of trade and navigation.

San Juan de Ulúa, Veracruz is a commercial port on the Gulf of México with transcendent and certain historical and cultural characteristics. Here he made his entrance Hernán Cortés and his men in 1519 , when the founding of Veracruz is commemorated. This place , then inhospitable and surrounded by a blanket of reefs, was not a suitable site for the conqueror of the Aztec empire , which, after a few days , he moved a few miles further north and settled in the coast in the Quiahuixtlan area, in a place called the Villa Rica de la Veracruz. In 1525, they move a little further south, along the river Huitzilapan, place known as La Antigua, until finally returning to the Sales Buitrón near its original settlement in 1600.

Meanwhile, during the sixteenth century, the island of San Juan de Ulúa, did not lose any time function and port must scale commercial fleet, because the surrounding coasts of Veracruz, riddled with reefs precluded parking ships. For these reasons, the historical significance of the fort that was built on the islet of San Juan de Ulúa is founded to have the dual function of defense and commercial port. Furthermore, because San Juan de Ulúa was the door European immigration in México, the only official port to enter the country, instead of crossing the inter-oceanic navigation between Europe, Asia and Africa, the key trade the Viceroyalty of New Spain and the first bastion of defense of Mexico.

Here the mineral wealth which was looted in Mexico, such as gold and silver, precious stones, richly decorated sumptuous objects deposited. In the port of Acapulco came as species other rich goods, silks and other sophisticated shipments from the Philippines and the Far East.

If there is a fortified work of the Mexican nation that symbolizes the Spanish colonial history and respond to the principles governing the American military architecture , is the castle of San Juan de Ulúa, name adopted by the island where he was raised. How much historical and cartographic wealth bequeathed to the country that dynamic relationship Veracruz -San Juan de Ulúa site intercontinental transit trade.

The castle of San Juan de Ulúa has all the attributes that identify the classic modern fortifications that arise from the sixteenth century. Its trace bastioned is one of its great aesthetic, where the elegance of its lines, shapes and structure predominates. Represent the permanent fortification bastion that was expression in stage reached the apogee of Italian Renaissance scientific level, which dominated the balanced composition, provided modern and functional defensive elements. Its geometric design consists of an irregular rectangle, each element, like curtains, are in proportion with its bastions and all are organically prepared to defend against pirates, pirates and smugglers who came to the city of Veracruz and the islet of San Juan de Ulúa.

This castle represents the complex constructive evolution of Spanish military architecture whose development responded to the scientific and technical artillery and military strategy developments. The Old Tower, with the Wall of Hoops, where moored boats coming into port and ground with the gentleman at the other end, are an image of the XVI century. These first defensive structures are promoted by the Viceroy Antonio de Mendoza, by General Cristobal de Eraso and finally Bautista Antonelli, an Italian military engineer, creator of the first defense system in the region. Later these works are replaced by a curtain and the defenses of San Pedro and San Crispino, with two towers crowning each of these defenses, buildings that are conducted between the XVII and XVIII century. There are still vestiges of the old tower and wall of the Rings embedded within the bastion of San Pedro.

In the seventeenth century the building Ulúa curtains and bastions mean is closed, rectangular adopting it still retains. In this long period the figures of military engineers and Jaime Adrian Boot Franck, together with the works of Ulúa, performed works and projects in the city of Veracruz. In the following century was expanded in stages, undergoing a process of modernization. The bastions means located at the four corners are replaced by the above defenses of San Pedro, San Crispin, Santiago and Soledad. In the second half of the eighteenth century the gap widens and double revellín of San Jose and the two lateral lunettes called Santa Caterina and Our Lady of Pilar and glacis standing. These works are due to other prestigious military engineers in America as Augustine Crame, Felix Prosperi, Manuel de Santiesteban and Miguel del Corral.

Even batteries are being built in the area barbeta glacis appearing as a witness in a plane National Corps dated 1850.

Ulúa works required a high level of expertise : military engineer, was gradually modernized the fort along with its drainage system , so important to supply a good complement of officers and soldiers of a

long siege and to protect the building moisture, the master mason, styled Mucara and coral stone, " taken from the reefs of the Veracruz coast, island of Sacrifices and other nearby locations," to lift the solid walls of the fortress and the works of advanced through the ashlar construction system, the carpenter, who ran with his manual dexterity huge Spanish bill gates , the drawbridges and fixed bridges, important from the practical and tactical point of view to defend the approaches to the fort, the blacksmith, who worked heavy wrought iron balustrades openings in the vaults, where they used to be placed bunkers, cells, stores of food, supplies and ammunition , troop dormitories, officers, and rakes, which protected the over the side entrances, the mason, whose expertise in the preparation of materials of construction, solidly up the walls, which are the fundamental obstacles to defend a fortress besieged and attacked by the enemy.

Along with this variety of master craftsmen, a heterogeneous workforce consisted of slaves, wage laborers, prisoners of war and civilians of different nationalities and social strata and free blacks or slaves adds.

The castle of San Juan de Ulúa was the backbone of a defensive big project. What's coastline north had placed strong house built by Cortés in Villa Rica, a battery in La Antigua, south, other batteries Island Sacrifices, Mocambo, Anton Lizardo and Alvarado. Another system was projected to the campaign, called Caminos Reales: from Ulúa and Veracruz, journeyed all goods coming and going to the City of México. These originally prehispanic roads were designed with sales, inns and fortifications for the protection of this lane.

In the nineteenth century the castle and barrack adopts a repressive character with independence struggles and foreign invasions. In 1810 Mexico achieved its independence. In 1838, during “the Pastry War”, there are clashes with French troops, in 1846 against U.S. intervention and between 1861 and 1862, faced again with the Spanish, French and English troops.

During the nineteenth century , precisely in 1858, President Benito Juarez , takes refuge in Ulúa and established his government for three years and in 1864 landed at Ulúa Maximilian of Habsburg and his wife to act as Emperor of México on behalf of Napoleon III of France.

The twentieth century it became is symbol of national identity. In 1915, Venustiano Carranza, president, presidio function eliminates the Ulúa fortress there and set the presidential residence and the following year was delivered to the Ministry of War and Navy and becomes the National Arsenal.

In 1961 he recognized their historical and cultural character and declares Colonial Historic Monument by Presidential Decree and is given to the National Institute of Anthropology and History for safekeeping. In 1994 the Special Support Fund for San Juan de Ulúa comprehensive rescue of this monumental work is created.

Port activities developed from the early twentieth century have distorted the essence of the property because they have absorbed the castle. That historic image of Veracruz -San Juan de Ulúa (See photo 1 and 2) has been replaced in the last century by a movement of huge cargo ships, the city has gained ground towards the sea and the island joins the city by a stone tab. Huge areas are occupied by cranes and countless containers. Degradation and pollution are threatening to place a monument to which the first conquerors arrived and where the end of the rule of Spain in the Mexican territory was defined. This is a heritage that brings the story of a colonial system and constructive language conveys a representative of an era, of a nation and of a vast region.



Photo 1: San Juan de Ulúa today



Photo 2: San Juan de Ulúa undermined by the port

2.2 Fort San Fernando de Bocachica, Cartagena de Indias, Colombia

The complex Cartagena Bay allows a peculiar defense system input channels Bocagrande the anchorage and the small inner bay, from 1642, to close the first channel, came into operation on Bocachica. Bocagrande input is protected with strong Matthias (1587), a square, and the platform Santángel (1617), the anchorage with the strengths of Santa Cruz (1610), also a square plan, and of Manzanillo and Manga (1631), the channel Bocachica fights with St. Louis (1647) and the campaign is protected with the Castle of San Felipe de Barajas (1656).

In Cartagena de Indias stands the castle of San Felipe de Barajas (XVII) of triangular plan , the restoration project is developed by Augustine Crame , engineer takes hard work during this period in the Caribbean: the castle is reinforced by multiple batteries side , pockets a hornabeque and a large underground mine and countermine system . The batteries in Cartagena are substantial: in Tierra Bomba the rise of Santiago, San Felipe and Chamba, on the side Bocachica Bay, the San Fernando (1753), San Jose and Santa Barbara and the Cerro del Horno, the San Rafael Angel. The Half Moon Battery (1730), the San Antonio revellín (1754) and San Sebastián del Pastelillo (1778) are the key works that complement the great defensive system; including highlights Arevalo hits late XVIII.

The role of the Fort as a cornerstone in the defense strategy of the Bay of Cartagena is the second half of the eighteenth century; its constructive evolution and other technical aspects are within the historical context of Cartagena.

The Viceroy Don José Pizarro director's custom engineers Juan Bautista and Evan Mac Don Ignacio Chamber, made the defense plan for Bocachica, inspected the canal banks and the two engineers in the company of Viceroy.

In its draft Mac Evan proposes to build battery Bocachica San Jose in a neighboring Baru Island and Fort of San Fernando on the beach Tierrabomba Strait island, about three hundred meters southeast of the old San Luis . Gov. Chamber accepts the idea of San José but as a combination of strong - bay, using the fort itself the remains of the fortification built by Juan de Herrera and Sotomayor thirty-five years ago and devastated by Vernon. There proposes artillery vaults and the gunpowder store for booking the adjoining island platform at the water for twenty guns.

The radical differences in the two engineers are presented in terms of the function and location of San Fernando. Mac Evan proposes a strong pass over the channel cross ring with San Jose from the vaults of a semicircular shade and protection for the front of the land of two mighty bastions, a moat and countermine gallery . This land expected reinforcement prevent San Fernando was rendered by troops landed in Tierrabomba, as had happened twice its predecessor the San Luis.

The governor is opposed to this project and its proposed San Fernando (name paying homage to both engineers reigning monarch Fernando VI) on top of the hills behind the village Bocachica. According to him, Evan Mac site was unhealthy and weak and exposed to strong ground attack and to be disarmed by an intense naval bombardment. The channel is able to defend with San Jose and Santa Barbara. You're San Fernando on the hills and out of reach of enemy ships was the complement to prevent the landing and occupation of the West Tierrabomba beaches, where British and French had set up camps of the importance of defense.

The Board of Fortifications and Defense of India dismissed the objections of the governor and Board in July 1752 ordered the construction of San Fernando along line of Mac Evan who could not enjoy this victory. He had died in April 1751 according to some anger and spite by humiliations.

As for the governor, the Viceroy not forgive delays that for almost two years (1749 -51) resists definitive to submit his defense plan Bocachca orders. It's up to begin construction of the Project was criticized, but has at the same time his resignation. A few months later he was appointed successor to time to inform you that "his Majesty very pleased with the zeal and love which your Excellency has served".

The fort of San Fernando in 1759 finish what Don Antonio de Arevalo, but with significant changes proposed by the new chief engineer Don Lorenzo Solis , partly to correct their weakness from the ground by the domination of the neighboring hills , the height was increased curtains and bastions. Arévalo complete works later adding two side booster batteries: Santiago to erase the northern glacis and San Juan Francisco de Regis, recently reconstructed from witnesses found.

The time came to do justice to confirm the correctness of the concepts of Don Ignacio Sala.

Strong Bocachica remain intact and survive as sentinels of the past and monuments to the military engineers who dedicated their lives to the defense of the empire (See photo 3 and 4).



Photo 3: San Fernando de Bocachica



Photo 4: San Fernando indoor Bocachica

3. Materials

3.1 Coral Stone San Juan de Ulua

Once the representative samples of coral stones as part of the construction of the fortress of San Juan de Ulua (foundation and architectural structure) and which will be used for restoration, coral species are Colpophyllia natans (photo 5), Porites asteoides (photo 6), Montastrea annularis (photo 7), Siderastrea radians (photo 8), Montastrea cavernosa (photo 9), and Diploria sp. (photo 10).



Photo 5: Colpophyllia natans



Photo 6: Porites asteoides



Photo 7: Montastrea Annularis



Photo 8: Siderastrea radians



Photo 9: Montastrea cavernosa



Photo 10: Diploria sp

3.2 Coral Stone San Fernando

The samples were taken in the walls of the fort where we observe similarity with some species of San Juan de Ulua as: Porites asteroids (photo 11), Diploria sp (photo 12) Montastrea annularis (photo 13)



Photo 11: Porites asteroids



Photo 12: Diploria sp



Photo 13: Montastrea annularis

4. Methods

The methodology for the analytical study of building materials (limestone, mortar and flattened) Memorial, was the analysis by X-ray diffraction, scanning electron microscopy. The study of scanning electron microscopy (SEM), also allowed us to ratify the results of the mineralogical characterization, observe the three-dimensional microtexture of corals, as well as the morphology of the constituent mineral phases, the structure of the porous system, precise chemical composition in different parts of the samples, and their transformations in the process of alteration. The corals were observed at different magnifications from 5,000 x, 2.000x, 1000x, 500x, 200x, 50x and 20x.

In the photo 14, image taken at 2,000 magnification, where we can observe the calcite crystals and skeletons of marine organisms within the coral.



Photo 14: Coral Colpophyllia natans, observed in scanning electron microscope (San Juan de Ulua, Mexico)

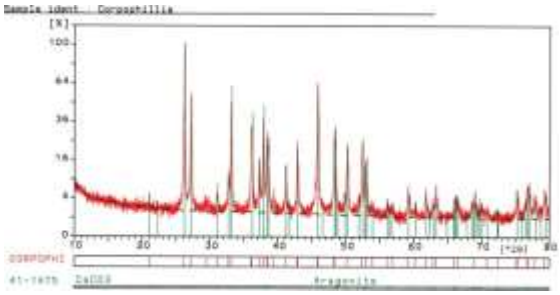

Fig 1: DRX coral species Colpophyllia natans (San Juan de Ulua, Mexico)

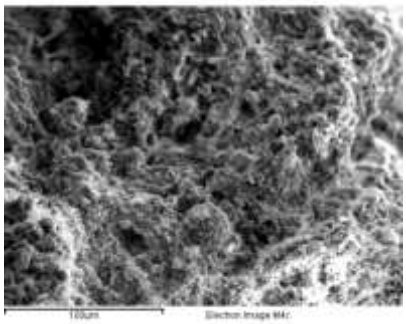

Photo 14: Coral Colpophyllia natans, observed in scanning electron microscope (San Fernando de Bocachica, Colombia)

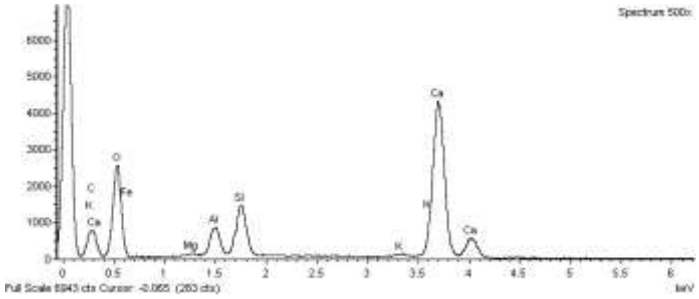

Fig. 2: DRX coral species Colpophyllia natans (San Fernando de Bocachica, Colombia)

In the test carried out by the technique of X-ray diffraction, it was observed that it corals are mainly formed of crystals of Aragonite and Calcite and mixture thereof.
In Figure 1 and 2. We note one practiced by XRD spectra of the sample of coral Colpophyllia natans analysis consists of Aragonite.

5. Results and discussion

In mortars with which Muca stones stuck it can be observed that are composed of lime, sand and conchiferous materials (pieces of soft coral shells, etc.) Or is calcite, aragonite and quartz. The percentage of calcite and aragonite is smaller than that of quartz. As for their planed or coatings are composed of lime, sand and shelly material (pieces of soft coral shells, etc., which were ground to achieve a fine texture to apply), or aragonite calcite and quartz. The percentage of calcite and aragonite is greater than that of quartz.
Regarding the study of Scanning Electron Microscopy (SEM) , also allowed us to ratify the results of the mineralogical characterization, observe the three-dimensional microtexture coral stone mortars and coatings, as well as the morphology of the mineral phases constituents, the structure of the porous system, timely chemical composition in different parts of the samples, and their transformations in the process of alteration.
In the spectra of X-ray microanalysis, we saw his spot composition, in this case the presence of calcium carbonate coral and mortar or coating flattened and noting also the presence of silica in the sand of the sea

6. Conclusions

Regarding conditions observe corals, which are part of the foundation of the buildings even though degradations suffered by water pollution are less impaired, and those who are part of the walls have greater impairment San Juan de Ulua, in San Fernando are in better condition because the species is more prevalent coral Porites Corpophyllia natan asteoides that according to the analyzes performed and the results obtained are able to investigate the manufacturing technique and based on the above the results we were able to prepare a mortar coatings to recover lost time and avoid the coral suffer further degradation.
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Bibliographical References

Zapatero, Juan Manuel. 1978. Fortifications Bastioned in America. San Juan, Puerto Rico. Puerto Rican Institute of Culture.

Calderon Quijano, Jose Antonio. 1984. History of the Fortifications of New Spain. Madrid, Spain. Superior Council of Scientific Research in Madrid.
Blanes, and Tamara Herrera, Pedro A. 1985. "The Spanish fortifications in the Caribbean and the Gulf of Mexico in the sixteenth century 'typological study in the journal National Library Jose Marti no. 3. Havana, Cuba. Pp 123-149.
Technical report. 1994. "The corals escleractinos the fortress of San Juan de Ulua, Veracruz." General Directorate of Naval Oceanography Research Institute of Oceanography of the Gulf of Mexico. Department of Biological and Chemical Oceanography. Veracruz, Mexico.
Pineda Campos, Dolores. 1998. First International Forum UNESCO workshop "Project Restore the fortress of San Juan de Ulua." Spain. Polytechnic University of Valencia, ISBN. 84-7721-921-4.

Dolores Campos Pineda. 2003. Second International Workshop Fortifications "Investigation of Fort San Fernando de Bocachica: An integral vision" Spain. Polytechnic University of Valencia, ISBN. 84-9705-350-8.

Pineda Campos, Dolores. 2005. Research of coral materials used in the construction and restoration of the Fortress of San Juan de Ulua, Veracruz, Mexico, for their conservation. Spain. Polytechnic University of Valencia, ISBN. 84-9705-921-2.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII
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From Antiquity to the Present

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Abstract
The re-use of a historical building is a challenge that an architect has to deal with a respectful and non-invasive way. Leave a monument unused means let him die; on the contrary, ensure it a new functionality means ensure it a new life. The flow through the ancient walls a modern lifeblood.
Today we try to achieve with minimal intervention, the best results for the historical buildings.
This is done to preserve the identity of the building: the deed must ensure some degree of reversibility and variations to the theme.
Writer Calvino proposes as solutions to “the hell where we live every day, that we form by being together" two ways to not suffer from this: “The first is easy to most of the people: accept the hell and become part of it to the point no longer see it. The second is unsafe and requires attention and continuous learning: endeavor to recognize who and what in to the hell, is not hell, and making it last and giving it space”.
Today's solutions to "preserve" actualizing the historical and architectural heritage are minimal intervention, sustainability, modern reinterpretation of the old technology, enjoyment that is the lifeblood of any space, and finally maintenance.
The trend is therefore, as Calvino wrote, to "groped to give an order to the chaos of reality."
Projects that would like to introduce at this Conference are the new UNICEF Headquarters in Italy which will be hosted by the “Hospital of the Innocents” in Florence and another one in Bari, Apulia, a proposal for the reconversion of a building of 1844 into an Art and Crafts Museum.

Keywords: Restoration, Conservation, Protection, Technology, Sustainability

1. Introduction to the subjects of the conference
The idea of this group of research and planning for the conservation and enhancement of a historic building aims to guarantee him a life every day. We often tend to transform the historical buildings in cultural containers, but just as often it means giving life only for the first year or only in case of special events. We should instead try to bring together a constant function and usable every day with different cultural events, temporary or not.
The re-use of a historic building is an issue that an architect has to deal with in a respectful and non-invasive way. Leave a monument unused means let him die, and grant him a new feature means grant him a new life.
Today we try to obtain, with minimal intervention, the best result in the historical built environment. This is in order to safeguard the identity of the building itself: the intervention must ensure some degree of reversibility and variations to the theme over time to adapt to changing needs.
Heritage management is today a very complex operation because Italy is a place full of historic buildings and archaeological sites. The historical buildings and archaeological sites today are suffering from poor maintenance and are in a particular state of decay, which sometimes turns into a real abandonment, because for many decades the management policy was not working for a well common but for the exploitation, intended as a simple filling of functions of these sites.

We are today the conservatives of a glorious past and for this reason it is essential to grasp the intrinsic potential, as well as the vocation of heritage "suggests". On the contrary exploit the wealth has meant in terms of historical, aesthetic, distribution, and use of plant materials, a task not fair to pass on the benefit to future generations.
The programming of the restoration work today follows tools that are not always suitable to the actual operations necessary for the preservation. The restoration project must take into account all the possible variables of accomplishment - architectural, structural, plant - identifying objective solutions, especially suggested by a careful historical research, in order to fit a success of the work.
In Italy often happens that the different phases, from feasibility study, the various phases of the project, well as the project management, are followed by different figures. Like an actor in a theatre, that has to empathize with the character to be able to climb on stage and be that character himself, he needs a deep study and analysis of the one who is going to represent, also the restoration project should not be separated from the phase of historical study to the realization. Only in this way the design team, having identified with the historical building on which it operates, will be able to deal in an objective and respectful of the restoration project .
The importance of a project will be followed by the same design team for the entire procedure is for the benefit of sustainability, which should not be understood only as energy savings, but also sustainability of the timing of planning and execution, and therefore costs. Instead, the procedures often have a very long time to the detriment of historical building that instead requires urgent action in real time, but with full knowledge of the story.
Moreover, the choice of eco-friendly materials, or how the site needs to be organized, are elements that contribute to the development of the project idea. Locate the nearest quarry, the workers and the local techniques can be a major asset in the success of the work, as well as facilitating the local economy , sustainability also means putting a limit on the range of procurement of materials.
Finally, you may not think that the restoration of a historical building will finishes on the day of closing of the yard: this intervention continues to exist through a "sustainable" and planned maintenance to be carried out in the years to come.
Only then can the restoration project can be considered a " work performed in a workmanlike manner".

1.2 Areas of development

The restoration and refurbishment project experiences that are presented in this article want to explicate the methods of this group of research and design to approach the issues mentioned above.
The different professional experiences, even in academia, including Italy, Spain and America, have expanded the knowledge to work in particular on two very important projects.
The first is the restoration and refunctionalization as the Arts and Crafts Territory Museum of the Pontrelli's mansion in Triggiano, in the province of Bari. The work has been developed within the School of Specialization in Architectural Heritage and Landscape for the study and restoration of Monuments of the University of Rome "SAPIENZA". Today the building is used as a town hall and the municipality itself has proposed the idea of creating a reality addressed to the delicate area of the arts, crafts and traditions. The current offices are partially relocated to the same building following modern standards of contemporary work and in compliance with the current legislation in the sector of Cultural Heritage. The others are located in the municipal area especially to improve the service to the citizen, who will also be the recipient and user of the new "historical center". This appears to be a pilot project since the different aspects of design and plant engineering solutions aimed at preserving as much as possible the historic building , as well as technological solutions have been identified in an objective manner in order to pass on the benefit to future generations. The different themes are to be mentioned here that in a handbook are potentially to be developed on a project by project basis, such as the project has been presented below .
The second project is the result of an international competition for the new functions of the historic east wing, the maternity wing, at the Hospital of the Innocents in Florence , which will be used as the new headquarters of UNICEF in Italy. In accordance with the Technical office of the Institute and the Administrative Board of UNICEF is presented in this conference the work in progress of the project which is under preliminary study. The design team is composed of the authors of this article for the intervention of the restoration of the building, the architectural and interior design and of the inner court. Also by the Technical Office Peroni, renowned studio in Rome that deals since decades with consolidation and structural improvement in the sector of Cultural Heritage and structural design, even complex of new buildings. And finally by the Company OpEngineering S.r.l. that is a very important design company that operates in Italy and abroad in the area of mechanical and electrical design.

2. Pontrelli Building in Triggiano (Bari)

The building is in the expansion area of Triggiano built during the nineteenth century, in Vittorio Veneto square, a village in the south-east of Bari. It's consists by two floors, the first of which with

barrel vaulted ceilings and the second with vaulted pavilion. Each area is approximately 900 square meters, and in the basement floor there are two cisterns for rainwater harvesting, now linked and expanded to host the archive. The lining of the basement of the main façade is made from *dolomia stone*, as well as cantonal rusticated ground floor and the window frames, that are decorated with the hammer at 16 teeth. The masonry is in so called *carparo tuff*. These two materials are very easy to find locally, in fact there are quarries, now disused, in the immediate neighborhood of the town. The front and both side elevations have lowered arch openings on the ground floor and on the same axis of windows and balconies on the first floor. The central part of the main façade is protruding from the side: the portal of white stone has a *prothyrum* with two Doric columns on *cymatium*, set against in two pilasters that deviate laterally. Due to the tight modulation of the surface of the facade, are created three spaces characterized by an impressive alternation of full and empty so that the surface appears to be excavated. Mapping some points on both corner facades has been detected a feature of the construction of the wall structure not otherwise perceptible: the masonry walls taper from the bottom upwards, as buttresses, in favor of the balance of the building. On the rear elevation are noticed some modification that have occurred over time: the demolition of a small building sitting there until the '70s and the subsequent completion of the front elevation, the opening of a series of square windows and the presence of plants on sight, have transformed the *facies originaria*, however, not preventing the reading. Crossing the molded arched door leads into the hall beyond which , when the palace was built, proceeding on the same axis, it came in a citrus grove now only partially visible. In the rooms to the right of the hallway, where originally there were stables and the *trappeto* with four mills, today there are rooms used for municipal offices. A monumental staircase, built with climbing vaults, is illuminated by a lantern that sits on the pavilion vault ceiling, leads to the first floor of the palace.

2.1 Historical background on the construction and cultural contex

The construction of Pontrelli's mansion is closely related to events that occurred from 1861 to 1867, the period of its construction, on land adjacent to the town walls. To the umpteenth epidemic that broke out in 1867, the City Council commissioned at the architect Nicola Capriati to draw up the construction project of the New Village Road and extramural planning similar to that of the architect Gimma for the new district of Bari called "*Murattiano*". This new area designed by Capriati was developed around the Central square: the lots planned were further divisible into for commercial reasons, but one had to be the designer who had to take care of the design of each lot on the front elevations. Annibale Pontrelli bought the seventh block in full and had a mansion built on two levels and a citrus grove behind. The Palace, for its monumentality, for the attention in the design and proportions, became the symbol, the image of the country which from that moment was not only based on agriculture but also open to commerce and industry. This is the birth of the new local bourgeoisie. These environments were considered the "saloon" of the city, were held here dances, concerts , and cultural and political meetings, in which take part the new bourgeoisie of Triggiano. Today these rooms host the town hall. In the '70s, when the restoration of the palace took place, the original tiled floors, now visible only through photographic sources were replaced with tiles grit. Another element that emphasizes the importance and the monumentality that the building wanted to express are the works of the iron railings, gate and "roste", a sign of the increased attention that lent itself to these arts, and therefore the presence of master experts in working iron. Although these elements bring to the architecture of Architect Castellucci near Bari and his circle of master: as the railings of the balconies on the first floor, are the railings of the mezzanine floor of the Palace of the Baron Ferrara, while the shapes of the fan they resemble those of the main door the fan they prelate of the Palace of Acquaviva near Bari, all buildings that belonged to the same architect. Since the beginning of the '900 the Pontrelli family is having to lease the ground floor and the first floor due to financial problems: the wing to the left atrium and the rooms upstairs are divided into housing, while the right wing atrium, since the fascist period, hosted the Imbriani Cinema, the first in Triggiano. Later the fascist youth movement and then the Bank of Naples have been using the building. In the 70s, following the acquisition of the Palace by the municipality, the historical Cinema stops working.

2.2 Guidelines for the restoration

The restoration of the Palace aims to continue the memory, of what this building has meant and means for the population. The project aims to preserve, research and respect, in the recovery project, the character and identity of the original architecture. Weed control, disinfection, cleaning, consolidation, filling and final glaze of the wall surfaces is the preventive intervention. The Palace is in a good state of preservation and degradation burden on surfaces is caused, for the most part, by the poor maintenance. On the basis of documentary sources and cameras, as well as the historical memory of the citizens, it was decided to remove the plaster from the rear elevation to restore the continuity of the technique of construction of the building: in fact the other three elevations appear to be without plaster, but in blocks of *carparo faccia-vista.* This choice is also supported by the state of conservation of the stone, on the facades where it is not plastered, there are no serious damage due

to exposition to winds and to weathering. Other interventions are those that provide for the closure of the openings improper dating back to the '70s, no longer functional for the architectural design presented below, the dismantling of the installation as machines for the air conditioning, water supply pipes and the replacement of descendants. The most affected part of the elevation after the intervention is the angle at the time of construction of the palace, which was leaning against a pre-existing building, demolished around '67 (date of purchase of the building by the municipality).
The idea of restoration of the rear elevation starts from wanting to create a continuity with the rules of symmetry and axial drawing of the building and which today are not relevant features anymore for this elevation. After the demolition of the pre-existence, there was a feeling of "unfinished" and disorder if compared with the study of the proportions of the other elevations: the opening of windows functional for the services and the impost of the vault of the old building do not let us perceive the elevation as completed, with a sharp contrast with the perfection given by the study of the geometry of the other elevations. From the compositional point of view, are reproduced the two bays missing, specular with respect to the center axis of the gate, so the facade passes from five bays to seven, as the main facade; also the new side scene will consist of a perforated metal sheet etched and copper mounted on a light metal structure (Fig.1): this choice reinterprets the feeling of richness of color and spatial surface of the stone reinterpreted in a modern key. The holes in the metal sheet are reminiscent of the vacuoles of the original stone, as well as the choice of copper as the coating material which refers to the color yellow/reddish of the *carparo* stone. From a functional/technical point of view - on the ground floor there are two service entrances to the interior: this is consistent with the project of renovation of the building in the Arts and Crafts Territory Museum. This building has a floor area of coverage lower than about 3.5 m where all the plants will be hosted and will be shielded from the new side scene. In addition, through the new functions and the renovation of all the systems that are external (for example radiant floor float) and therefore easier for maintenance, we tried not to interpose with the original structure of the building, making any intervention potentially reversible.



Fig. 1: Pontrelli Building, rear elevation, perforated metal sheet

2.3 Proposal for enhancement and refurbishment

The project includes a partial change of use of the building which in part will become the office of the Arts and Crafts Territorial Museum of Triggiano and in part will continue to host some municipal offices. This choice aims to make Pontrelli mansion a receptive center for the development of the country and it will catalyze the rediscovery of the past and the territory of Triggiano, it will reorganize the multiple sources of the story and highlight the findings, today not usable, that belong there. The project will be developed in various phases: the concept aims to expand over time switching from the Town Hall Museum: jobs are divided to solve the logistical problems of construction due to the transfer over time of some offices elsewhere. The first phase is the adjustment and improvement of the engineering part: to not interfere with the historic structure of the building, it will be installed on both levels a floating - radiant floor that allows the passage of new electrical installations, security and data connection. By the same principle of reversibility of the process, the possible detection of vertical shafts, was considered most suitable because of its dimensions contained in the plant, the location of a single shaft that uses the central well of the scale of the service, which also host the elevator, with the aim of optimizing the accessibility for the disabled people. This shaft is also made of perforated sheet metal etched and mounted on light metal structure, and will be possible to be inspected when needed. The choice of radiant floor heating is also aimed at improving the thermo hygrometric wellness, well as to save energy: the radiant floor operates at a temperature of about 35°C, a radiator is common to about 80 °/ 85 °. In addition, by heating a diffusing surface of the heat, given the breadth and the height of the rooms, there will be no cold spots, as is the case with existing radiators, which are a point source. The second phase involves the reorganization of the ground floor : the rooms to the left of the hallway with access from Vittorio Veneto square will be reallocated to the municipal

offices open to the public. The rooms to the right will instead be used as a bookshop, literary cafe, restaurant and will also set up a small conference room, which can temporarily host art exhibitions and cultural events. In the entrance hall are provided, for the host service, the wardrobe and a permanent exhibition, which continues in the basement, about local products. On the first floor will be set up the Arts and Crafts Territory Museum that is part of the third phase of renovation of the Palace. The rooms are characterized by structures made of iron and wood, prefabricated cubes, with interactive desk. This choice is motivated by the desire to create a layout that is completely detached from the structure of the building and for its vocation of reversibility. At first, these volumes will be the archives of the various offices and desk workstations. The next step is to prepare the real set: with minor modifications of these cubes, prepared from the outset, the volumes will host the showcases and interactive areas of the museum. Through screens and video will be narrated the evolution and history of the area. There will be exposed some archaeological remains, now deposited in the Church of Santa Maria Veteran but not accessible now. There will be interactive areas where will can learn better about the working tools of a tradition that must not be forgotten. Finally there will be rooms devoted to educational workshops for schools and youth clubs. The last step to complete the installation includes the installation of a suspended structure, secured with tie for points, on which will be mounted on the projectors and the basic lighting of the rooms. This element, which develops the idea of the reticular bean for theater (Fig.2), characterize the intervention of refunctionalization of the Palace, will bring visitors along the outside of the museum (Fig.3), and will also be a recognizable element and appeal because, in different points, will be part of the main façade too.

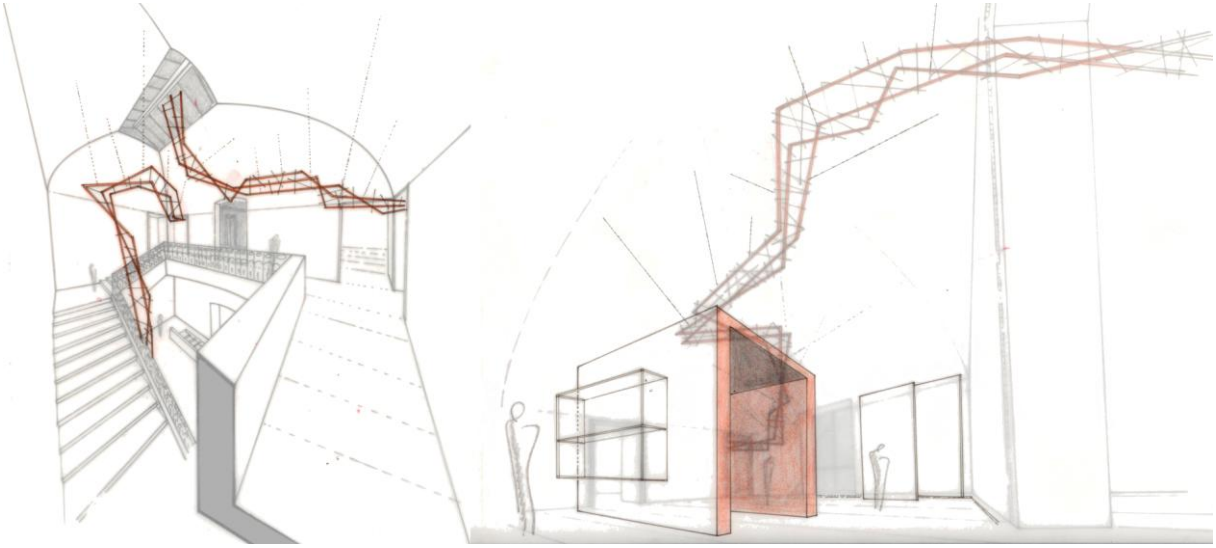

Fig. 2: Pontrelli Building, interiors, reticular bean for theater

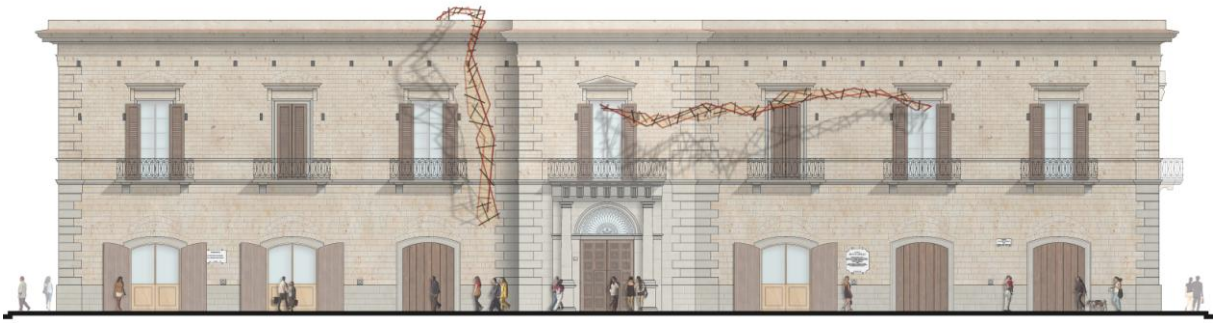

Fig. 3: Pontrelli Building, main elevation, reticular bean for theater

3. The new office of UNICEF in the Hospital of the Innocents

The construction of the monumental complex of the Hospital of the Innocents, which was the first orphanage in Europe, is launched in 1419. The initial project was by Filippo Brunelleschi and it represents one of the first works of Renaissance architecture.

From the sources the construction of the east wing that hosted the Maternity and which will become the new headquarters of UNICEF, between Fibbiai street and Alfani street, starts in the first half of the ‘500. In 1546 several houses were bought along Fibbiai street and belonging to the Monastery of the

Angels to "make places for nurses and other hospital stuff," while proceeding to the completion of the wing on Alfani street. In 1552 the Praetor Vincenzo Borghini builds a large lodge in the Garden of Women, which today is the courtyard towards Alfani street, and that was demolished in the late '800. At the same time the building on Alfani street was completed.
In the first half of '800 century, the building was expanded, incorporating the report to Fibbiai street that becomes a concrete foundation wall spine between the two perimeter load-bearing walls, one that already exists on the courtyard and the new one on Fibbiai street. In fact, the openings on the perimeter of the bearing wall from the courtyard are aligned with those of the central spine wall but not with those on the perimeter wall to Fibbiai street. In addition, the portals on the wall of the central spine are padded like those of the bearing wall on the court, but mirrored. Another intervention of the nineteenth-century is the realization of the monumental staircase with a square base with an internal courtyard lit by a skylight made on a wattle pavilion vault.
Between the '60s and '70s Guido Morozzi heads important restoration and renovation work in the entire complex, providing the former Maternity wing but not realizing the reopening of the drying rack on the top floor that had been hit by masonry walls towards the courtyard.
Until 2011 this wing hosted on the top floor some offices of the Province. For nearly two decades, the Foundling Hospital hosts a design institute and a school of fashion. In large dormitories that once housed the Maternity, offices, classrooms and hallways have taken place to meet the needs of these activities. The functional program and the use of unsuitable materials, such as gypsum board, mineral fiber tiles and linoleum, now hide to the user that walks inside the real importance of this building and its history.
A careful historical research in the archives of the Hospital of the Innocents, in the Headquarters of the Superintendence for Architectural Heritage, Landscape, Historical, Artistic and Ethno-anthropological Heritage at Pitti Palace and at the International Center of Studies of Architecture by Andrea Palladio, has reconstructed through documents and drawings the various transformations that the Maternity wing has undergone over time. This research has allowed us to know the life that was done in this wing of the complex, interpreting the spaces and listening to the inner vocation. These actions were necessary to define the concept of design for new activities that will be hosted.
The project team strongly believes that this refunctionalization project should be a significant sign of modernization and at the same time an example of a possible harmony between secular history and architecture of Florence and the needs of UNICEF, and a work environment completely contemporary..

2.1 Concept design for the new headquarters of UNICEF

We strongly believe that this work should be representative of the important work that UNICEF plays and of representation in the complex of the Innocents in the Florentine environment, national and international.
From an understanding of the work of UNICEF and its guidelines comes the concept of the project within the complex of the Innocents.

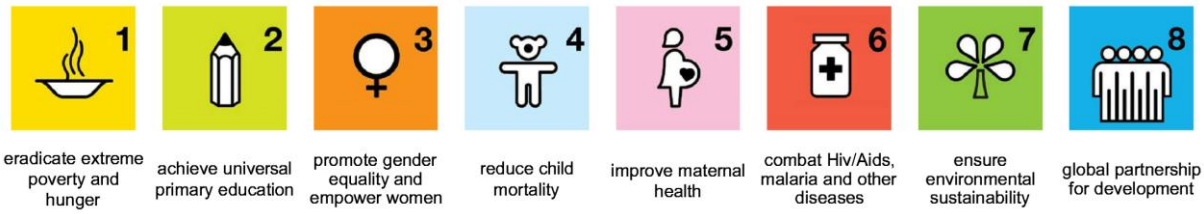

Fig. 4: UN General Assembly, 8 Millennium Development Goals.

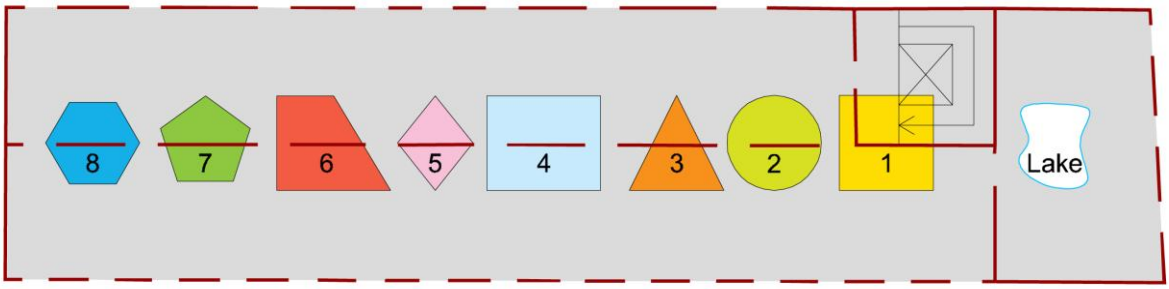

Fig. 5: the 8 Millennium Development Goals and the speech of Director General Anthony Lake represented as architectural elements.

UNICEF is a complex organism of connection and equalization of multiple realities. In September 2000, during the UN General Assembly, were enshrined the 8 Millennium Development Goals, which are ever more ambitious goals set by the International Community (Fig.4). On this occasion, the Director General of UNICEF's Anthony Lake, who is a supporter of the 8 Millennium Development Goals, gave a speech in support of the Millennium Declaration: "At Their heart, the Millennium Development Goals are about giving the world's most vulnerable children Their a better chance to reach full potential - Whether it's improving on maternal and child health Increasing gender parity in education, or Eradicating hunger. We've got a lot of urgent work ahead, leading up to, and beyond, the 2015 MDG targets we've set for ourselves. And I believe we can do it with political commitment, sound strategies, adequate investment and the engagement of a global community".
Transforming into architectural elements the eight Millennium Goals and the speech of the General Director Anthony Lake and inserting them in the building, the outcome is the planimetric layout (Fig.5) from which we started to organize various functions required by the client.
The functional planning *ante operam* has a type distribution as a comb shape with a central corridor and work environments that open on this. The individual cells do not facilitate the social and cultural exchange, as they constitute an individual space. The central path is bidirectional and it isn't illuminated by natural light, which makes them less attractive as a space of socialization (Fig.6, left).

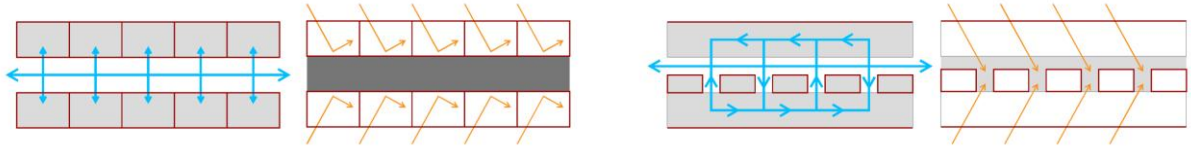

Fig. 6: individual cells, bidirectional distribution; open spaces, omni-directional path.

The new distribution of the project is in favor of socialization through an omni-directional path. The functional planning provides for the removal of internal partitions to form the open spaces that facilitate the life and work of the group. The open space evoke the spatiality of the past Hospital of the Innocents, the Maternity wing, who wants to return to live in a contemporary way. The service areas are organized within the 8 functional volumes, which represent the 8 Millennium Development Goals, and grow along the wall of the central spine. The alternation of full and empty spaces of the functional volumes along the central spine facilitates the distribution of natural light, open spaces and connective not have physical boundaries and therefore are optimal for the lighting of the central areas of meeting and report (Fig.6, right). Natural lighting also comes from above: there are skylights on the flap toward the interior elevation of the court which open at the empty space between the volume and the other. In addition, the floor of the second level is made of glass in correspondence with skylights to let in natural light coming from above to penetrate even the first floor. Finally, the skylights will open with electronic control. Speaking of sustainability an improvement of the building envelope will be made through the replacement of fixtures with new ones in accordance with current regulations and equal geometry: but also the optimization of the lighting and natural ventilation are in favor of saving energy (Fig.7).

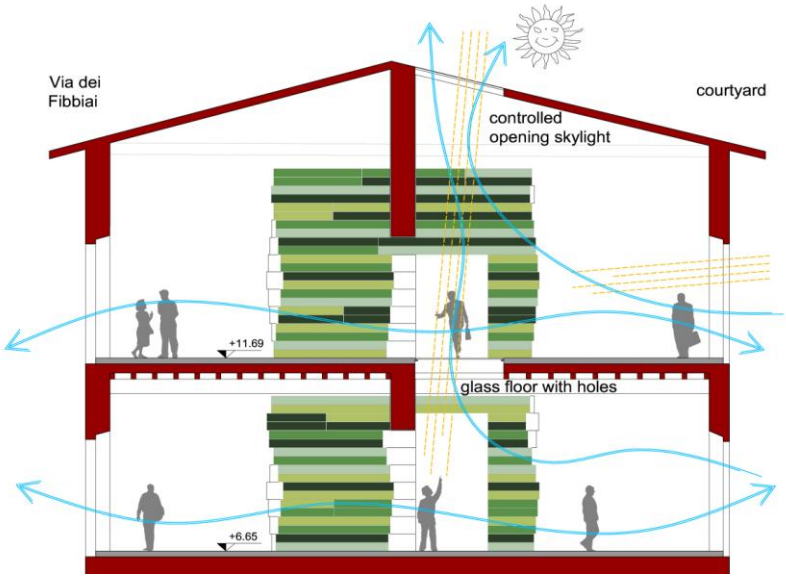

Fig. 7: section, lighting and natural ventilation; color of volumes functional.

The bearing walls A and B have the openings in axis as the wall B appears to be from the historical sources as the original front elevation. Only later was made the C wall with openings on Fibbiai street. These openings do not match those of the existing walls. The gaps of the volumes that represent the 8 Millennium Development Goals and speech of the General Director Anthony Lake of UNICEF seek alignment with the windows so that by accessing the central connective workspaces there is always an on-axis opening (Fig.8).

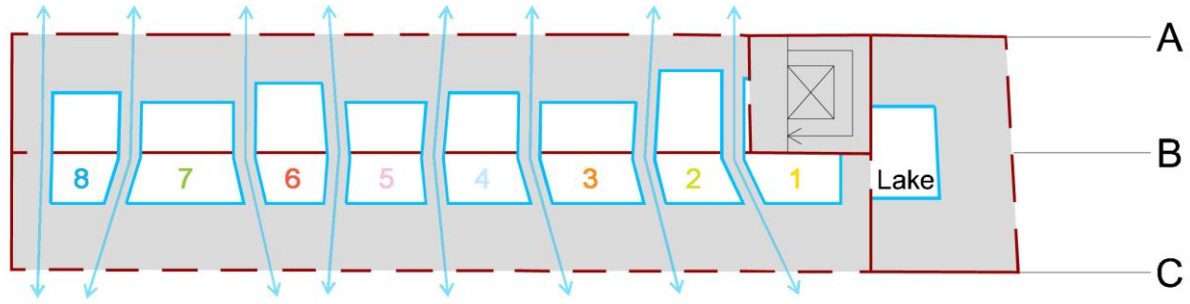

Fig. 8: structural walls; the gates of the volumes seek alignment with the windows.

Within the volumes are organized toilets (men, women and disabled), the scale and the lift of the connection between the first and second floors, the closets, equipment rooms and office machines, according to the Legislative Decree EIGHT1/200EIGHT seeks to limit and circumscribe the toxicity of emissions from laser printers and copiers (Fig.9).

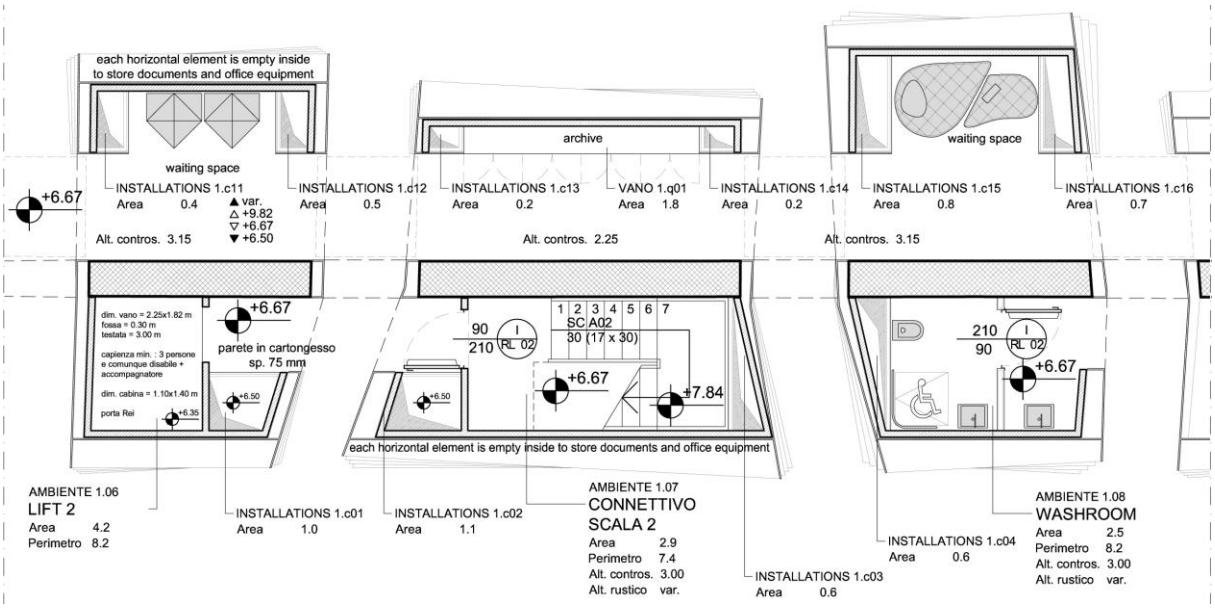

Fig. 9: functional volumes, toilets, the scale and the lift, the closets, equipment rooms and office machines, archives.

The volumes refined from the point of view of the relationship between form, function, structure and material, separated from each other and arranged in the large open space that recall the original spatial complex of Hospital of the Innocents, create a sort of unusual urban landscape, in which paths connecting the various functional areas "indoor and outdoor" space become users' communication. The overall effect is that of an organic randomness, which refers metaphorically to the image of a distant village where UNICEF operates, albeit in a completely modern way. The identity of each volume is given by the fact that they all have common variables and constants: constants are the use of various color tones and the rotation around its vertical axis; random variables are the use of shades of color, the angle of rotation and the function inserted internally.
The twist of the volumes, the splitting and the overlap of elements rotated between them along a vertical axis, generates an organic element which together with the other volumes appears to be a complex organism. That is also functional cause each horizontal element is empty inside to store

documents and office equipment: sliding ladders on rails anchored to the volumes allow a vertical archiving, thus create an archive widespread and not concentrated (Fig.10).



Fig. 10: open spaces and relational spaces and passage.

Concerning the internal distribution, the central spine appears to be a complex spinal column from which all the vital activities of UNICEF will radiate (Fig.11).



Fig. 11: particular skylight and passage.

In addition, the complex geometry of the volumes creates corrugated surfaces which improve the sound quality of teamwork in the large open space. Finally, along the space and connective report at each volume, will take place an artistic installations that recall, colors and slogan, The 8 Objectives and the speech of the Director General Mr. Lake.
In order to live with constant functions and usable every day with different cultural events, temporary or not, the open space can be divided with lightweight partitions and furniture. The open floor plan in this way can be used not only as offices, but also as a space for events, conferences and presentations, evenings charity. The functional volumes are transformed into the backdrop, due to the lighting project.
In the context of the regulatory choice of color for these functional volumes deserves particular attention in relation to the study of psychological reactions in relation to color. For this reason it appeals to a color code of safety applied and standardized by the International Commission of lighting and Organizations ISO and UNI: of particular importance to the standard ISO 6385 that requires the examination of the use of lighting and colors.
In holistic color therapy the green color is in the center between the cool and warm colors, thereby playing a balancing function. It 's the color of nature, the plant world and is a symbol of renewal, is associated with youth, adolescence, freshness, hope, optimism and new. It's neutral color, relaxing, encourages reflection and calm. It 's the color of the fourth chakra, Anahata: This Chakra is the wheel of energy of the heart and blood circulation. The key words of this Chakra are: friendship, love, companionship, public relations and interpersonal love and emotional links.
These are the fundamental concepts around which develops the design idea of this "special" work environment UNICEF which operates according to the principles of co-operation and humanitarian aid on a global scale in favor of the most vulnerable

.

2.2 Action of improvements on the building

The modern parameters by which this group intends to intervene, are the respect and appreciation of the historical memory of the context. In addition those of contemporary architecture in which there is sectorialisation of spaces, tasks, thus not facilitating the aggregation phenomenon, and finally the saving of energy and thermo-hygrometric wellness of the users, intervening where possible and in accordance with the current regulations and constraints, with integrated systems architecture and reversible. The flexibility of the space is the centerpiece of the proposal: at the various needs of users and for different functions, match the layout of the conformation space and the dynamism and versatility of UNICEF are concepts that are reflected in the Florence’s headquarter. Maximum functionality of the space requires solutions designed taking advantage of the available surface, so that nothing is random, although having possible variables conformations.
The wall spine is the centerpiece of the project and not only from the architectural point of view to displace the different functions at the service of open space. In fact, along the central bearing wall will develop the primary distribution of electrical, data connection and ventilation, concealed by the same functional volumes .
The proposal of the various plant systems is aimed at a significant reduction in energy consumption. We have tried to combine the energy saving performance and environmental comfort.
In addition, the design team has proposed the installation of the machines service of heating radiant floor/floating and cooling via pipelines, integrated architecture and, therefore, in accordance with the historical memory of the Foundling Hospital in a compartment built from scratch under the floor of the court. This facilitates their installation and therefore the maintenance, thus reducing the costs. In addition, the proposal aims to stop affecting machines with bulky and heavy on the supporting structures of the historic building. Finally, this solution is optimal because the ventilation plant room is from vents integrated in the new garden design. In this way, within the offices takes place the only distribution utilities, thus reducing the risk of emergency situations caused by equipment problems and in favor of the safety of the end users.
To restore the condition of the premises of the large dormitories of the Maternity wing, and therefore the historical memory, this involves the removal of ceilings to enhance and make visible the wooden beams, obtaining in this way the very high ceilings: for this it has been decided for the laying a built-in floor radiant and float, so as to ensure the thermal comfort of the users.
The radiant flooring system installed on a floating floor, which also allows the installation of other equipment such as electrical and data connection, ensures accessibility to facilities and the flexibility of the space, without sacrificing the unparalleled comfort of the under floor heating. The low thickness of the package makes the heating system, low-inertia, the time for making the scheme appears to be reduced compared to conventional floor systems. The dry laying directly on the existing floor greatly reduces the material produced is intended to landfill also allows you to install the system in a short time and therefore is cost effective.

Finally, in addition to the installation of skylights was planned to lay solar tubes that allow natural light to illuminate a room without windows. The solar tunnel, which will be installed in compliance with the regulations and constraints on the building looks on the outside with a flat windshield wire cover in order to improve the integration with the architecture in the historic centers.
The light tunnel can be installed in any room and can be considered as a source of light and ventilation alternative/supplementary to the windows. By placing a solar tunnel it not only improves the quality of light, replacing the artificial with the natural one, but you also save on electricity consumption, as during the day there are points of light like spotlights. The tubes can be extended up to 15 m: this allows their installation not only in areas directly under the roof, but also those located on the first floor. These will be installed in shafts within the functional volumes to light and allow air exchange services and all areas enclosed volumes, both on the second floor to the first.

4. Conclusions

We resume to points of the themes that have allowed us to develop the projects submitted. Summarizing:

- both projects are started with a thorough historical analysis;
- research and interpretation of the intrinsic vocation of the building;
- revival and enhancement of spaciousness is in coherence with the new use;
- sustainability of the work from the design phase to the construction site and maintenance;
- coexistence of constant functions and usable every day with different cultural events, temporary or not. This is also allowed by the versatility of the space.

The close relationship with the customer, that is, with UNICEF, allows us to tackle the project in all its aspects.
Already in the preliminary phase, all parties concur, Client, planners and funders, working in harmony and cooperation to find the best solutions.
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Bibliographical References

[1] ADDANTE, Pietro, *Cronache triggianesi: Triggiano e la terra di Bari dal 1900 al 1950,* Bari, Levante Editori, 1994

[2] BATTISTA, Pasquale, *Triggiano al tramonto del X secolo (sulle origini),* Bari, Levante Editori, 1983

[3] BATTISTA, Pasquale, *Triggiano dal Borgo Nuovo al Paese Liberty,* Bari, Levante Editori; 2005

[4] CHIEPPA, Cristiano*, Luigi Castellucci e l'architettura dell'800 in terra di Bari,* Fasano, Schepa, 2006

[5] ROPPO, Vincenzo, *Trivianum: memorie storiche di Triggiano,* Bari, Stabilimento Tipografico industriale del Giornale delle Puglie, 1924

[6] CHIERICI, Ugo, *Guida storico-artistica del r. Spedale degli Innocenti di Firenze,* Firenze, Tipografia Bandettini, 1926

[7] MOROZZI, Guido, *Ricerche sull'aspetto originale dello Spedale degli Innocenti di Firenze,* Roma, De Luca, 1964

[8] MOROZZI, PICCINI, Guido, Attilio, *Il restauro dello Spedale di Santa Maria degli Innocenti: 1966-1970,* Firenze, Giunti - G. Barbera, 1971

[9] MENDES, Atananzio M.C., *Nuove indagini sullo spedale degli Innocenti a Firenze,* Roma, De Luca, 1966

[10] SANDRI, Lucia, *Gli Innocenti e Firenze nei secoli: un ospedale, un archivio, una citta',* Firenze, SPES Studio per edizioni scelte, 1996

Thanksgivings

We would like to thank The Engineering Department of the Hospital of the Innocents and the Board of Directors of UNICEF who gave consent to report our work to this convention, which is in progress, the new headquarters of UNICEF Italy.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Crossing the river.
Urban design in Pompei and Scafati

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Abstract
The enhancement of rural-urban landscapes of the Sarno river plain involves the bands along the river and the arrangement of the banks and the riverfront . The paper deals with the architectural redesign of the bands on the river edges, in order to highlight the important places of settlement and cultural heritage in the areas of Pompei and Scafati . We present studies and projects developed within the PRIN research and the Laboratories of the Department of Architectural Design Architecture " Luigi Vanvitelli", focused on the relationship between the public spaces and the types of the Mediterranean productive garden. The solutions are studying river band's accommodations compatible with the periods of "floods" and thus able to reduce the risk of flooding . The interventions strategy along the river, in the southern expansion of modern Pompei, provides for the localization of an agro-fluvial park with river crossings to enhance cross-connections of the plain. In order to redevelop the central Scafati area close to the locks on the river, the aim is a new design on the mills island and the renovation of public buildings , with the inclusion of accommodation in public-private joint management . The overall area's redesign is completed by the new square's solution for the Villa Comunale entrance , with the location of an "urban center" and other public utilities .

Keywords: Urban design, extended city, productive housing, riverfront

The theorical basis of this work, starting from a national Prin research, are connected with the idea of the green extended city which could regenerate the periurban areas around the modern dense metropolis. The concept of the "city in extension", recalling a Samonà's theory, is aimed to create a *multi-polar* system, built up by small urban clusters made with residential-productive structures (integrated with public utilities) separated by rural areas and parks. The discontinuity of urban parts alternating with agricultural plots avoid that green and unbuilded areas among the detached cities will be satured with more buildings. The main goal is to reduce sprawl and soil waste designing new urban roles, giving order and functional improvement to the urbanized territory for an efficient alternative to the chaotic overlapping of rural and urban structures. The outcome of the project research could be named as some *agro-urban* settlements thought as elements of a wide discontinuous fragmented city.
The enhancement of urban and rural landscapes of the Sarno Plain needs new arrangements of ribbons and banks along the river and the redesign of the riverfront in the densely built areas. This paper deals on some issues of architectural renovation of the Sarno edges, considering them a necessary step to regenerate the important places of settlement and cultural heritage in the areas of Pompei and Scafati. In line with the *Prin* national research entitled "From urbanized countryside to the *extended city*" , which assigns an organizer role to the river Sarno in the design of the urbanized countryside (1) (2), I show several urban projects developed within the *Prin* research team and within the workshop of the Department of Architecture and Design " Luigi Vanvitelli ", aimed to improve the relations between the public spaces on the river, residential and productive developments and the types of the Mediterranean garden.
The thesis of this theoretical and design research is that the redevelopment of the river should play a leading role in the restructuring of urban centres and rural areas in the Vesuvian areas crossed by the Sarno river. The project themes are chosen to activate new relations between the two sides of the

river - to reunify both in visual and functional terms - improving their connections through the redesign of the infrastructure and of residential significant parts. In addition to the system of redevelopment along the banks of the river, we have studied urban and architectural projects able to give strength to several *cross ribbons* to Sarno, with the goal of improving the relationship between the river and its habitable contexts. In the most densely built-up lands, particularly in Pompeii and Scafati, you need to work through actions recovering old urban blocks, infilling in existing buildings and especially through redevelopment of the typological structures in close contact with the river and the secondary canals. In the areas where the river stream crosses the transversal infrastructures, the new earth modelling designs propose special “park arrangements” of the river banks to reduce the flooding risks.

In the area close Pompei centre, - the cross ribbon design is focused to a future agro-park running along the river, and creates a " pendulum " with two terminals: the north terminal is formed by the pole of the new green market and by urban house-gardens, and the south is formed by residences with greenhouses and utilities. The residential and productive core overlooks the agro-park on the river Sarno, which is solved by a system of house-gardens and small basins and canals, designed to contain any river flows. The narrow canals running through the southern end of the park are integrated in the design of green areas and homes with private gardens , which will also benefit from the practical and economic proximity to the new structure of the green market. .

In the core of Scafati, which is the main study-area of this work , the strategy of interventions crossing the river is realized through the creation of two opposite polarities. The first one consists in a residential cluster, with both agricultural and urban characters, formed by productive houses and a new primary school that would create a public space aggregating the population of the whole area.

This cluster is located on the transversal axis that connects the towns of Scafati and St. Anthony Abate, according to the appropriate zoning here provide the urbanistic plan of the area, where new homes with greenhouses integrate with the old renovation work. The residential unit is crossed by a secondary channel that participates in a general design of the tanks overflow in the private and in the public gardens . Master-plan studies provide different arrangements of houses and greenhouses, which can be realized in open or fenced lots.

The second pole is located on the Sarno river near Scafati town centre, and includes the system formed by the town park named “Villa comunale”, the old Town hall and a small island close the old "mills ". The architectural interest for the entire nucleus of the Town hall building stems from its wonderful location overlooking the river, a solution which highlights the old courtyard building that had been, in the previous age, the Meyer’s “palace”, the residence of industrial man active in the textile field of Sarno area. The current municipal gardens , which coincides with the private garden of Meyer palace, includes two old brick greenhouses and a pergola for walking along the river . Therefore, we wanted to plan solutions closely related to the high quality of these places. Therefore our architectural solutions are aimed to enhance the public nature of these sites and to consolidate their role as "primary elements" of the system crossing the river.

Whereas the logic of the papers presented invests the relationship between the historic core of Scafati and the river, a relation today in crisis as evidenced by the abandonment state of thethe main goals of urban plans. The indications of the PUC (that is the town urban plan) and of the Piano di Recupero (a Recovery plan) provide for the central area, called the Mills, the recovery and development of landscaping in connection with the exploitation of the river park .

The Scafati PUC proposes a complex intervention for urban regeneration of the heart of the city, characterized by a compact urban fabric (the neighborhood Glaziers and Mills), some areas of poor urban quality (formerly the Gaizo area), some disused structures (former tobacco factory) and degraded peripheral area of the city. The Integrated Program for the Sarno River, elaborated by the public Park Company, highlights the economic resources available and identifies the regional territory to be involved: the project aims to build up, through the enhancement of the environment of the river route and of the historical, cultural, archaeological heritage of the territory, creating a park in order to combat the phenomena of severe environmental degradation. Other projects on the same area are aimed to environmental restoration and rehabilitation of the river. The goal is to increase the tourists flows around the cultural and eco-environment actions and at the same time increase the level of employment in the area.

The sphere is constituted by the historic settlements connected to the central core consisting in the Mills area, the settlements close the central road -Corso Trieste- and situated between Via Roma and the river. This area still have an original urban texture nevertheless it has been altered by insertions and substitutions of recent buildings, inconsistent with the preexisting tissue .

In this context, the administration proposes a measure of recovery and redevelopment of the area with enhancement of the river park. In particular, the mills island along the river has wide potentiality for significant redevelopment and enhancement .... Specifically, we can implement program interventions “*More Europe”* associated with the rehabilitation of Zara central street and with the reconnection with the neighborhoods Mills- Glaziers-Mariconda. The plan suggest:

- Pedestrian viability and adjustment related to central street via Zara ;

- Reutilization of the ground floor on the Canal;
- Recovering and redevelopment of the old mills; ...

In particular, the old Mills area is expected a feasibility study for the creation of a pedestrian bridge connecting the house with the City and / or a connecting passage between the former conference small structure wellknown as “Venice Hall” and the space on the south side of the Town hall , which is proposed for a global redevelopment. Also planned is the rehabilitation of facades along the river Sarno connected with the arrangement of green landscape interesting areas and with the redevelopment of discovered public spaces located in the undeveloped areas. In this sphere are permitted the following uses:

- Residence, hotels and bb. / business accommodation / retail shops / equipment and public or private social services / offices and public facilities as restaurants, bars, meeting-conference rooms, and entertainment hall with a capacity not exceeding 150 persons.

These planning indications were proposed as the basic data of the work assigned to ph.d., undergraduates, students, requiring them also a critical revision to propose new applications for architecture .

For the north area which concerns the so-called island of the mills, the project program is the construction of a small public-private partnership housing, intended as a small residence integrated with utilities and receptive nucleus, forming the counterpart to the existing Venice Hall. This problem requires you to keep clean and to improve the existing garden and to redesign the front of the river. The compositional themes relate to the embankment wall as a practicable structure, the chance to create a boat dock, and an efficient integration between the house and accommodation utilities. For the south shore area of the Sarno , located between the Town hall and the “villa comunale” park, the municipality requires the demolition of the large volume of the school, built up in the Sixties. Our choice was to propose the creation of a new Urban Centre, as a public facility providing space to develope, discuss and expose proposals and studies for the Sarno and vesuvian territory. A system of public spaces, thus allowing a strong presence and participation of the population .

As urban theme this project involves the construction of a public place well related to the structure of the historic Town hall , and suggests a general redesign of the new entrance gates to the public gardens, rethinking and rebuilding a new river front.

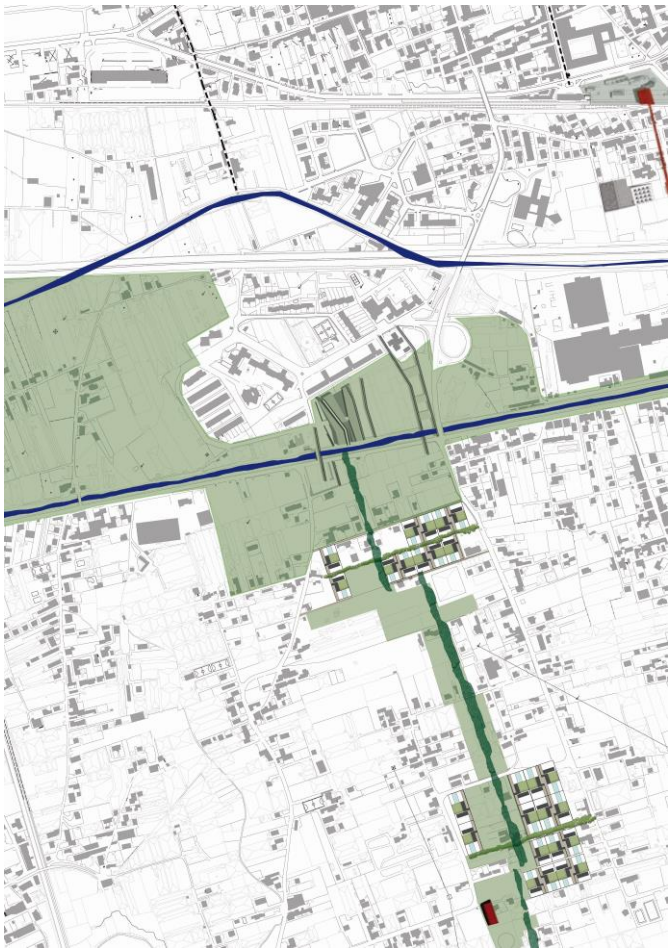

Fig. 1. Pompei cross axis: market and green cluster pole



Fig. 2. Scafati cross axis: green cluster pole



Fig. 3. Sarno-gate pole (Capasso-Filogamo-Gorga)

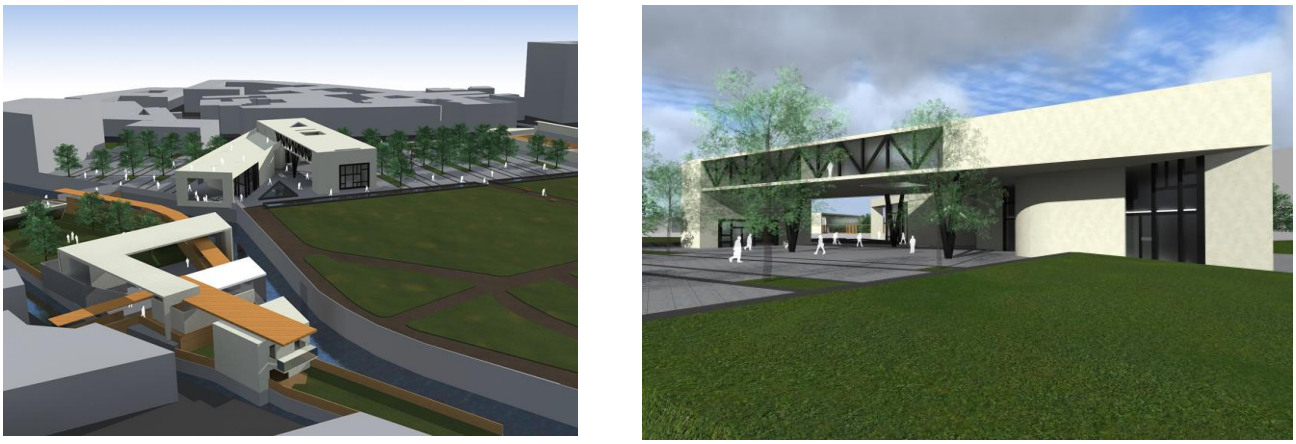

Fig. 4-5. Sarno miller island and library (Capasso-Filogamo-Gorga)

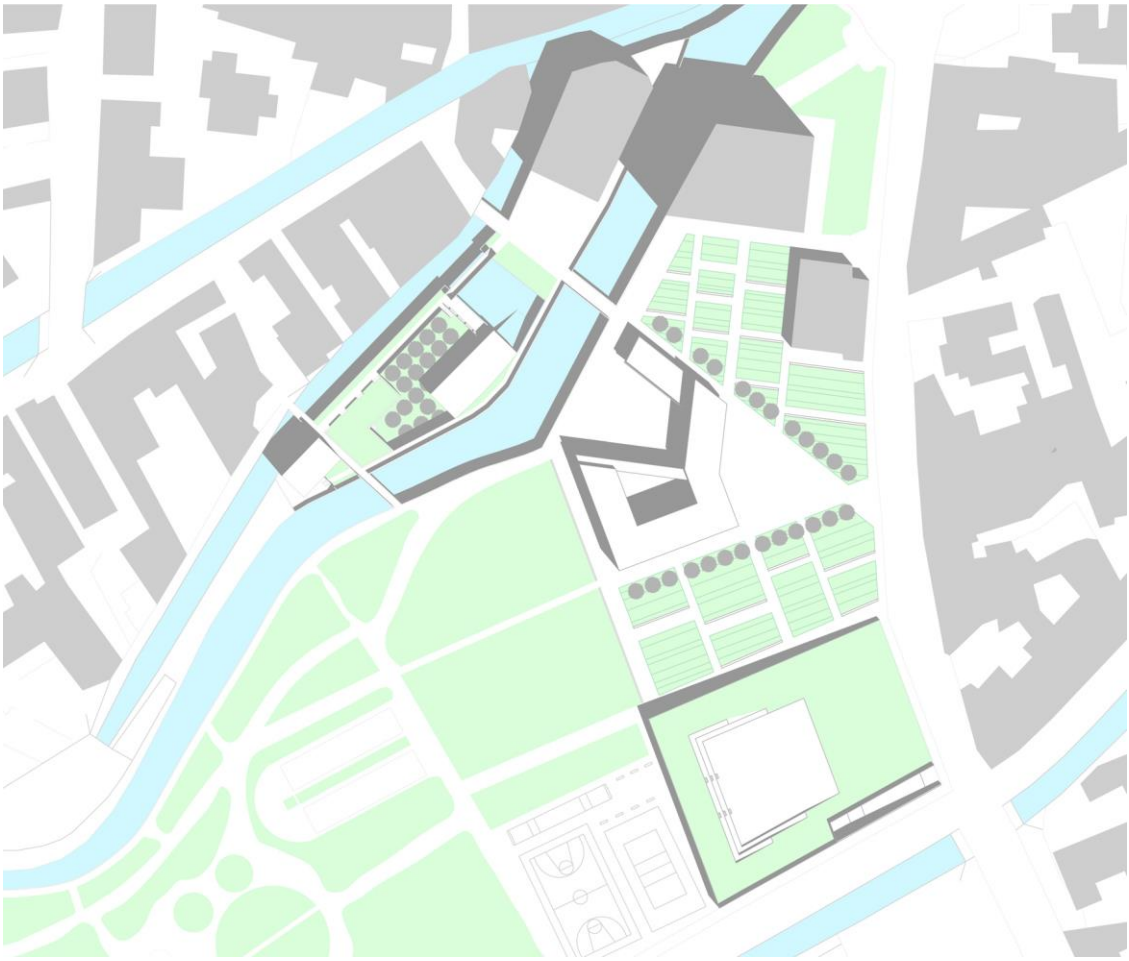

Fig. 6. Scafati Urban center and new basin (De Rosa-De Lucia)



Fig. 7. Sarno new basin view (De Rosa-De Lucia)

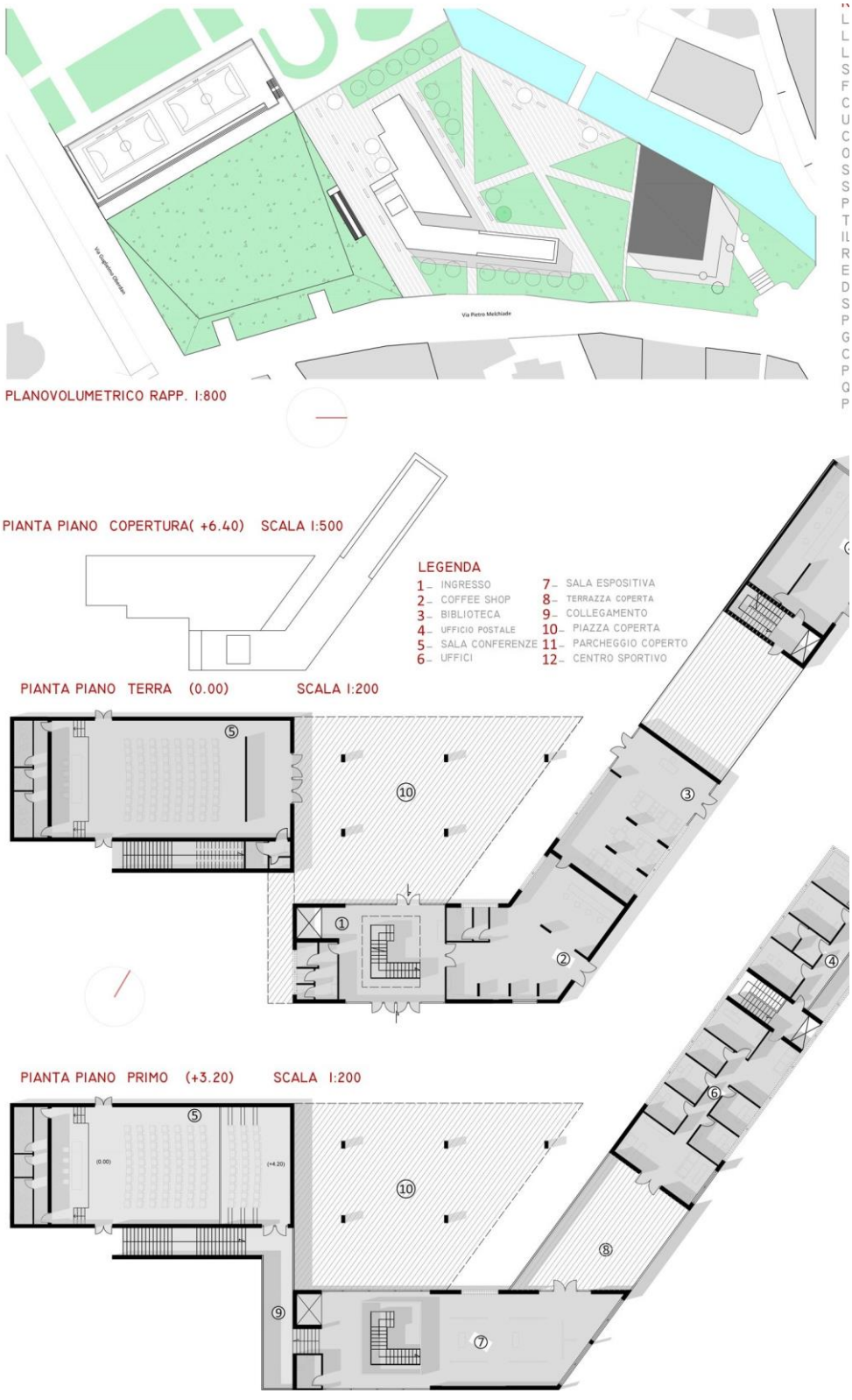

Fig. 8. Scafati Urban center and parking area

Bibliographical References

[1] Carlo A. Manzo : **Urban models in the modern Pompei and in the Sarno plain**, in FA. Magazine (Festival of Architecture, Parma 2013)-
[2] AA.VV.: Piano Strategico Operativo, Provincia di Napoli 2003.

In the Laboratory of Architectural and urban design (Department “Luigi Vanvitelli” – S.U.N.), in the 2013-2014 focused to the subject "Crossing the river", have worked Andrea Santacroce and Maria Antonia Giannino.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
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Features of rural architecture and industrial archaeology in Calabria.
Some typical cases.

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Abstract
The essay, seeks to provide a historic-architectural framework of the heritage of industrial archeology in Calabria, considering the socio-economic landscape in which the factories developed. The study examines significant examples in the province of Cosenza.
From the analysis of mills, spinning mills, sugar refineries, it can be deduced that Calabria, between the seventeenth and nineteenth centuries, showed the ability to exploit its agricultural resources in the evolution towards the industrialization process. By examining the industrial architecture present in the region, the focus on some specific characters and typological evolution demonstrates the permanence, symbolic-formal variations and functional distribution of the selected types. Some invariant characters derived from a cross comparison between the different factories, evident in a formal setting, in the functional distribution, defined as factory-farm. The artifacts are linked to the agro-industrial design. The productive module, in relation with the agricultural lot, is built around a courtyard, together with the residence, workers' building units, and spaces for activities, while the organization and composition of the factory is attached to the structure of the rural farm.
Finally, the essay aims to /or touristic improve knowledge of this heritage, of its architectural and constructive consistency, in order to provide both conservation actions as well as cultural and rehabilitation.

Keywords: Industrial archeology, Knowledge, Heritage, Conservation, Redevelopment.

1. Features of rural architecture and industrial archaeology in Calabria.
Although there is extensive literature on the subject of industrial archeology, little is known about the architecture of work in Calabria. It has always been considered to be a backward region in comparison to the productive actions of the entire nation. In fact, at one time, Calabria, and southern Italy, in general, in its heterogeneity of "*culture materiali*", possessed both resources and technological practices that bore witness to a good business capacity[1]. This was based, essentially, on the transformation of agricultural resources, with the existence in the region of unique factories such as flour mills, oil mills, sugar mills, etc.. Today, they are not completely systematized, even if there is significant proto-industrial heritage in its identifying characteristics.
This essay, through different analysis and critical reading of a repertoire of archival data, seeks to paint a picture of the historical and architectural heritage of rural and industrial archeology present in Calabria, and intends to delineate the socio-economic landscape in which the artifacts developed, focusing attention on some representative examples within the province of Cosenza.
We wish to highlight this historical-productive legacy, which is often unknown, which exists in conditions of degradation and that in its meaning of "*monumento industriale"* requires census operations and subsequently reuse operations, with the aim of its cultural and/or touristic redevelopment.

In southern Italy in the 15th century, transformations of agricultural raw materials and the related business activities of the local feudal system, generated a production profile with the aim of developing the economy of the county. This, in turn, led to the start of the evolutionary process of the agro-industrial landscape, and in the southern architectural landscape, which resulted in the construction of several factories.
In Calabria, a primary sector in regional production was the cultivation and processing of sugarcane, which represented, the same as the silk and more recently the steel industry, one of the leading sectors of the economy, with the presence of several factories located on the Tyrrhenian coast between the fifteenth and sixteenth centuries.
It should be noted that sugarcane processing in southern Italy, was incisive on the economy in a remarkable way and its entrepreneurial story can be considered homogeneous and widespread throughout the south. Since the fifteenth century, there had been a technologically advanced activity whose origins lay in the Arabic tradition; it enjoyed an important position in European markets. For example, in the Sicilian economy, sugar production represented a significant chapter in pre-industrial activity, and occupied an emerging place[2].
From an examination of the types present in the south, at the time referred to as *Imprese*, it is possible to note thatlarge areas of land were required in order to grow sugarcane and the factory was always in the vicinity of the plantations.
The production unit comprised of a group of buildings: spaces for storing sugarcane, crushers for squeezing, rooms with boilers for refining, and storage space for equipment. Furthermore, there was also a farm or manor house, sometimes the lord's castle, and residences for hired staff.
The sugarcane factory was, in its spatial composition, designed as an articulated structure, responding to the system of dwelling - productive activities - agricultural activities. The same home was related to the agricultural lot and was inserted in the entirety designed for production[3].
A significant example in Calabria, which provides an expression of rigorous architecture, was *Il Carcere dell'Impresa*, in the municipality of Santa Maria del Cedro (CS), south of the mouth of the river Lao. The structure dates back to the sixteenth century, with a defensive tower of Norman derivation, it refers to the type of fortified farms, now restored and dedicated to museum centers. The area that houses the architecture is of great archaeological interest due to the presence of numerous finds from the Hellenistic and Roman periods, which were found during recent restoration work.
Il Carcere dell'Impresa, defined as a castle in a document held at the Superintendence of Calabria[4], was equipped with a spring that supplied water to a mill inside the complex. It is possible to infer that the factory can be considered as one of the references of the productive structures in Calabria related to the agro-industrial system. *Il Carcere dell'Impresa* is a complex typological system where the role of the farm castle-manor house is centrally located, with dimensions and architectural significance, with the presence of a tower, which represents the defensive element that, in turn, defines the entire complex. The tower generally existed prior to the agricultural structure, with workplaces for productivity, with mills, crushers, rooms used as stables and housing for workers, a chapel, all functions which were articulated around a courtyard and near the farm lot[5].



Fig. 1: *Carcere dell'Impresa,* and plants of the ruins prior to restoration

In Calabria, there are many pre-industrial complexes thus organized, and from a summary discussion, it is possible to examine the cross-sectional and invariant characters exemplifying them in examples such as the feudal village of Cannavà, in the municipality of Rizziconi (RC), known for the cultivation and production of oil. Even in this case, the village appeared as a complex urban system, in close relation with the land cultivated with olive trees. It was designed around an attractive square, where the prince's residence and the church were located. The square was also the location for building units

used, in part, for farmers' accommodation and for local agricultural activities, such as stables, granaries, troughs, stores and two large mills with adjacent oil warehouses.
The structure of the rural farm type[6], demonstrated an elemental architecture, except in the setting of the residence, which indicated the main type present in Calabria, with horizontal string courses to mark the two orders of the building and the arched entrance portal. The peasants' houses, overlooking the square, generally consisted of a single level to accentuate the horizontality of the building profile, with strict setting, resuming the essential characteristics of rural architecture in Calabria. Inside, the rooms were minimal, with brick floors, and *incannucciati* ceilings (made from cane and chalk) while the walls were lime washed.

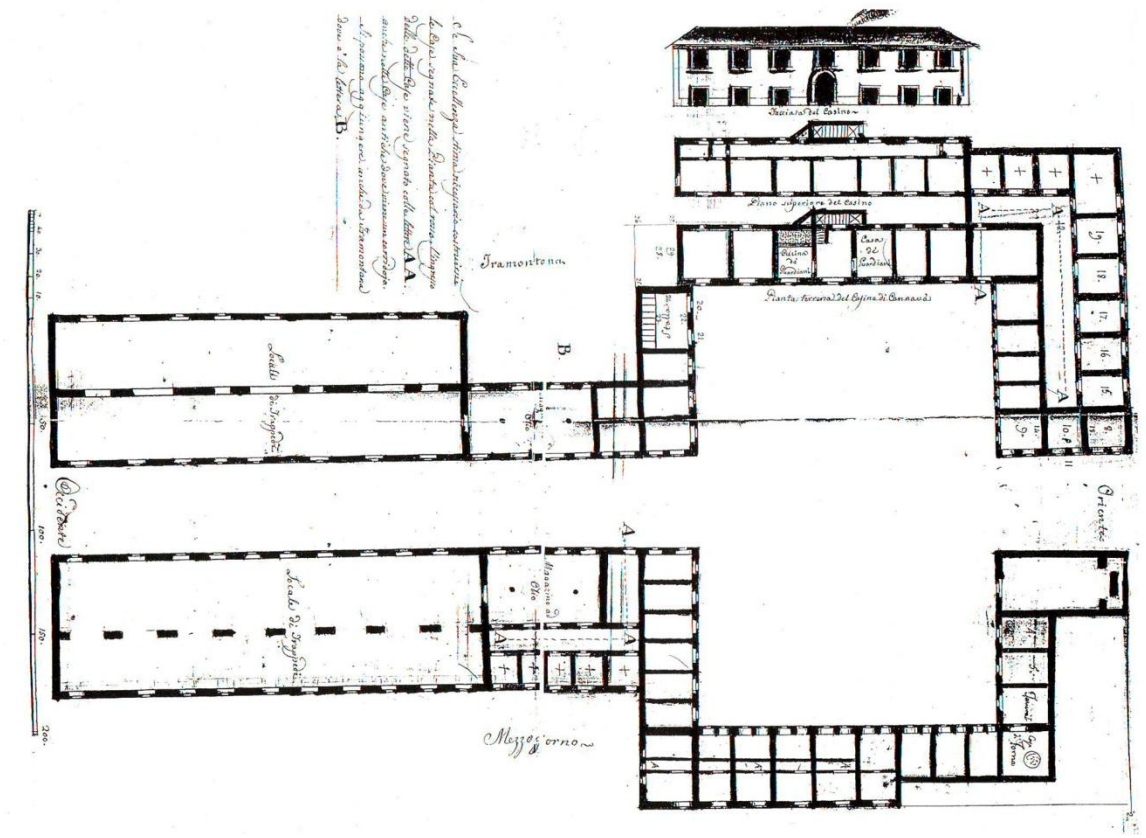

Fig. 2: Plant of the feudal village of Cannavà (from Ornella Milella)

Another example in which social life combined with agricultural production is the castle of Bivona (VV) called St. Nicholas due to the presence of a church dedicated to the saint[7]. The sugarcane factory was located within the military and productive structure but no trace of it remains today. However, it is widely demonstrated in a detailed inventory of the environments and tools for production, while the existence of a mill with the presence of a *saetta,* also used for the grinding of sugar cane is still traceable[8]. The factory was also equipped with a crusher[9].

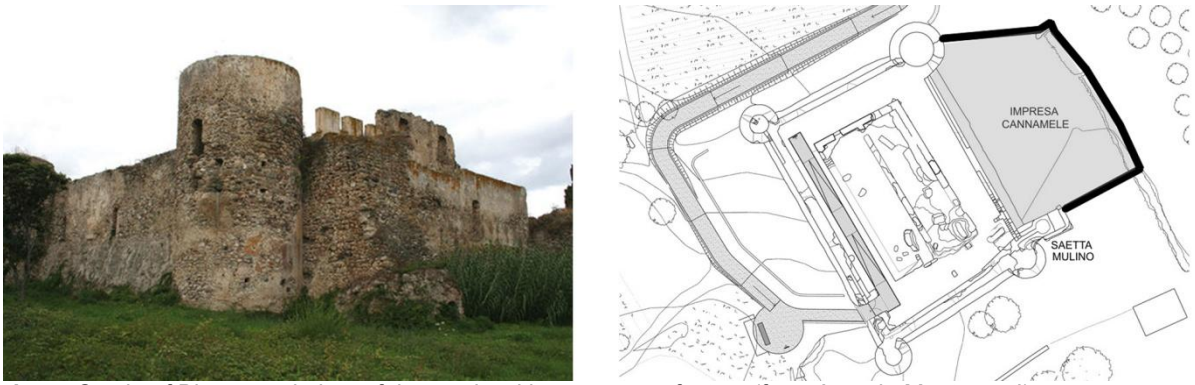

Fig. 3: Castle of Bivona and plant of the castle with sugarcane factory (from Antonio MontesantI)

It is understood, that in work architecture, there were some features that were repeatable, traceable in the conformation of installations, which could be ranked by homogeneous classes and were attributed to the same typological variety. The socio-economic landscape, between the fifteenth and sixteenth centuries, saw the local nobility manifest its entrepreneurial vocation related to agricultural production. The methods of land cultivation and the organization of production plants generated architectural systems that, although showing homogeneous character, also exhibited unique aspects and variations between them.
This can be found not only in the economic field, but also in the architectural results. It is sufficient to refer to the setting of the mansion that is related in some way to the needs of productive capabilities[10].
This, in particular, is evident in the typological system and functional organization of the ground floor of the building in Cosenza, and of southern Italy, in general, with the presence of some constant features throughout the region.
The courtyard type ground floor was, in fact, used to service the residence, and consisted of areas for the storage and drying of foods, there were cellars, stables, warehouses, premises for the breeding of silkworms, contained environments for grinding grain with the help of hand-operated grinders, ovens, and nearby areas planted with vegetable gardens or gardens. While overlooking the street were shops to witness a strong commercial focus [11].
The presence of vegetable gardens and gardens planted with a variety of plants and frequently mulberry groves, once again, emphasized the intention to meet food and productive needs in the same dwelling.
The internal organization of the house combined the need for representation, with the presence of a reception room, a library, a gallery, with the demands of farm life, especially in setting environments dedicated to servants. These reflected functions that satisfied peasant tradition: a fireplace with various boilers, coal cookers, a *cascia*, a piece of typical furniture found in rural houses, with the function of a sideboard, and tools: mortars, stone or wood hand mills, clay vases for meat in brine, and water jars. This was more evident in basic building as it represented a complex spatial culture linked to the needs of production. In fact, the distinction was significant and the names of the various neighborhoods and roads of the settlement, represented the activities that took place there (*vinella delle ricotte, via della neve, piazza dei pesci, piazza degi speziali, via dei cuculli* (silkworm), etc.)
The houses that constitute the basic construction were named in the *Catasto Onciario* of 1756, as *case locande*, *case torri* situated on parcels of agricultural land, *masserie*, *case matte* etc. The *case locande* were similar to the terraced plant, and were comprised of a *basso* and/or shop, one or two rooms and an attic called the *tavolato***,** used for storage and the drying of foods. This is where the definition of *cannizzo* derives from due to the presence of horizontal planes formed by woven reeds used for the drying of vegetables. It produced a basic building with a legacy associated with agriculture, while noble architecture, despite the subtle relationship between the living space and the productive module[12], gave rise to an erudite language, linked to the architectural vocabulary prevailing at the time. The described economic development, which can be attributed to the composition of the city and the formation and evolution of the urban fabric, as well as in the production system of the center, had a slight decline in activity at the time of the Spanish Viceroyalty. Nonetheless, cities such as Catanzaro, Cosenza and its surroundings, maintained a certain solidity due to the hard work in the field of traditional manufacturing activities.
In Cosenza, the rearing of silkworms and weaving were activities that drove the economy. In 1813 in what is now Corso Telesio, the main street in the old town with a strong commercial vocation, there were twenty-one active silk sellers, and a part of the population negotiated the sale of silk from their homes, not being owners of any commercial activity[13]. This activity became the source of income of entire families. In the nineteenth century, several spinning mills operated in the city center. The spinning mill with garden belonging to the Campagna brothers, in San Giovanni Gerosolimitano Square, near the river Crati[14] was active until the mid-nineteenth century, the Salfi spinning mill that of the female orphanage, and the Rendano mill located on Triglio hill, which was one of the most important factories in the city. The Mollo noble family initially owned the Rendano mill, which had had a significant functional and compositional evolution. It had a controversial history and came into possession of the Rendano brothers around the last two decades of the nineteenth century. In 1879, Stefano Mollo stated in a deed of sale that he owned a factory in the Triglio district "*per filanda di seta consistente in un grande locale per filarvi la seta ora ridotto a gallettiera…. una stufa per soffocare i bozzoli, un magazzino per pesarvi e ricevervi i bozzoli che si comprano, ed una piccola casetta baraccata di tre stanze e due bassi per uso di cernere i bozzoli e farvi altre operazioni concernenti il suddetto stabilimento industriale, più due grandi cisterne per conserva di acqua…il tutto circoscritto da mura a fabbrica*"[15]. It is understood that, at that time, the mill was of limited size and with a spontaneous organization. Later the factory increased in size with the addition of other bodies and

with the transformation of the original. Thus, in 1887, in successive document refers to it as a *"caseggiato ad uso di filanda"* [16] to indicate a series of adductions, which occurred over time and led to a different size. In fact, a precise description of the composition of the building is shown in a survey of 1886: "*Opificio Serico Dapprima a sinistra si presentano tre serbatoi in muratura comunicanti l'uno coll'altro per mezzo di brevi cascate… Di fronte 'havvi spazioso portone che immette in una corte scoperta, la quale di contro lascia vedere l'ingresso al trattolo medesimo. Entrando a pianterreno a dritta presentasi la macchina motrice con la rispettiva caldaia, e montando una scala in muratura si perviene a primo piano in un ampio camerone … La fabbrica istessa comprende diversi ambienti occorrenti al compimento dell'Opificio, stufe, gallettiere, magazzini, deposito sete, locale di ricezione dei bozzoli e simili, nonché discreta abitazione pel dirigente l'industria; sicché la filanda in oggetto devesi ritenere per completa ed una fra le migliori delle Calabrie* …"[17]. At the beginning of the twentieth century, the factory was described as an integral part of a system consisting of three parts, two of which were used as a residence. The three buildings that made up the complex set around an open courtyard were indicated as *palazzo, palazzina* and *filanda* surrounded by a large green area. The mansion, built consequent to the spinnery, now restored, characterized by the architectural language of the nineteenth century was comprised of a ground floor connoted in height with ashlar base and entrance portal and two floors above ground. The spinnery was situated to the rear and consisted of two levels, driven by a steam boiler and comprising a variety of environments: stores, warehouses, premises for the cultivation of cocoons, for equipment, and an apartment of the company manager. A building with a formal composition, which was modest in comparison with that of the villa, was located nearby. At that time, the spinnery contained more than fifty basins for the manufacture of silk and employed about ninety workers, of whom a large number were women[18].

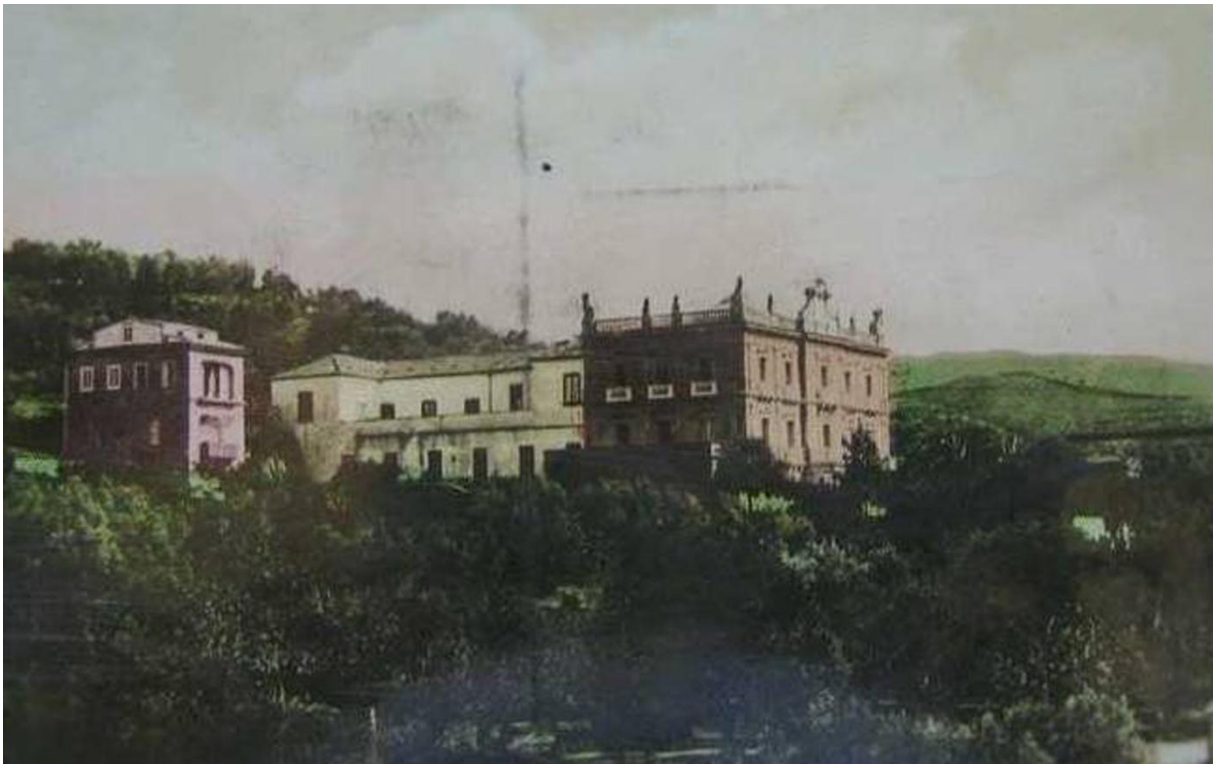

Fig 4: Historical view of the villa and Rendano mill

There are currently few disused spinning mills remaining in Calabria to bear witness to the history of steam. The Caminiti spinnery, the Cogliandro spinnery and the Lamonica spinnery were important factories located in the area of Villa San Giovanni which were active in silk production between the 18th and 20th centuries. While, two factories were significant in the province of Cosenza: Gaudio in Mendicino, which is still active today, and the Zupi spinnery in Cerisano. There were also spinning mills in the area of Rogliano. The Quintieri spinnery in Carolei, was located in a park that also housed the main house, from the middle of the nineteenth century until 1940. Even in this case, it was in the presence of a composite system that adhered to the previously examined features; the residence is combined with the buildings for productivity. The main building and modest buildings for manufacturing activities, which are organized around it, form the complex. The spinning mill, designed as a cocoonery for the raising of silkworms, was built of local stone and spread over two levels, with a porch, which had a pitched roof with roof tiles. Adjacent to this building, another building was placed,

whose ground floor was used for spinning. There are traces of a textile mill located in Marano Marchesato (CS), quoted here both for the poverty and simplicity of its composition, adhering to a spontaneous rural system, both to highlight the spread of sericulture throughout the territory, even by means of family businesses. The rudimentary industrial system was articulated around a courtyard, with the presence of a rectangular building used as the spinnery. Other structures were present in the courtyard, namely a shack, a small lean-to room attached to the spinnery that housed the stove for the cocoons, a well, three clay *case matte*, an open space with roof, used to house trays for the production of silk and contiguous open space with boiler for the cocoons. The residence of the owner was situated on one side. Here, the drawing of the spinnery, which was attached to the 1918 Judicial Report is shown[19].

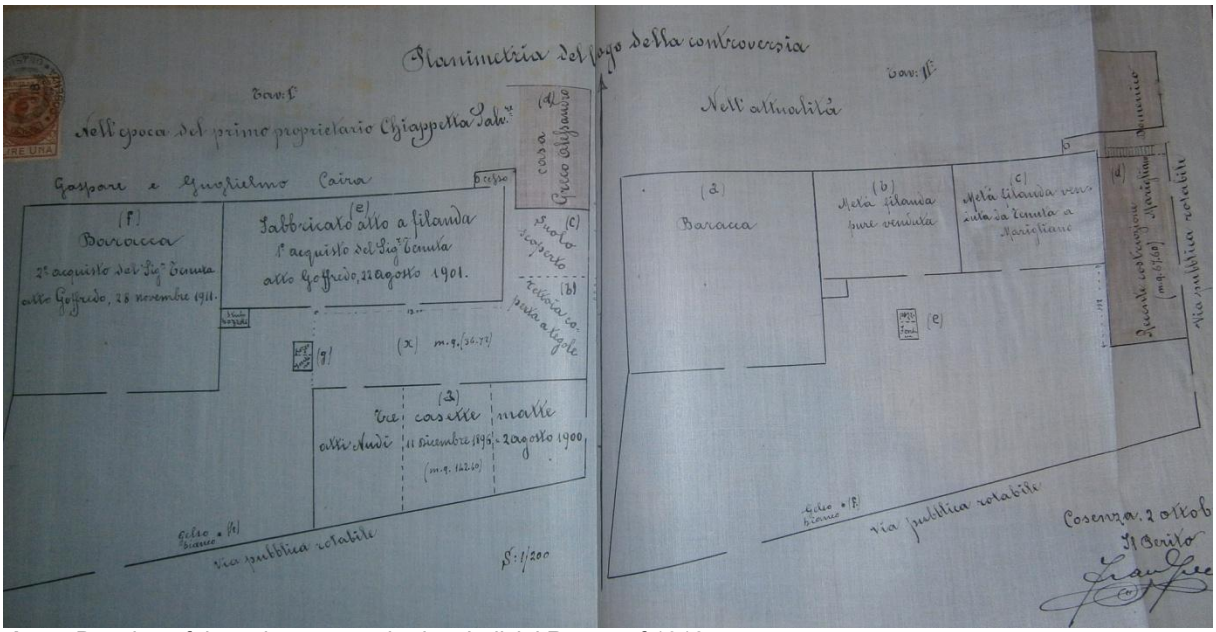

Fig. 5: Drawing of the spinnery attached to Judicial Report of 1918

The Filardi spinnery of Città results as being the most complex and significant in the Pollino area, powered by water, known for carding and spinning wool, today it is an eco-museum of industrial archaeology. The reading of this factory, once again shows a series of features to be found in the whole territory. The wool spinnery is part of a rural system comprising several buildings. Large pools for water collection are present, as well as premises for spinning, storage and mills, etc.


Fig. 6: Filardi spinnery in Civita

Furthermore, the factory also had its own socio-economic value with an important effect on the entire community, and a relationship of integration with the production system of the entire rural area of the Pollino, enriched by crushers, mills, fulling mills. Even in this case there is an invariant feature present in the Calabrian centers. The economy and the population's source of income derived from the production of factories present. It was not a coincidence that the majority of the population was engaged in wool manufacturing, or other connected activities, that is to say that the entire social body moved around the work of the factory. At the end of the nineteenth century, there were several factories in Mormanno and the territory of Morano, witnessing, in the Coscile valley, an intense production activity with a significant impact on the economic and social system. The same natural environment, unique in its beauty, demonstrated integration of socio-economic activities in the agricultural landscape. The area of the fulling mills and mills located downstream from Morano, today still bears witness to the virtuous use of the area by a population which has always been engaged in agriculture and sheep-farming. The scenario of the work architecture in Calabria is complex and more detailed than previously shown and is accompanied by other different examples of architecture like the many water mills that dot the region. There are, in fact, many milling structures Calabria with horizontal wheels driven by water, which are in a state of neglect. The factories, which were present at that time, were located near rivers and streams, and were influenced by the amount of available water. Consequently, this influenced the type of plant constructed, which had to be capable of working even with a modest water flow. Storage tanks connected to feeding canals were necessary and some factories were inactive during summer months due to water shortages[20]. The dimensions of the canals and the tank determined the self-management of the mill and the construction of the plant was adapted to environmental characteristics with an impact on the architectural features and construction of the basic type.

Based on inspections carried out, and from examined documents, it is clear that a single, rectangular shape in which the grinding wheels were housed formed the basic mill type. The interior space that housed the granite or limestone millstones, was essential. It had beaten earth or stone floors and unplastered walls. The roof structure was like that of a shed, and was in view. A prismatic volume and an elementary facade with arched stone underground structures, where the vane horizontal waterwheel was placed, characterized the mill, on the outside. The tower or *saetta*, which had particular variations across the region, was placed on the roof. The canal was set on arches. In the more advanced types, the factory was formed by two or more compartments, some mills were equipped with two *saette*, and in this case, even the plant was larger.



Fig. 7: Mill in Paola

There were, in fact, complex types, originally conceived for water that had been converted to electric turbine factories. The composition of these structures referred to the planimetrical setting of the manor farm system but they were very close to the actual industrial design. There was a mill with several compartments, which housed the grinding machines, deposits, warehouses, stores and sales offices. The proto-industrial system included the miller's house, along with a modest church, in its composition. The house, similar in design to the mansion, was on the upper floors, whose entrance was accessed from an external staircase. It comprised of several comfortable rooms with the presence of a representation hall. Some significant milling realities were located in the municipalities of Aspromonte, Pollino, on the Ionian and the Tyrrhenian Coasts. For completeness, in shaping the industrial landscape in Calabria and its architecture, it is necessary to note, in this context, the presence of several distilleries, furnaces for bricks, and for ceramics[21], which were located throughout the region, glassworks, *conci* for the production of licorice[22], establishments for fish, etc.
Fish production was initially characterized as an entrepreneurial activity of the nobility, in which the *tonnare* had an important role in fishing and tuna processing, particularly in the Gulf of St. Eufemia, between the fifteenth and sixteenth centuries, with important examples in Bivona, Briatico, Pizzo, and Tropea. These centers were the main migration passage stages of migratory tuna along the coast of Calabria and Sicily. The *tonnara* of St. Irene and Rocchetta in Briatico and Santa Venere in Pizzo were significant during this period[23]. At the end of the nineteenth century, a characteristic type of *tonnara* was the architectural complex of Bivona built in 1885 and renovated in 1911. It consisted of a main house, a large loggia, a sort of shed that housed the boats and was allocated for the initial stage of fish processing, of salt stores, of environments for equipment, and the home of the *Rais*[24] and insiders.
This review highlights that Calabria, in the past, was not marginalized compared to national production, but appeared able to capitalize on its natural resources, fisheries, agriculture, and textile manufacturing, in an evolution towards the industrialization process. From industrial architecture in this context, it is possible to deduce some features specific to Calabrian factories, their formation and the socio-economic landscape in which they developed through the stages of cultivation of the raw material, production and sale. The focus on typological evolution of the examined artifacts has shown permanence and symbolic-formal and distributive-functional variations between the types studied where possible.
From an exegetical reading of sources and from different analyses and comparison of the types of factories, some of the recurring features were inferred transversely. The recurring features were evident in the formal setting, in the composition and functional distribution of the type that we can define as factory-manor-farm. These features have proven to be repeatable proto-industrial architecture in Calabria. Finally, the essay expresses the desire to improve knowledge of this heritage, through the evaluation of its architectural and constructive consistency, in order to provide proper care and conservation, but subsequently reusability and redevelopment of this significant heritage, capable of promoting the development of local economies.

Bibliographical References

[1] MATACENA Gennaro. *Architettura del lavoro in Calabria tra i secoli XV e XVI*. Napoli: Edizione Scientifiche Italiane,1983.
[2] Cfr. GIUFFRIDA Antonino, REBORA Giovanni, VENTURA Domenico. *Imprese industriali in Sicilia*. Palermo: Mediterranea ricerche storiche, 2012.
[3] BACULO Adriana. *La casa contadina, la casa nobile, la casa artigiana e mercantile. I caratteri dell'edificazione. Analisi e recupero del patrimonio edilizio in Campania*. Napoli: Liguori, 1979.
[4] Document of the 7th of April 1964, held at the Superintendency of Cosenza, del 07-04-1964, file: position M; record 1530; castle and tower ruins (called *Carcere dell'impresa*, Sollazzo property).
[5] Cfr. AA.VV., *Masserie fortificate del Materano*. Roma: De Luca Editore, 1986.
[6] For further information on manor farms, see MILELLA Ornella. *Torri e Masserie nel giardino mediterraneo.* Roma: Gangemi, 1992.
[7] AA.VV., *Per un atlante della Calabria. Territorio, insediamenti storici, manufatti architettonici*. Roma: Gangemi, 1993.
[8] Notary deed Giò Franco Ursello di Monteleone 1694, Naples State Archive Notarial Archives Fund Pignatelli-Cortez, n.79, paper 1, 2.
[9] MONTESANTI Antonio. *Tra mare e terra. Il ruolo dei traffici marittimi nella storia dell'area costiera vibonese,* Roma: Ed. Fegica,1999.

[10] FAETA Francesco. *L'architettura popolare in Italia. Calabria*. Bari: Laterza,1984.
[11] CANONACO Brunella. Caratteri architettonici e costruttivi del palazzo signorile del XV-XVII secolo nell'Italia meridionale. In AA.VV, *Storia dell'Ingegneria*. Atti del 4° convegno di Ingegneria. Napoli: Cuzzolin, 2012.
[12] FAETA Francesco. *op.cit.*
[13] *Meridiana.* CAPALBO Cinzia. *Mercato esterno e tradizione di mestiere. La produzione della seta a Cosenza tra Sette e Ottocento*, 1988, vol. 2, p.78.
[14] Judicial Report 1856, State Archive of Cosenza (hereafter referred to as **A.S.Cs**.) Civil Court Fund, file 52, folder 21.
[15] Notary deed Angelo Gabriele 1879, **A.S.CS**., Notarial Archives Fund n.1083, paper 18. On this occasion, the factory was sold to Mr Raffaele De Falco and then passed to Giannuzzi Savelli, who sold it to the Rendano brothers.
[16] Notary deed, Notary Giovan Battista Cardamone 1887, **A.S.Cs**., Notarial Archives Fund n. 1091, paper 293, 322.
[17] Judicial Report 1886, **A.S.Cs**., Civil Court Fund, file 1, folder 48.
[18] TERZI Fulvio. *Villa Rendano. La casa delle idee*. Cosenza: Pellegrini, 2013.
[19] Judicial Report 1918, **A.S.Cs**., Civil Court Fund, file 29, folder 87.
[20] Judicial Report 1926**, A.S.Cs**., Civil Court Fund, file 36, folder 93, in which there is a reference to the seasonal functioning of the Sparta mill in Rota Greca (CS).
[21] It is important to remember the production of ceramics at Briatico Trainiti, cited in: MAZZA Fulvio. *Vibo Valentia. Storia cultura economia*. Soveria Mannelli (CZ):, Rubbettino, 1995.
[22] The Amarelli factory, which is still active, represents an important example of a proto-industrial *concio*, characterised by the steam boiler chimneystack.
[23] Cfr. *Vibo Valentia*. *op.cit*
[24] MONTESANTI Antonio. *La Tonnara di Bivona: una rete tra storia e sviluppo*. 2006.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The modeling based on techniques advanced of takes of data for the study of the church of the Asunción in Vistabella del Maestrazgo 1604-24.

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Abstract
The use of architectures or inverse modeling, through physical or digital representations of buildings that are part of our cultural heritage, it is increasingly necessary and essential to know and put them in value in a way that is both rigorous and scientific; bringing it close to a large audience for its high visual and tactile content. On the other hand, this type of modeling, from a technical point of view, gives us a data bank where we can experiment and test possible solutions without having to act on the actual model, which is useful for analysis and study, all prior to any proposed architectural intervention. In this way, through the use of the technologies of advanced data collection, such as the 3D scanner and other lower-cost, such as stereoscopic photogrammetry, we obtain a reliable documentation appropriate to reproduce and make these models either through computer graphics or 3D printers. All this has been carried to term in a building of Renaissance character with Gothic influences in its construction, where is has studied with this method a stretch of the vaults of Church of Nuestra Señora de la Asunción in Vistabella del Maestrazgo, Castellón, Spain.

Keywords: Vistabella del Maestrazgo, Renaissance, reverse architecture, scanner 3D, advanced graphic representation.

1. Objective
The present communication aims to make known and to value the use of new advanced technologies of architectural survey and its later inverse modeling or building architectures in the documentation of architectural heritage from a graphical point of view. The drawing is the best language for the communication of technical information, increased by an increasingly incipient in the use of audiovisual media graphics that bring demand and approximate knowledge of architecture and heritage to everyone.
Therefore, from the emerging group of investigators studying the architectural heritage of the University Jaume I of Castellón is being made work and research in this sense in addition to introducing open and free software in order to optimize the cost.

2. History
The example shown is the parish church of “Nuestra Señora de la Asunción y San Miguel” located in the Village of Vistabella del Maestrazgo de Montesa in the former Kingdom of Valencia, Spain. This building is definitely the best Renaissance building of the Province of Castellón.

Outwardly, it appears as an exempt building, with a rectangular ground plan, with another smaller rectangular body attached at the apse of the church. Highlights in its main façade, faces to the south, the two portals and the bell tower. Special mention deserves the major facade placed in an impressive front altarpiece, sheltered by a pointed arch. It is built from ashlar stone and mansonry, the main body is covered with a gabled roof tile, the apse it is cover with a five sides roof, and cover with a single pending the header, that is lower than the previous constructions.



Fig. 1: General view of the south facade of the church**.**

In his interior it is form by a single nave with four aisles, and chapels between buttresses, presbytery which is octagonal and ambulatory, with chapel and sacristy in the head-board. Both, the nave and the presbytery, are cover with ribbed stellar vaults and the lateral chapels with groin vault simply.

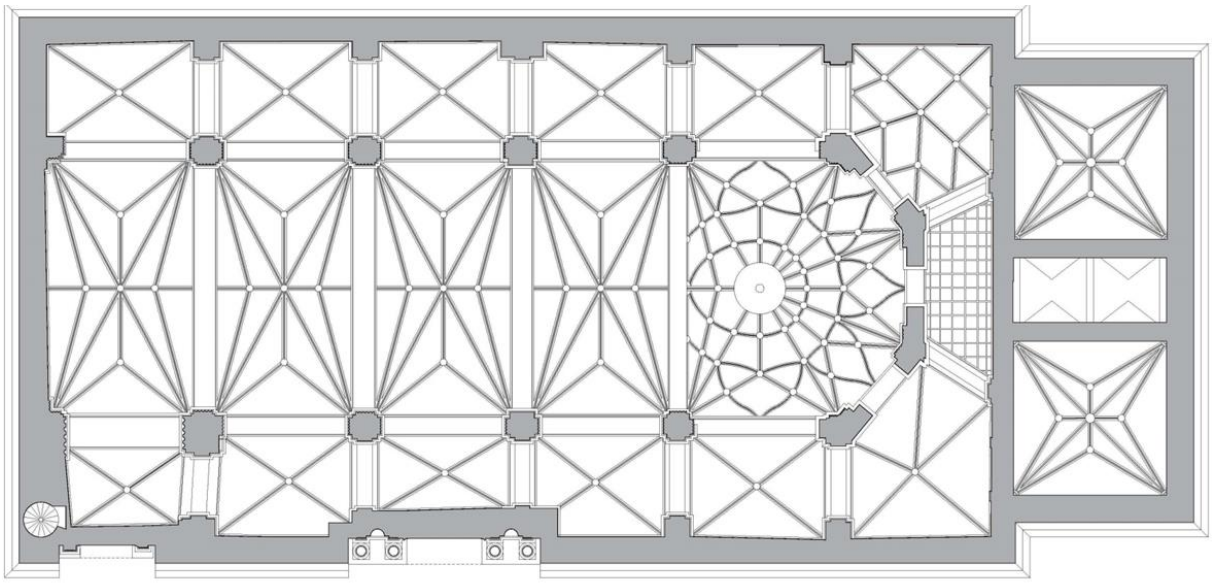

Fig. 2: Plano church vaults

The building was constructed between 1604 and 1624, exnovo, all at once and outside the medieval city walls, the temple was plotted and executed by the French architect Joan Tell, following metrology based in Valencia span and the prevailing Renaissance at the time. The use of Renaissance theories of symmetry, proportion, modulation, the correct distribution, the correspondence of the parties and party size in comparison with the whole and with your module, make the building is and should be considered fully Renaissance, despite its ribbed vaults of Gothic tradition, with straight terceletes northern French roots, but modernized to fit the stylistic point.

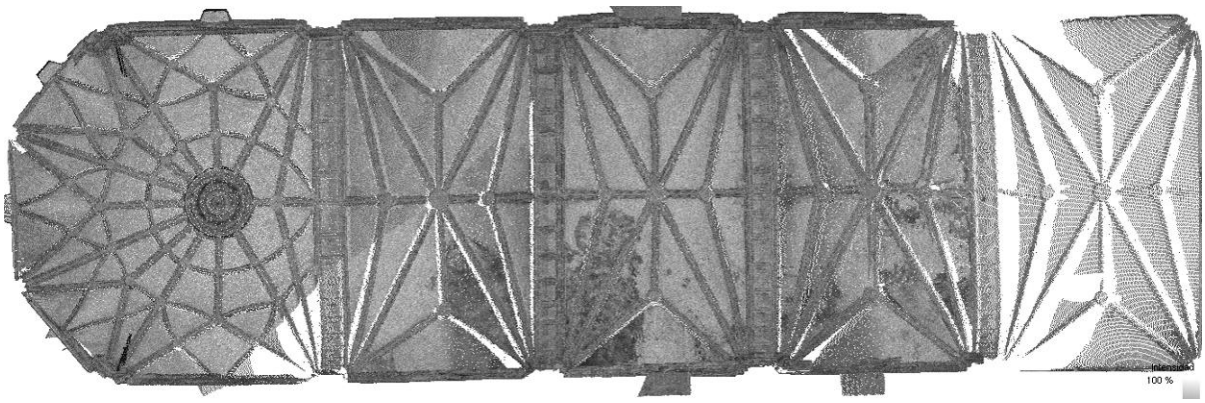

Fig. 3: Orthogonal cloud image scanning general points of the vaults of the main body of the Church

3. Methodology

The developed methodology is developed in the following stages of work: work planning the first and the second making consistent topographic data using 3D scanning equipment, total station reflector less imaging and GPS centimeter, or simply taking pictures , the third, and after obtaining field data , data recording and processing cabinet with specific software , and the last building a virtual or physical model.

The methodology faces uprising traditional architectural drawing , made with data collection methods , such as conducting drawings , measurement using measuring tapes , levels, plumb or comb archaeologist, leading to the award from floor plans, elevations and sections to details elements such as sockets, ribs or moldings.

The use of new technologies based on photogrammetry and laser scanner, has advantages and disadvantages compared to traditions measurement systems. One advantage certainly is getting more graphic and visual quality of the projects. Furthermore the documentation system through the laser scanner and photogrammetry is possible to perform a survey in its entirety without other traditional media. Besides the possibility of adopting hybrid solutions , combining different methods of data collection : traditional and modern , allows maximum use of each , provides some advantages since the main virtues of each method are adopted, and in this way turnaround times are reduced , the data quality (accuracy) is increased and decreases the final cost .

Although the work is done by combining different systems exposed measurement, due to the differences between the teams that make up each of them , each of the stages of work are carried out separately , comparing and combining the results after data processing to develop unique and relevant graphic documentation .



Fig. 4: Elevations of the vectorized by church and textured architectural photogrammetry.

The laser scanner provides information of a huge number of points in a short time, the exact location of these thousands of points, and information on the brightness and color of each. With this process as many points clouds obtained number of scans have been executed by the scanner, from which one can generate a realistic virtual representation of the object. The degree of definition of this model depends on the density of point clouds and gaps or shadows that occur when taking data.



Fig. 5: Views of the assembly point cloud from scans with different densities of the principal facades and their covers.

Using photogrammetry is possible to determine geometric properties of an object, however, in this case the data are obtained from only photographic images, eliminating restrictions positioning involved in moving heavy equipment laser scanner, as the data obtained with a simple camera, which also saves on economic investment.
However, the work of data processing is more elaborate, since unlike the laser scanner data are not obtained directly but it is necessary to obtain them using specific software, so it has to invest a greater number of hours of work to achieve similar accuracies to the system offered by the laser scanner.

4. Results

Once all the data collected in the field and after processing them can proceed with the development of virtual models , the principal is given by the sum of the different point clouds each sorting them either by using recognizable physical targets for the scanner or cabinet by using natural targets on the building itself or point cloud. You can also guide and record the point cloud by topographic relative or absolute coordinates obtained with the total station, GPS or through the observation of a point forward, a known point and behind the instrument height. This will get a nine or Cloud Virtual to which we can, for display, apply the property of the color obtained from the very intensity of the laser beam to impinge or through coaxial camera equipment or an outdoor camera for quality. In this case the point cloud was primarily used to determine the geometric elements such as large domes, arches , ribs , pilasters, etc…
With point clouds obtained we can start building volumes or maya directly through a mechanized process of self- management software point clouds, although the specific case of the vaults of the church studied has opted for a more artisanal procedure particularization consisting of each , particularized and separates each element . Obtaining the principal directions of the ribs , the shape of the plant and its stage, besides nerve section allowing us to proceed with the CAD drawing software proceed to the construction of an initial volume configured by lines or guidelines nerve to then proceed to the preparation of a new volume by simple extrusion or loft section of each rib along the guideline obtained or patterned , once completed to proceed with the cuts unions solidification set and obtain the corresponding fusions constructed to render them.



Fig. 6: Images corresponding wired neural arches and surface rendering models nervaturas model.

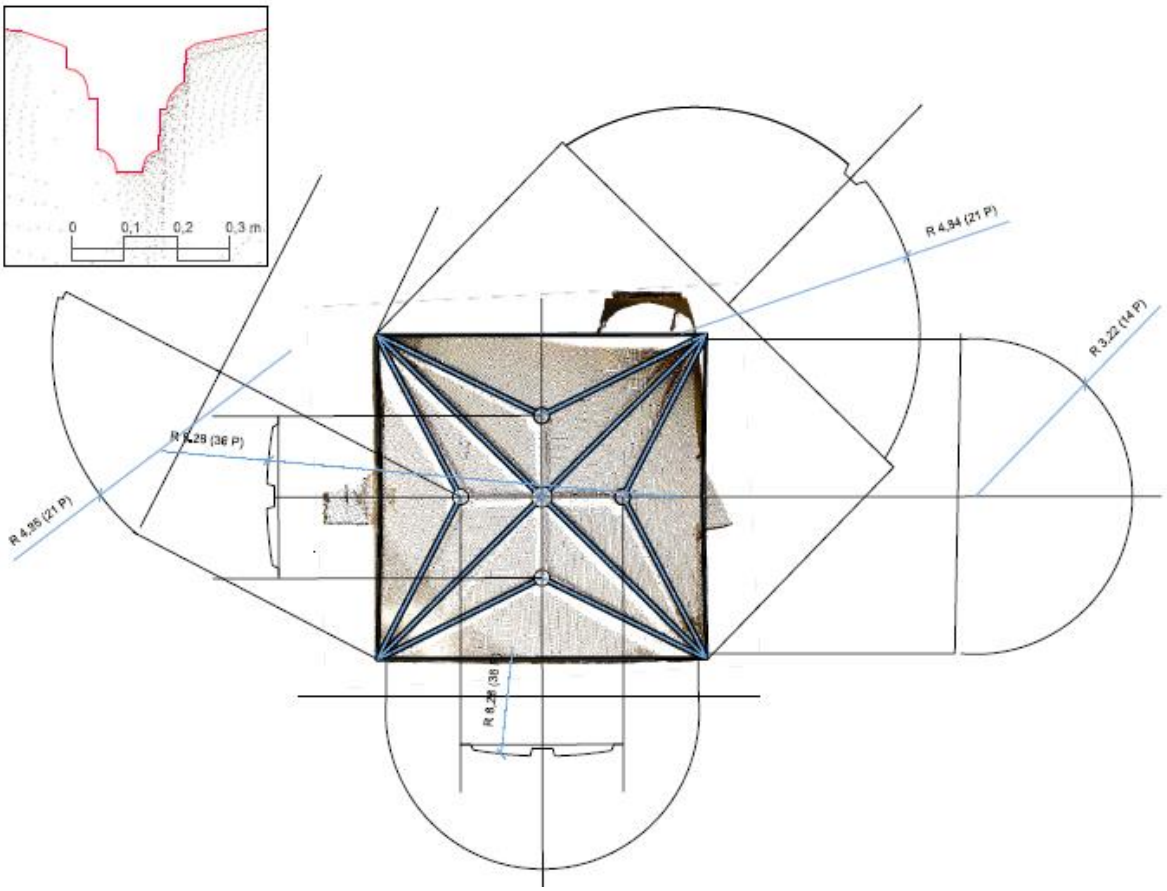

Fig. 7: Views of obtaining obtaining the address section of a nerve based on point cloud obtained once registered.

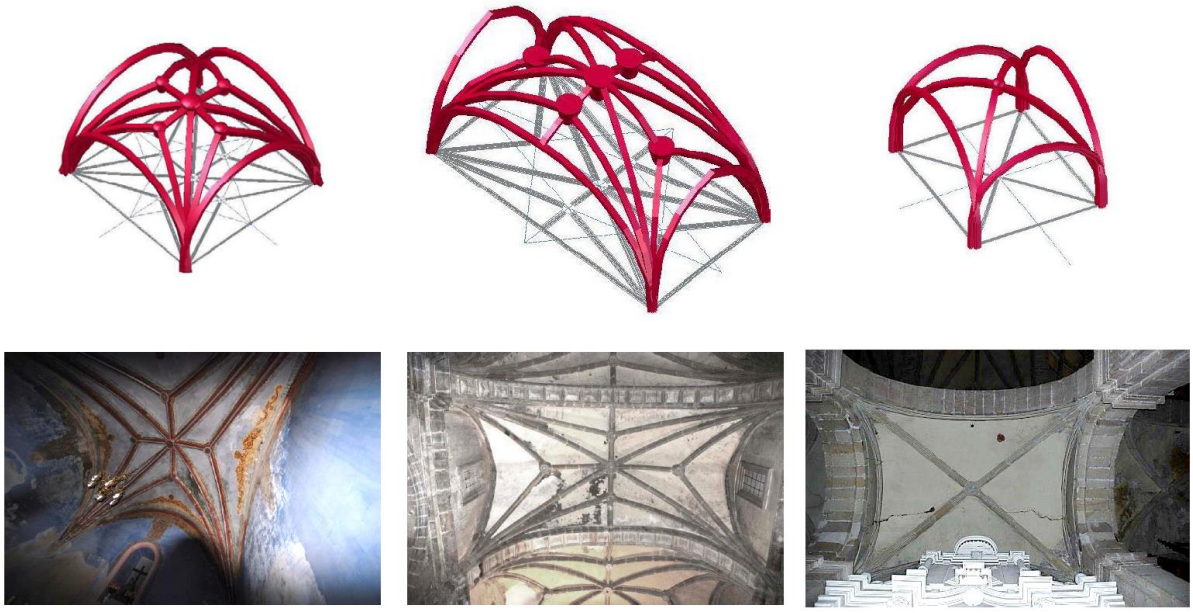

Fig. 8: Images corresponding to the pictures and neural modeling rendering at different vaults.

Once obtained the geometry of the nerves and obtained a solid we can proceed with the construction of a physical model, in our case concluded, for making these physical models Opted two possibilities, one through 3D printing by an inkjet printer on binder powder or the other by using a numerical control machine or drilling procedure, according to the element to be reproduced, in the case of large volume elements have chosen to 3D printing and powder injection in the case of predominantly surface or flat

elements we opted for machining by numerically controlled or milling. Being able to export the results in various supported formats such as DXF, JPEG, LAS, VRML and OBJ and more.

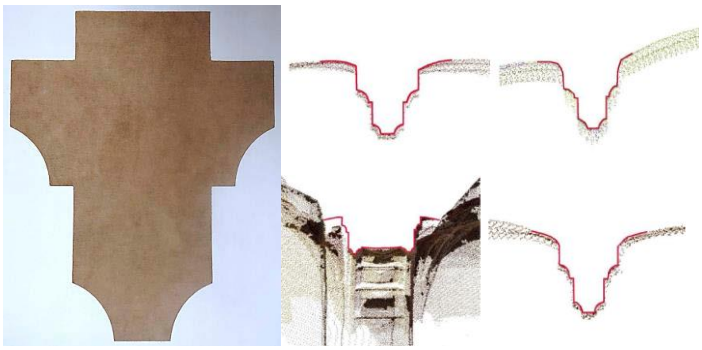

Fig. 9: Template made with a numerical control router sobe veneer 4 mm. And nerves profile of the vaults on point cloud.

For the analysis and study of smaller pieces has resorted to the use of feedback systems and documentation through the use of lighter and versatile photo cameras, with which we can make capturing multiple photos and mediate programs imaging usually free treat photogrammetric imaging systems direct intersection once calibrated or identified the camera, which we can also get quite dense point clouds all based on pixel camera. One time the point cloud obtained we can proceed to a mesh of the same in formation of irregular triangular meshes (TIM) which cover surfaces to which we apply the color or texture of the photograph itself, this system is the one has been used for modeling the bases, capitals, moldings and in general for all those elements ornamentals object modeling.



Fig. 10: Views of various ornamental elements modeled by mayado and texture obtained through camera.
.

Another way to appreciate the results is through video playback graph obtained from both the point cloud models as maya and vectorized by the engines own video display and allow us to obtain true virtual museum tours and even for the work, ranging from the most general aspect as are space, magnitude, even small and insignificant difficult to see at a glance by taking a real sense of proportion and unity.



Fig. 11: Views of the physical models made using a 3D printer in the case of the vaults and using of numeric control milling in the case of the front and niches.

5. Conclusions

The graphic documentation understand that it is an indispensable tool for the study, preservation and analysis of architecture built. So what is seen above, we can deduce the possibility of making a comprehensive record of information included in addition to the shape, color and texture model lift and thus get their virtual representation with a virtual cloud of points or the development of physical and tangible models.

The virtualization system or modeling , based on images or videos, virtual museum will provide a basis for sharing these experiences and share them with the general public through the global Internet granted and thus to value the heritage as intangible property and the building itself in question.

The application of this methodology has shown the consistency of measurement systems generally used independently, which can be seen from the early stages of architectural as lifting , their combined use is a significant reduction in the time needed to power operators overlapping tasks during data capture leveraging time intervals in which sweeps are performed with the laser scanner to take pictures that will process later by photogrammetry.

Experience noted that the combination of traditional systems and new systems architectural survey , are not incompatible, but the opposite, having to apply in most cases hybrid systems, thereby obtaining a graph accurate documentation and detailed of the various elements that constitute the proper " document " . Without data collection practiced alter or modify the physical conditions of the object (non-intrusive measurement), with a fast and accurate system, the results are easy to reference, and storage of information, which allows us to easily a check and monitor the evolution of the "document" over time. Promoting understanding of the building and its architecture. That may even be a technology or GIS and geo referencing serving turn experimental testbed for verifying and peritara building developments , checking them solve or proposals for future intervention without resorting to building.

Bibliographical References

[1] CABEZA, Manuel, SOLER, Alba, MAÑEZ, María Jesús, SÁEZ, Beatriz, GARFELLA, José Teodoro, PITARCH, Ángel Miguel. *Geometric and constructive study of the Mediterranean Gothic Architecture with virtual models: Church of San Francisco in Morella*. Less More Architecture Design

Landscape. Le Vie dei Mercanti. X Forum Internazionale di Studi. Aversa (Capri). 2012 La scuola di Pitagora editrice. ISBN: 978-88-6542-129-1.

[2] GARFELLA RUBIO, José Teodoro, MAÑEZ PITARCH, María Jesús. CABEZA GONZÁLEZ, Manuel, SOLER ESTRELA, Alba. *La documentación gráfica a través del empleo de metodologías avanzadas de fotogrametría y escáner 3d*. Colexio Oficial de Arquitectos de Galicia. Actas del 4º Congreso de patología y rehabilitación de edificios PATORREB 2012. 2012, ponencia P04-04. ISBN: 978-84-96712-49-2.

[3] SOLER, Alba; CABEZA, Manuel; MAÑEZ, M. Jesús; SÁEZ, Beatriz. *Geometría y construcción en la Iglesia Arciprestal de Sant Mateu (Castellón)*: las trazas de los sistemas abovedados. Séptimo Congreso Nacional de Historia de la Construcción. Santiago de Compostela. Instituto Juan de Herrera, 2011, p. 1357-1365.

[4] MAÑEZ, María Jesús, GARFELLA, José Teodoro, MARTÍNEZ, Joaquín Ángel. *La iglesia de San Bartolomé de La Jana en Castellón.* XI Congreso Internacional de Expresión Gráfica Aplicada a la Edificación. Valencia. 2012 Universitat Politécnica de Valencia. ISBN: 978-84-8363-964-1.

[5] GARFELLA, José Teodoro, MAÑEZ, María Jesús, MARTÍNEZ, Joaquín Ángel. CABEZA, Manuel. *Aplicación del color a las nubes de puntos, las texturas y su posterior modelización mediante toma de datos avanzada a través del escáner y la fotogrametría arquitectónica*. X Congreso nacional del color. Valencia. 2013 Universitat Politécnica de Valencia. ISBN: 978-84-9048-058-8.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Effects of Alternate Load Paths in damage evolution and identification in architectural heritage

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Abstract
The conservation of architectural heritage encompasses various aspects of technical sciences. In large buildings, made and further modified in different stages with different materials and techniques, it is difficult to measure the "health" of its structure in a simple way. The monitoring through displacement gauges represents one of the less costly solutions for estimating the evolution of damage in an existing structure: evidence of damage is represented by an increase of displacements. Anyway, due to the nonlinear behavior of large constructions, it is possible that displacements are measured only when the damage is at an advanced stage. In this sense, urgent measures have to be taken for ensure the stability of the construction. A preliminary study of the monitoring system and a good calibration of the threshold displacement values is required in order to limit the uncertainty about the true damage evolution stage. At the end, a full example illustrating the strategy to adopt in monitoring an historical construction is proposed.

Keywords: Structural monitoring, progressive damage

1. Introduction
Architectural conservation has a crucial role in the modern era. The history of any country is in some sense defined by its architecture. The actual trends are focused on preservation of historical architectures and monuments.
Weaver [1] noted that architectural conservation of historic urban sites is the most important evidence of the past life style. The idea of preservation deals with issues of prolonging the life and integrity of architectural character and integrity, such as form and style, and its constituent materials, such as stone, brick, glass, metal, and wood. What exactly is architectural conservation has been defined by Stubbs and Makas [2]: architectural conservation constitutes actions and interests that address the repair, restoration, maintenance and display of historic buildings and sites or measures taken to keep the existing state of a heritage resource from destruction or change. Therefore, actions preventing decay and prolonging life are needed. This includes maintenance, repair, consolidation, and reinforcement.
The international community as a whole and, in particular, the international scientific community have a very important duty: protect the integrity of cultural heritage sites from the destructive effects of natural and man-made hazards. The most prominent factors affecting cultural heritage structures are the environment, pollution, and tourism [3-5]. Some sites with recognized cultural value have been already deteriorated, partially destroyed, or are in imminent danger due to the effects of various "stresses" as earthquakes, volcanic eruptions, floods, land subsidence, pollution and acid rains.
Engineers can help architects and all the people involved in the conservation of such objects through innovative techniques. As said, continuous deterioration plays one of the most relevant hazards for historical constructions. One strategy for assessing such continuous processes is represented by the installation of sensors able to detect unusual increments in displacements in the structure. These can

be related to progressive damage. Unfortunately, various problems occur. Preliminary to any discussion, the behavior of structures made by connected entities has to be highlighted (Section 2). Then, solutions to the emerging problems are presented. These are based on the idea of force paths in the structure. An example of what has been theoretically presented is reported in Section 4. General conclusions are, then, illustrated in Section 5.

2. Behavior of damaged structures

The response of connected structures to damage can be extremely variable. Usually, such structures are characterized by the presence of multiple load paths. In other words, once a set of loads is assigned to the elevation part of the construction, the ways the forces are transferred to the foundations is extremely variable. The presence of multiple load paths is essentially linked to the static indeterminacy of the scheme, for which equilibrium equations are not sufficient for finding the forces in the elements. Thinking about robustness, intended as the capacity of a structure not to be too sensitive to local damage, whatever the source of damage, the presence of multiple load paths is considered a powerful strategy for preventing large deformations due to local damages and, thus, for ensuring the robustness of the structure. In parallel, the robustness of the structure may be a good indicator on the possibility that the structure exhibits large or smaller displacements before the collapse. In these terms, it is important to assess whether a structure is robust or not. To discuss on the behavior of frame structures under localized damage and on the difficulty in assessing the progression of the damage, consider the structure represented in Figure 1, taken from [6].

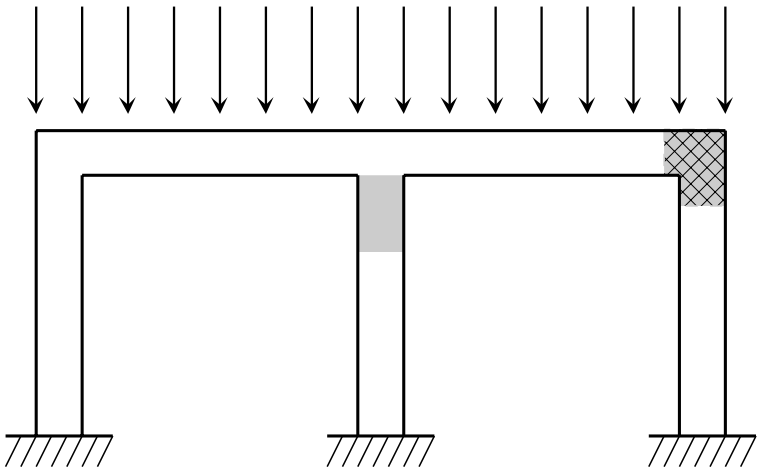

Fig. 1: A three columns – one storey concrete frame. Two different damages are supposed to act, alternatively on the structure. The damage acting on the top right joint (indicated as grey shaded transversal black hatchings represents the first situation. Otherwise, the plain grey area represents the second damage situation, from [6].

The example relates to a three column-one storey frame on which a uniform load acts on the horizontal deep beam. Since the system is symmetric, the bending moment in the central vertical element is null. Therefore, only an axial force acts on this vertical element. Idealizing the system as made by five monodimensional elements, say “beam elements” in a finite element software (two for the top beam and the remaining three for the columns), the degrees of static indeterminacy are 6. In this sense, as briefly explained, there are various load paths.
A main question follows: what happens if one column is progressively damaged? Since the system is statically indeterminate, the damage does not turn the equilibrated system into a mechanism. In particular, as soon as the degrees of static indeterminacy of the undamaged scheme are larger than one, the damaged scheme is still statically indeterminate (and presents more than one load path). In other words, damaging progressively one column, the remaining is able to sustain the external actions, i.e. to transfer the loads from the elevation to the foundation.
Suppose now to monitor the vertical displacement at the two mid- spans of the top beam. In the case in which the damage interests the top right joint, the resisting bending moment at that point reduces and, thus, the bending of the top beam increases, i.e. the mid-span of the right beam moves down. On the contrary, if the damage interests the cross- section of the central column, which is only subjected to axial force, the stiffness reduction is smaller. This is essentially due to the fact that the flexural stiffness is several orders of magnitude higher to the respect to the axial one. Hence, the damage progresses and the system apparently behaves as undamaged. The collapse may occur in two distinct

situations: (i) if compressive strength in the central column is exceeded and the element breaks in compression, (ii) if flexural strength is not sufficient for the additional horizontal force acting on the structure and generating bending in the columns [6].
As a result of what presented above, as much as there are alternatives in the ways the loads are transferred from the elevation to the foundations, the effects of damage can be various. There is the possibility that the monitoring of some cinematic quantities (say displacement or rotation) at the wrong point does not give any evidence of progressive damage [6].
This fact has been highlighted by De Biagi [7] in evaluating the variation of deformation work after a localized progressive damage. He generated topologically similar structures with different stiffnesses distribution. In theory, since the topology is constant in the analysis, the number of load paths does not change. Anyway, the different distribution of stiffnesses, i.e. the cross-section of the elements varies, causes the behavior of the structure to be different, once a load is applied on it. That is, if one considers the scheme into which the load path, i.e. the way the forces are transferred from the elevation to the foundation, is unique the suppression of elements belonging to the most effective (and unique) load path entails large increases in the work of deformation. In parallel, the removal of elements not belonging to the most effective load path, does not involve an increase in work of deformation. On the contrary, if the stiffnesses distribution is such that is not possible to identify the dominant load path, the effects of progressive damage on deformation work are extremely reduced.

2.1 Models for damage evolution

Damage phenomena on constructions are various and uniform approaches are difficult. Although the choice of a function for structural damage is a challenging task [8], specific approaches are possible only once damage causes are clearly identified. In order to assess structural robustness with respect to a progressive deterioration of the structural components, the damage on the structure acts at the material level. As reported in Lemaître and Chaboche [9], the phenomenon can be modelled by softening of material strength and/or stiffness. In this sense, the decrement of stiffness is governed by a reduction of material elastic modulus, from its nominal value to zero in the undamaged and totally damaged cases, respectively.

3. Monitoring for damage through displacements

The damage can be considered as an unplanned variation of the properties or of the geometry of one or more parts of a structure, which entails a weakening and, usually, negative consequences. The methods usually used in the evaluation of damage on a structure consider its static or dynamic response, or both. Previous researches shown that the former is more sensitive to damage than the latter [10] and stressed the fact that the instrumental equipment for static measures is economic and easy to install [11].
As stated in the previous section, because of the redundancy in the structural schemes, the interpretation of deflection, rotations and strains is not straightforward for a direct evaluation of the health of the structure [12]. The main problems in the usage of static data rise when the damage acts on an element that has no or fairly little contribution to structural deformation under a certain load case.
The response of the structure, under its elastic phase, is a function of the distribution of stiffnesses and the position and magnitude of the external loads. In structures with high degree of static indeterminacy, e.g. frames, the overall behavior is determined by the contribution of all the elements belonging to the scheme. For example, in a three stories frame subjected to vertical loads and horizontal wind forces, the actions at the foot of one of the columns are highly dependent upon the way the stiffnesses are distributed on the whole structure, rather than on the neighborhood of the column under consideration.

3.1 Instrumentation for displacement measurements

The best way to assess the displacements of a large construction is represented by a topographical survey. Marks are placed on the building at precise points and the position of the measuring instrumentation is clearly defined in the neighborhood of the construction (which may be considered fixed). At precise time steps, the relative position of the reference points (materialized on the construction with the marks) is measured by means of distance and angles. In order to evaluate the absolute displacement, the set of reference points has to include fixed points (say objects that cannot deform or move around the construction). The displacement of the measuring points is estimated by subtracting the positions of two consecutive surveys.
In order to get the measurement quicker, it is possible to idealize a fixed measuring gird. Concrete pillars can support topographical instruments and keeping the alignments unchanged for many steps. One of the major advantages of the possibility to fix the position at the initial time is represented by the automatic survey. The system is able to recognize the correct position and performs automatic

searching within the angular range set by the operator. In addition, the metallic marks can be substituted with crystal prisms and the procedure can be further accelerated.

4. Example: monitoring the main facade of Roman Theatre of Aosta (IT)

The effectiveness of the considerations made in the previous sections are now applied to a real example of piece of architecture.

4.1 Historical aspects

The considered construction is the Roman Theatre in Aosta, Northwestern Italy. It was built in the late reign of Augustus, some decades after the foundation of the city (25 BC), as testified by the presence of pre-existing structures in the area. There was also an amphitheatre, built during the reign of Claudius, located nearby. The theatre occupies three blocks annexed to the ancient city walls, along the Roman main road (the decumanus maximus, next to the Porta Praetoria. The structure occupied an area of 81 x 64 m, and could contain up to 3 500/4 000 spectators.

What remains today include the southern facade, standing at 22 m. The theatre is made of large parallelepipeds of “puddinga” a local sandstone with large grains. It was covered by slabs of limestone. The cavea was enclosed in a rectangular-shaped wall including the remaining southern part. This was reinforced by buttresses each 5.5 m from the other, and included by four orders of arcades, which lightened its structure. It has been supposed that the theatre once had an upper cover, making it a teatrum tectum.

The orchestra had a diameter of 10 m. The scene, of which only the foundations remain, was decorated by Corinthian columns and statues, and was covered with marble slabs [13].

The first archeological analyses were made in the first half of 19th Century by Promis. At the beginning of 20th Century, the facade was still covered by medieval houses and part of the area was totally covered by debris. During Fascism, the architectural shape was highlighted through the demolition of superfluous constructions and with excavations, see Figure 2. Many problems due to humidity and low temperature emerged after this intervention. The building was later restored in 2009, see Figure 3.



Fig. 2: Roman Theatre of Aosta in the Therties during the first intervention works. The houses built around the historical monument were demolished, source Wikipedia [13].



Fig. 3: The Roman Theatre of Aosta nowadays, source Regione Autonoma Valle d'Aosta.

4.2 Damage analysis

In the following, the structure of the main facade of the Roman Theatre of Aosta is subjected to a progressive damage. As explained in Section 2.1, the damage model takes into account the reduction of Young's modulus of the material constituting the construction through the parameter *d*. Young's modulus of the undamaged "puddinga" is set equal to 10 GPa.

The damage parameter varies from 0 to 1 for undamaged and totally damaged (i.e. removed) element, respectively.

A frame-equivalent scheme discretizes the masonry facade. A node is set at each connection. Beams connect the nodes. The model is composed by 49 nodes and 76 beams. The cross section dimension of each beam is determined from the sizes of the real masonry structure. The self-weight of the construction is inserted in the numerical model through nodal loads. The frame-equivalent scheme has been determined from rotated and scaled pictures, see Figure 4.



Fig. 4: The main facade of the Roman Theatre of Aosta, source Regione Autonoma Valle d'Aosta.

Since progressive damage velocity is extremely reduced, each damage situation can be considered as a static case. Each simulation consider the damage progressing on just one element. The vertical and horizontal displacements of a control point are monitored as much as the damage evolves on the structure. The control point is at the top of the construction, as indicated by red diamond in Figure 5. The initial displacement, in case of undamaged element, is subtracted from the set of measurements as long as the damage evolves. This gives the possibility to measure relative displacements, instead of giving absolute values that may be prone to various measure errors. In this sense, in the undamaged situation, the monitored value is null.

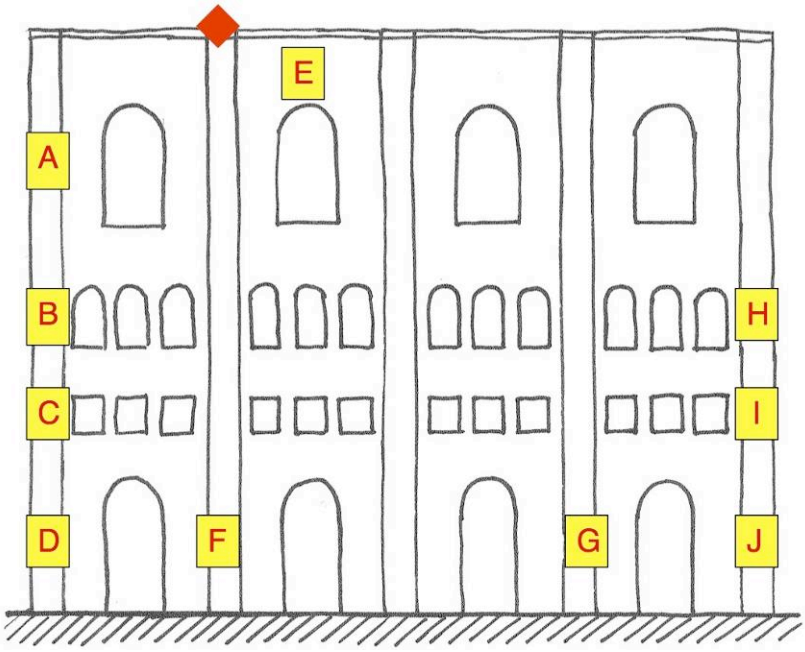

Fig. 5: Localization of the control point (red diamond) and the damaged elements

The vertical displacement due to damage evolution is proposed in Figure 6. Here we show that there are damages that imply larger displacements at the control point, and others not.
The vertical displacement at the control point (red diamond in Figure 5) is plotted as a function of the damage on elements of the frame-equivalent structure. As can be seen in Figure 6, there is evidence of progressive damage only in a limited set of cases. For example, as much as damage progresses on element F, i.e. one of the main columns of the masonry facade, the displacement increases rapidly. Effects of damages on vertical elements are various. Despite the fact that a damage on the columns close to the measurement point induces larger vertical displacements, this does not appear in the case of damage on distant columns.
The horizontal displacement at the control point is plotted as a function of the damage on elements of the frame-equivalent structure. As can be seen in Figure 7, the response of the structure to damage is variable. The main effects are shown in case of damage on elements D and J. This causes large horizontal displacements after the damage reaches a prescribed value. Damage on horizontal beams, say element E, does not cause an increase of horizontal displacement.
Few considerations can be drawn:

- the proposed calculations showed that damages close to the monitored point do not always imply increase in the recorded data. Remembering the damage on element E, no horizontal and vertical displacements are measured, while the damage acts. This is due to the lack of external horizontal forces acting on the structure.
- the evolution of damage and the evolution of displacements are not linear. That is, I record a large increase in the measurements as much as Young's Modulus of the damaged element is close to zero. This affects my estimates on the real health state of the structure.

5. Conclusions

It has been shown that, in frame systems, the response of the system is governed not only by the evolution of damage, intended as a localized reduction of Young's elastic modulus, but also by the

connectedness of the elements. This implies non-linear response of the system when damage occurs on one of its parts.
This fact is important in structural monitoring. The local measure of displacements can give wrong interpretation of the real progressive phenomenon. As clearly visible in Figures 6 and 7, the response of the system does not increase to the final value as much as the damage evolves. This is due to the connectedness of the system and its capacity to redistribute the loads.
An example on a real historical construction shows this property of such structures. The best strategy we propose is to subject the structure to other sort of external loadings (say by mean of tendons) in order to activate other load paths in the structure and highlight all the possible damages.

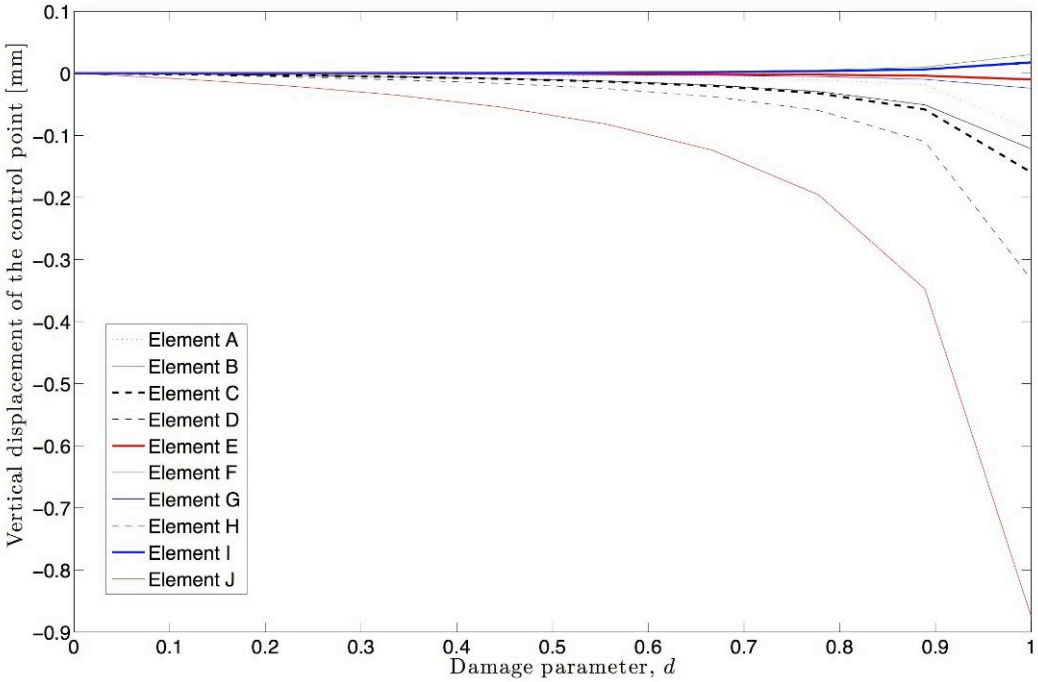

Fig. 6: Vertical displacement at the control point as a function of the damage on vertical and horizontal elements of the frame-equivalent structure.

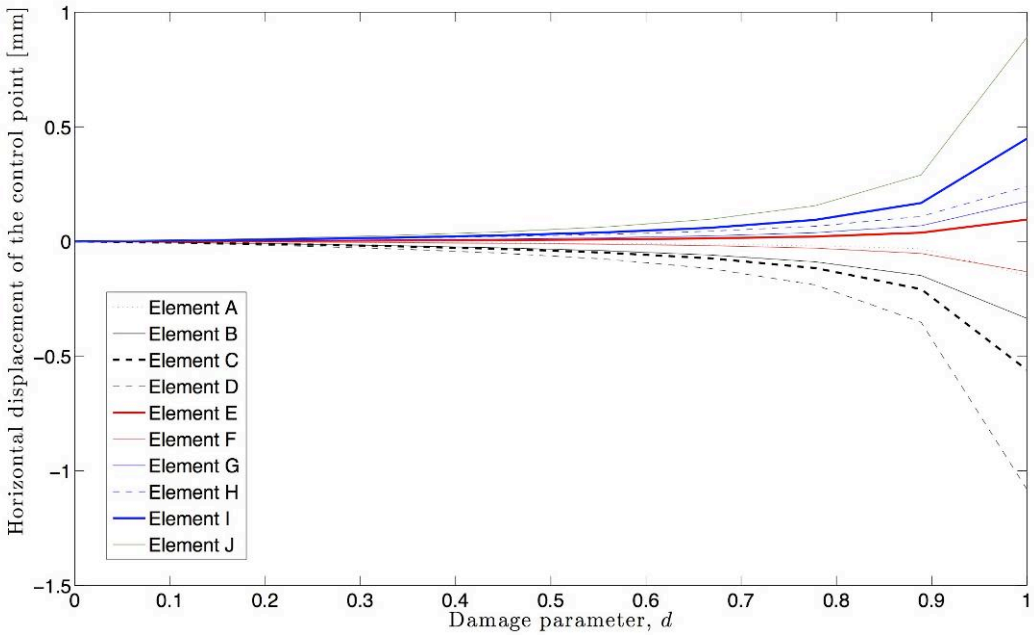

Fig. 7: horizontal displacement at the control point as a function of the damage on vertical and horizontal elements of the frame-equivalent structure.

Bibliographical References

[1] WEAVER, Martin. *Conserving Buildings: A Manual of Techniques and Materials*. New York: John Wiley & Sons, 1997. ISBN: 978-0-471-50944-8

[2] STUBBS, John, MAKAS, Emily. *Architectural Conservation in Europe and the Americas: national experience and practice*. New York: John Wiley & Sons, 2011. ISBN: 978-0-470-60385-7

[3] BENARIE, Michel. Air pollution and conservation. Safeguarding our architectural heritage. In ROSVALL, J., ALEBY, S. edited by ROSVALL, J. and ALEBY, S., Elsevier, Amsterdam, 1991.

[4] BAER, Norbert Sebastian, SNETHLAGE, Rolf. *Saving our architectural heritage: the conservation of historic stone structures: report of the Dahlem Workshop on Saving Our Architectural Heritage: the Conservation of Historic Stone Structures*, Berlin. John Wiley & Son Ltd, 1997.

[5] STUBBS, John (2009). *Time Honored: A Global View of Architectural Conservation*. ISBN 0470260491, Wiley; 1 edition

[6] CENNAMO, Claudia, CHIAIA, Bernardino, DE BIAGI, Valerio, PLACIDI, Luca. Monitoring and compartmentalized structures. *Zeitschrift für Angewandte Mathematik und Mechanik*, 2014. DOI 10.1002/zamm.201300091

[7] DE BIAGI, Valerio. *Complexity and robustness of structures against extreme events*. PhD dissertation, Politecnico di Torino, 2013.

[8] PETRYNA, Yuri, KRATZIG, Wilfried. Compliance-based structural damage measure and its sensitivity to uncertainties. *Computers Structures*, 2005. Volume 83, pp. 1113-1133.

[9] LEMAITRE, Jean, CHABOCHE, Jean Louis, 1994. Mechanics of Solid Materials. Cambridge University Press.

[10] HJELMSTAD, Keith D., SHIN, Soobong. Damage detection and assessment of structures from static response. *Journal of Engineering Mechanics*, 1997, Volume 123, pp. 568-576.

[11] WANG, Xu, HU, Ning, FUKUNAGA, Hisao, YAO, Zhenhan. Structural damage identification using static test data and changes in frequencies. *Engineering Structures*, 2001, Volume 23, pp. 610-621.

[12] HOUSNER, George W., BERGMAN, Lawrence A., CAUGHLEY, Thomas K., CHASSIAK-OS, Anastassios G., CLAUS, Richard O., MASRI, Sami F., SKELTON, Robert E., SOONG, Tsuteh, YAO, James. Structural control: past, present, and future. *Journal of engineering mechanics,* 1997. Volume 123, pp. 897-971.

[13] http://en.wikipedia.org/wiki/Roman_Theatre,_Aosta

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Non-destructive monitoring of an old masonry clock tower with forced and environmental actions

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Abstract
The aim of the paper is to describe the non-destructive tests performed on the clock tower of the Castle of Trani (Bari, Italy). The tower is about 9 meters high and has a square plan with a side of about 3.90 meters; moreover it is built on the principal enter of the Castle and supported by a barrel vault reinforced with an arch.
The tower, built in 1848, was realized in tufa masonry (Stone of Trani); nevertheless, during the years, it has undergone a series of interventions, in particular in 1979 and 1997 to consolidate the walls cores with armed injections and the vaults extrados with hood in reinforced concrete.
The non-destructive monitoring was realized using specific accelerometers placed on the structure for measuring the acceleration in different points. The particular squat structure of the clock tower made the traditional monitoring, with only environmental actions, the so called only-output measurements, not so safe for determining the building modal parameters. For this reason, an electro-hydraulic shaker was ad-hoc designed and realized for applying a controlled dynamic force on the examined old masonry tower.
In this paper all the phases and procedures of the experimental monitoring will be described together with a preliminary analysis of the data.

Keywords: Non-destructive monitoring, Masonry Tower, Forced Vibrations, Dynamical analysis.

1. Introduction and historical background

Trani Castle is one of the most important castles among those erected by Holy Roman Emperor Frederick II. It is placed close to the sea and its location on the edge of the town allowed to guard the entrance of the port and the access roads to the village.
Originally the Castle had a simple and functional quadrangular enhanced layout with four square towers with the same height. The clock tower of the castle (Fig.1), in tufa masonry, was added to the main entrance in the XIX century, just when the castle became a prison. With this modification of its end use, many changes underwent, but fortunately the interventions of the XIX were only superimposted to the old structures and consisted of opening and closing passages, local filling of masonry walls, the construction of new rooms, always using the existing structures to fit with the least expense to the new needs. The clock tower was built by Tommaso Moscatelli early in 1848, while the clock was built and put in place by Vincenzo Russo in 1848.
In 1976 the castle was consigned to the Superintendence for Architectural, Artistic and Historical Heritage of Puglia who started restoration works since July 1979 and finally the opening to the public of the monument was celebrated on the 5th of June 1998.

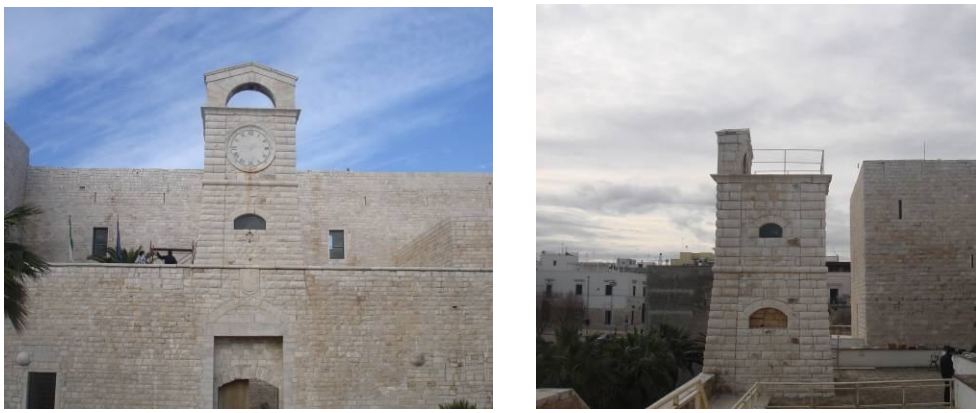

Fig. 1: The clock tower of Trani.

The dynamic behavior of the historical buildings is usually analyzed in order to evaluate its vulnerability, and eventually for designing repair intervention solutions and retrofitting to seismic actions. Retrofitting interventions on old masonry structures are quite common as these ones, like the tower under exam, have been built to resist only to vertical actions. Studies consider different kinds of analyses [1], the mechanical characterization of the structural materials [2] and intervention techniques [3-5] to improve the behavior of masonry structures. The most utilized techniques consist in non-destructive in situ tests aimed at acquiring acceleration data in specific points of the structure induced by ambient and forced vibrations.
Usually the experimental data are recorded by means of a series of accelerometers installed in specific points of the structure, and subsequently are analyzed through the Operational Modal Analysis (OMA) (i.e. [6-11]), with the aim of evaluating the modal properties of the structure. Slender structures, such as towers, are particularly suitable to this type of investigation [6-15], as they show significant vibrations also in the field of low intensity actions, like the ones induced by ambient actions.
The analyzed clock tower can be considered a squat building; this circumstance has suggested to perform forced dynamic tests [15] in order to obtain more clear data. To this aim an appropriate electro-hydraulic shaker has been designed, built and used for forcing the structure to vibrate. In the paper the equipment and the experimental set up utilized for in-situ dynamic identification tests are described and an extensive analysis about the effects of the shaker on the response of the tower is presented.

2. Description of the tower

The clock tower is about 7.0 m tall and consists of three parts: the base, the clock and the hut where a small bell is housed. The base has a slightly trapezoidal shape and rests directly on the walls at the entrance to the Castle, immediately after the stone bridge that crosses the moat. The clock tower is about 4.0 x 4.0 m in plan., its structure consists in masonry walls in Apulian tufa (with a variable thickness of about 75 cm), covered with Trani stone, of about 25 cm thick. The clock part, with similar dimensions of the base, is a cubic element that has, on each facade, a division in different parts. On the main facade there is the face of the clock, in perfect line with it, while the other sides has lower-level openings.
On the last level, in perfect proportion with the underlying layers, there is a hut which was used to house a small bronze bell that, at the time when the castle was used as prison, indicated the changing of the guard, but that however it was not presented during the dynamic tests.
Each level is defined by a cornice; the one which separates the first from the second level is rounded and has no protrusions; the frame on which the hut is set is convex and presents a higher protrusion.
The artifact is accessed from the plan sets with the castle wall through an opening.

3. Description of the testing set-up

The monitoring system consists of several elements properly connected: the acquisition units or piezoelectric accelerometers with a sensitivity of about 1000 mV/g; the data acquisition system or DAQs positioned at each of the monitored level; the laptop with an acquisition software; the cables that connect all elements to each other. In the specific case twenty-three high sensitivity seismic accelerometers ICP PCB 393B31 were positioned on the four corners of the tower; using appropriate rectangular blocks for ensuring the orthogonality (see details in Fig.2). The accelerometers were

placed on four different levels in such a way to guarantee a certain alignment (Fig.3); two accelerometer were placed on the superior arch for monitoring the oscillation of the upper part, probably the most significant local modes for stability analysis.
This paper will consider the data of the accelerometers aligned in the frontal side including the superior arch and registering the vibration orthogonal to the main entrance and indicated as positions A,B,C and D in Fig. 4.



Fig. 2: Details of the accelerometers mounted on the tower and the connecting wires

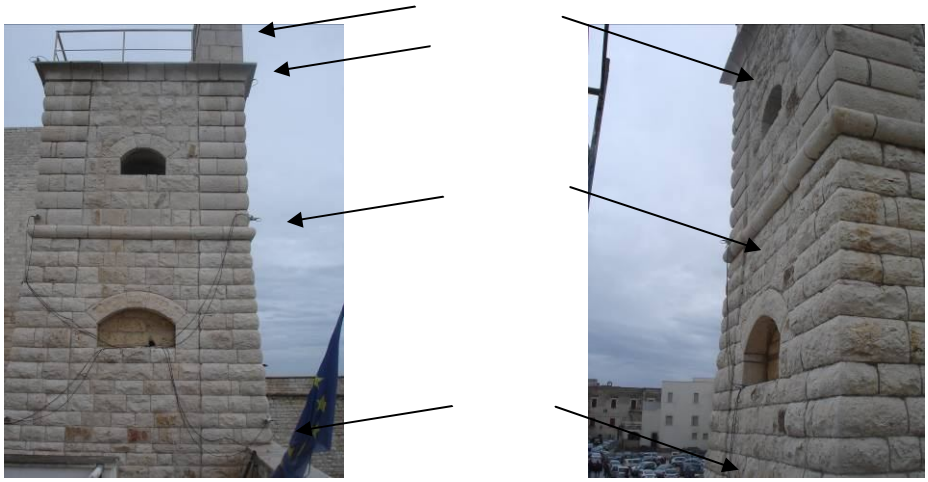

Fig. 3: Different levels of alignments of the accelerometers in two different sides

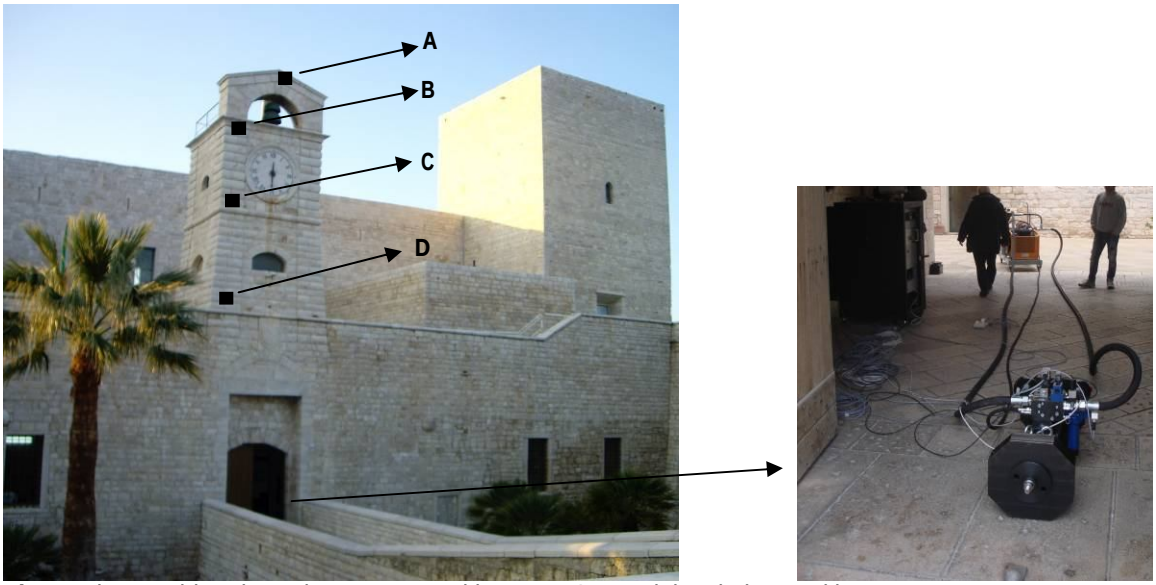

Fig. 4: The considered accelerometers positions A,B,C,D and the shaker position

The forced vibration tests have been performed by means of an electro-hydraulic shaker (fig. 4). In particular, the system adopts an electronic control system that governs a hydraulic pump valve (with a maximum flow rate of 40 l/min and a maximum pressure of 120 bar) and drives the actuator device to-and-fro by adjusting hydraulic power units. The shaker can apply a maximum static force of 50 kN and is characterized by a large stroke (maximum displacement of ±100 mm); moreover the shaker has a 200 kg stabilizing mass. Due to specific limitations imposed by the Superintendence and to logistic difficulties, it was not possible to place the shaker near the clock tower. As a consequence, it was decided to position the shaker at the main entrance of the Castle without a direct contact with the turret and with a vibration direction orthogonal to the door, while the hydraulic pump was behind the actuator and connected with the two actuator chambers by pressurized black wires.

4. Experimental tests

4.1 Preliminary results in environmental conditions

The experimental tests were carried out on the 24th January 2014. Preliminarily, three environmental tests were conducted for testing the amplitude of the recorded oscillations. The tests lasted 15 minutes with an original sampling rate of 1024 Hz.
The data have been under sampled to 128 Hz and also normalized eliminating the offset of each signal by subtracting the mean value of each acquisition.
In Figs. 5-8 the three time histories for the four considered positions A,B,C,D are plotted.
From the results shown in Figs 5-8 two important considerations may be immediately carried out:
- the repeatability of the oscillations for the three different tests;
- the different amplitude of the oscillations for the four considered measure points in all the tests: the peak to peak value of the oscillations in position A (on superior arch over the turret) is around $4*10^{-4}$ [g], it decreases to $2*10^{-4}$ [g] in position B (upper part of the turret), to 10^{-4} [g] in position C (middle part of the turret), to around $0.8*10^{-4}$ [g] in position D (lower part of the turret). This consideration ensures a registered environmental oscillation of the superior part of the turret and of the arch nevertheless the very stocky profile of the building; the peak to peak values are consistent with the accelerometers sensitivities ensuring the correctness of the used experimental setup.

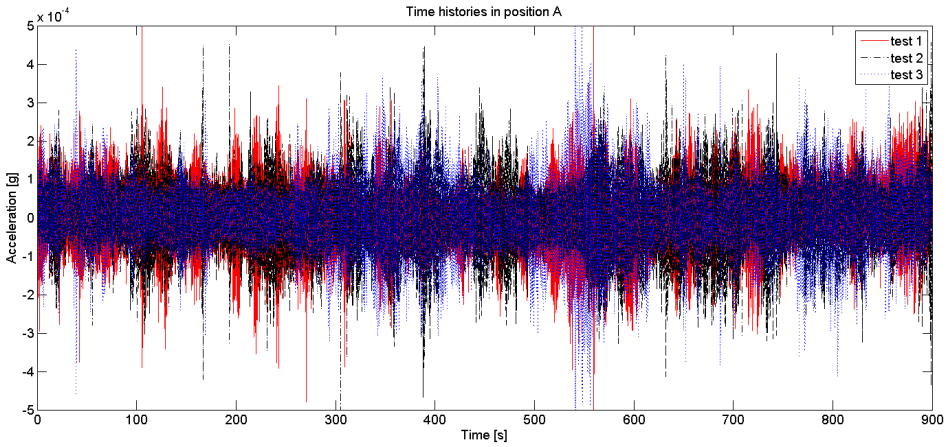

Fig. 5: Time histories in position A (environmental excitation)

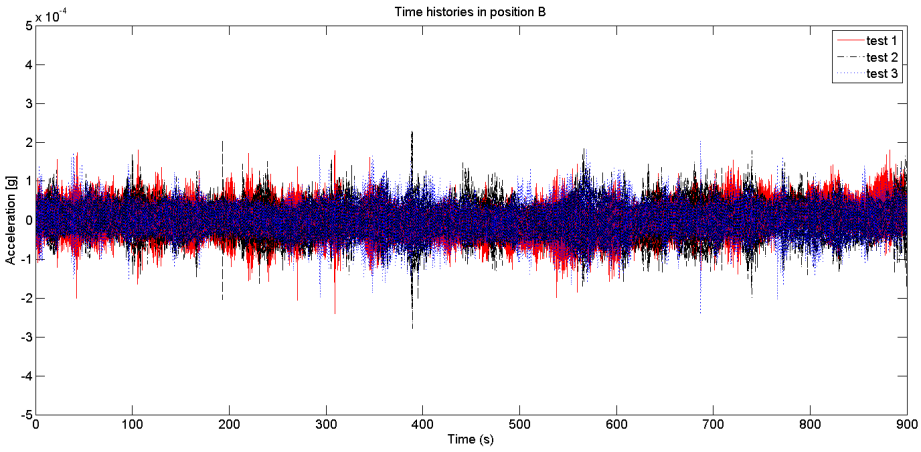

Fig. 6: Time histories in position B (environmental excitation)

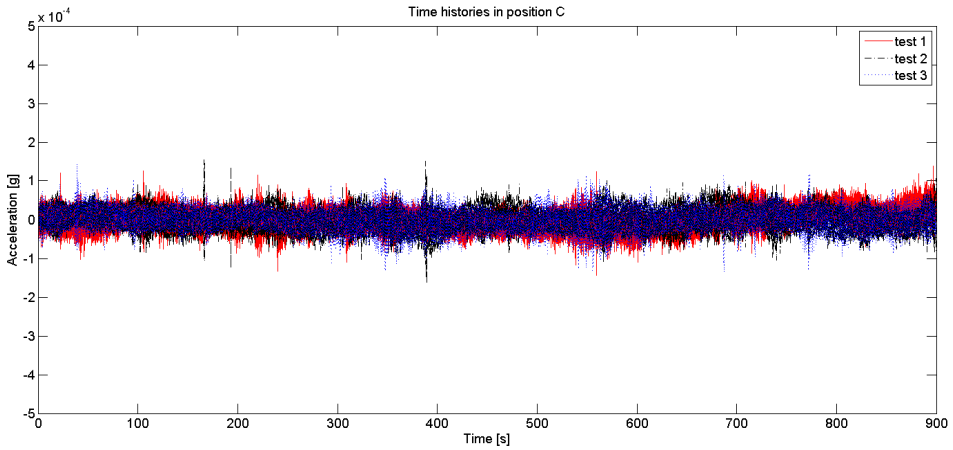

Fig. 7: Time histories in position C (environmental excitation)

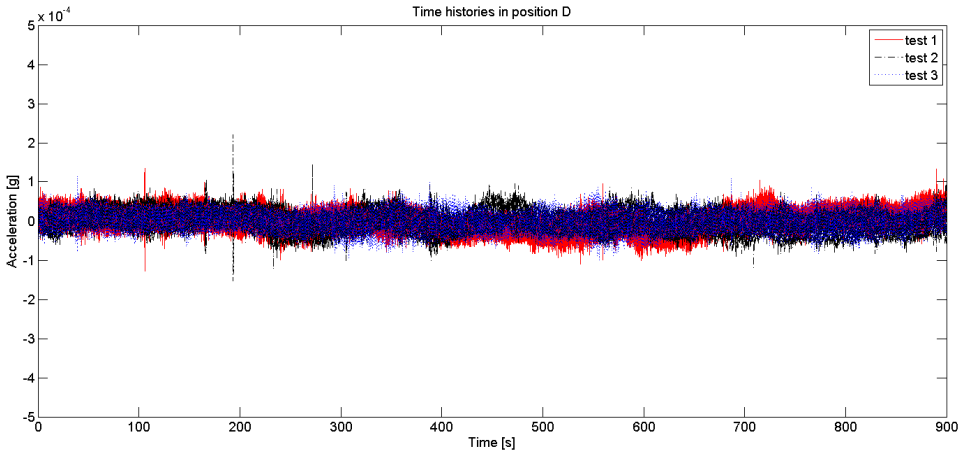

Fig. 8: Time histories in position D (environmental excitation)

4.2 Results of the tests with the use of the electro-hydraulic shaker

In order to amplify the oscillations values the electro-hydraulic shaker has been placed as previously described in Fig. 4. The first test was carried out considering an excitation with the same amplitude and a changing frequency during the acquisition. In detail the frequency was changed from 1 Hz to 15 Hz with a step of 2 Hz manually modified every about 2 minutes. The final 80 seconds of acquisition have been done switching off the motor in order to evaluate the influence of the motor to the oscillations in the considered positions.

The results for the four considered positions are shown in the following Figs. 9-12. It is evident that the shaker amplifies the oscillations in all the positions (with a factor of 5-10 times with respect to the environmental oscillations of Figs. 5-8); nevertheless it is placed in the base entrance without a direct contact with the tower structure. Moreover, it is interesting to observe a relevant amplitude variation according to the shaker frequency variations; in all the positions the signal increases in the second part when the shaker frequencies gets to 9,11,13 and 15 Hz.

Finally, observing the last 80 seconds of the acquisition when the pump motor is switched off, it is evident that there is a brusque redution of the oscillations. In order to investigate on this aspect, another acquisition of six minutes has been carried out considering the oscillations related to the effect of the pump motor only. The results are shown in Figs. 13-16 and they show clearly that the dominant effect of the oscillation is due to the pump motor. This preliminary analysis convinced the authors to use the shaker with only the accumulator power (motor switched off) in order to excite the structure avoiding the vibrations of the motor. Next section shows the results in this testing condition.

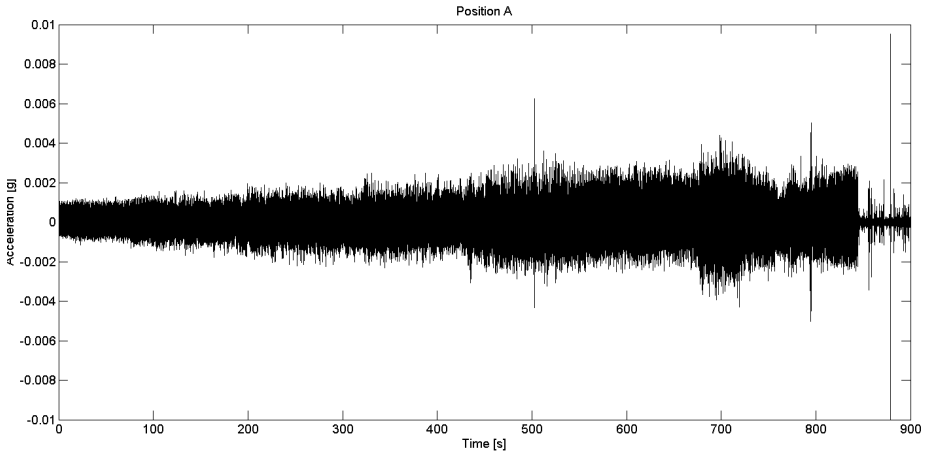

Fig. 9: Time history in position A (with variable frequency shaker and motor)

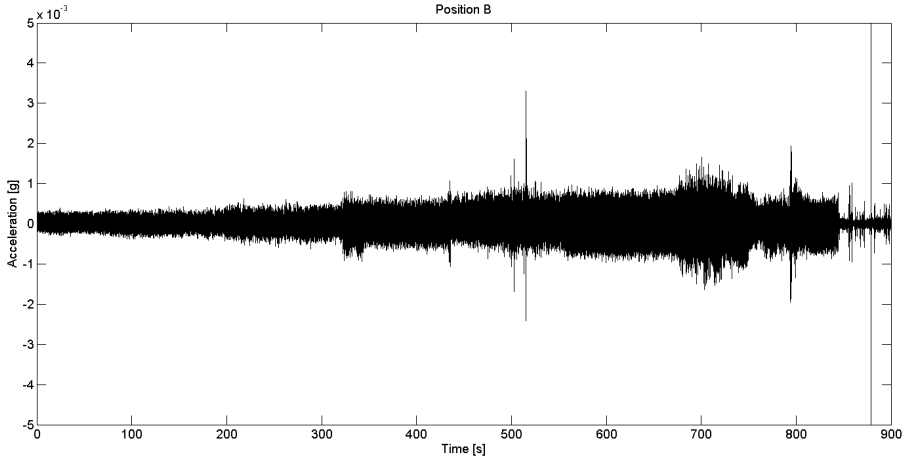

Fig. 10: Time history in position B (with variable frequency shaker and motor)

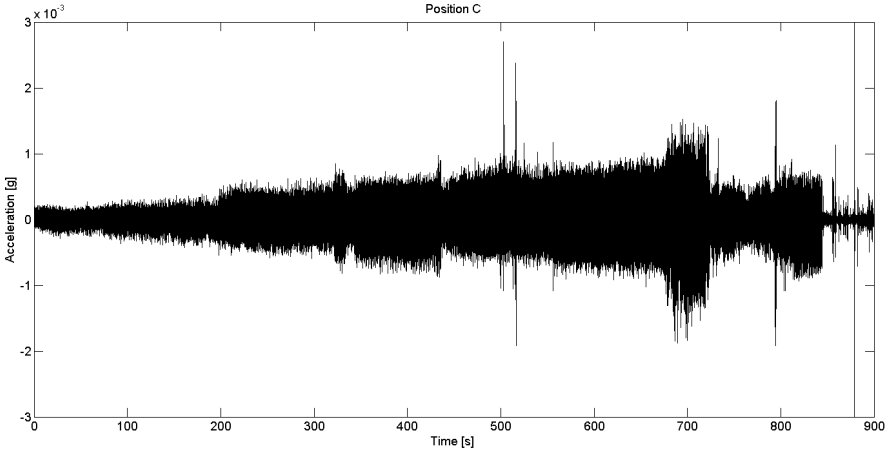

Fig. 11: Time history in position C (with variable frequency shaker and motor)

4.3 Results of the tests with the use of the electro-hydraulic shaker with only the accumulator

The preliminary analysis has been very useful for arranging further tests without any doubt about the possibility of damaging the structure and/or about the possibility of acquiring data only related to the shaker forcing action and not influenced by the pump motor effects. For this reasons, short tests were carried out using only the accumulator energy. Nevertheless the accumulator autonomy was very short and also depending by the frequency; for example, for a frequency of 3 Hz the accumulator has 110 seconds of autonomy, but it decreases to about 50 seconds for 9 Hz, to about 25 seconds for 18 Hz and to only 15 seconds of autonomy for 20 Hz. All the time histories of the tests are shown in the following Figs 17-20 for the considered positions.

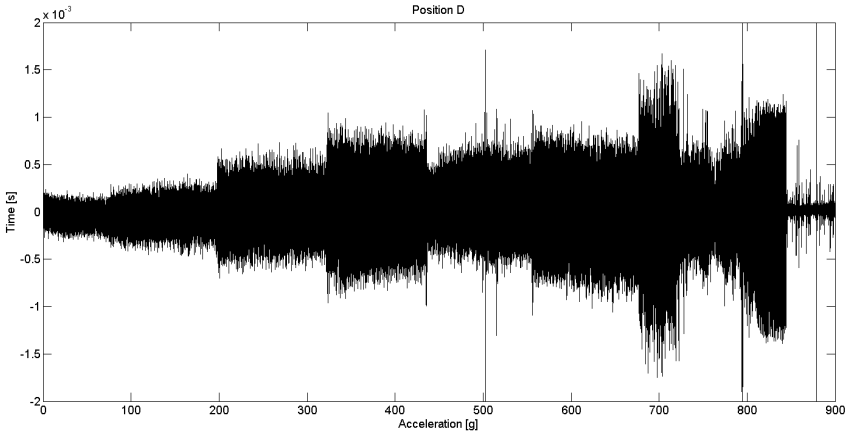

Fig. 12: Time history in position D (with variable frequency shaker and motor)

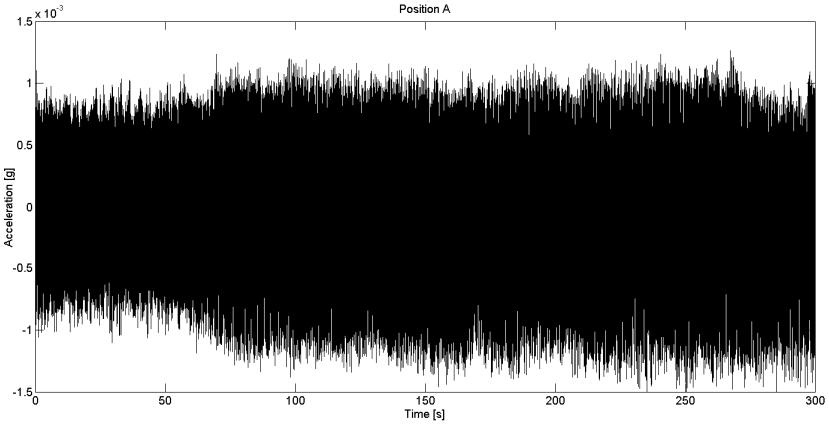

Fig. 13: Time history in position A (with only motor)

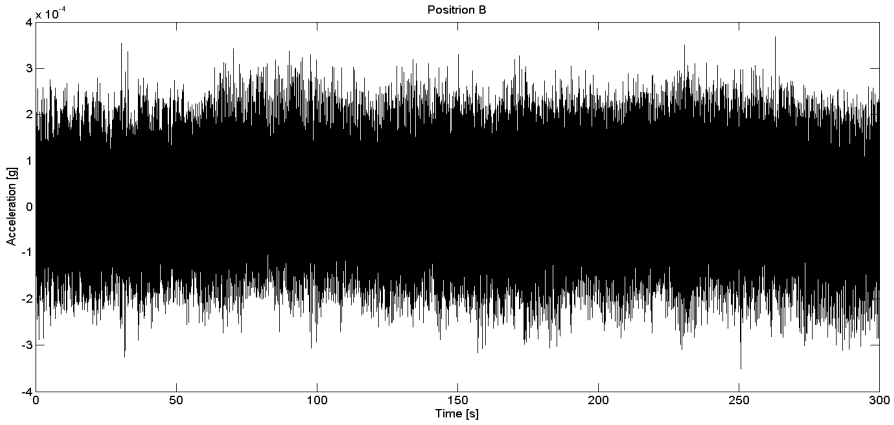

Fig. 14: Time history in position B (with only motor)

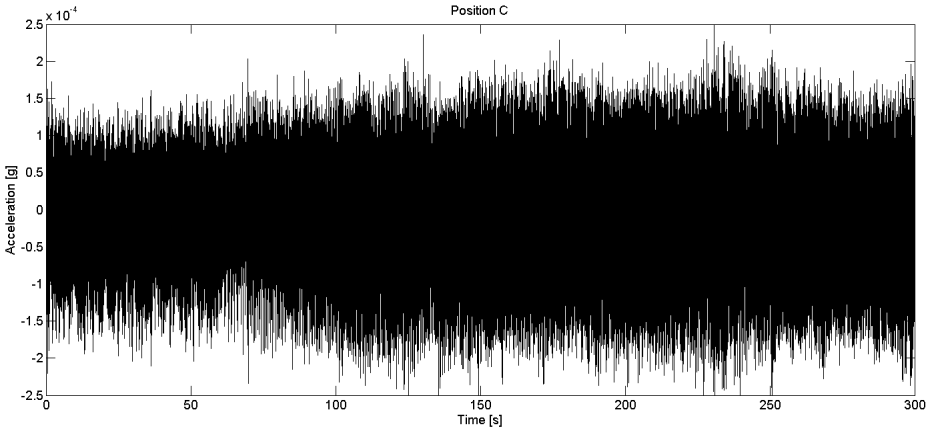

Fig. 15: Time history in position C (with only motor)

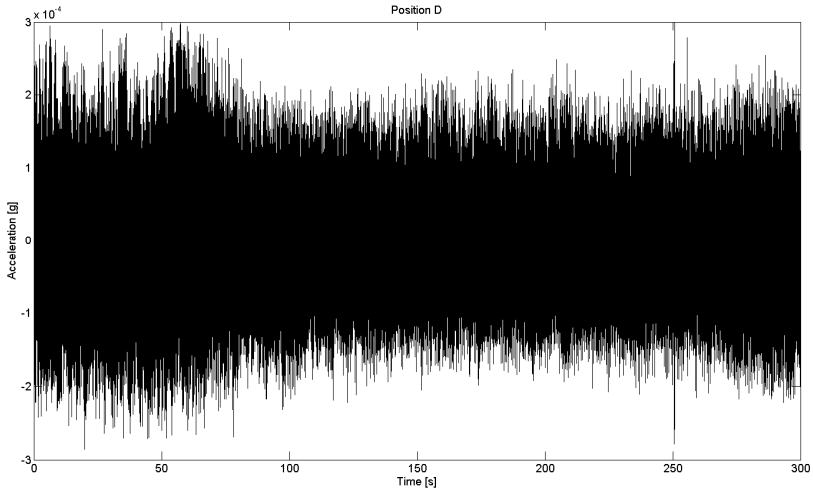

Fig. 16: Time history in position D (with only motor)

It is evident that the amplitude varies at changing the frequency of the shaker; in all the positions the maximum amplitude is achieved with a frequency of 18 Hz, letting us consider that this value could be considered very close to the first natural frequency of the building. Anyway the results here discussed are meaningful as they demonstrate the applicability of the electro-hydraulic shaker for forcing the structure also if it is not applied directly in contact with the turret.

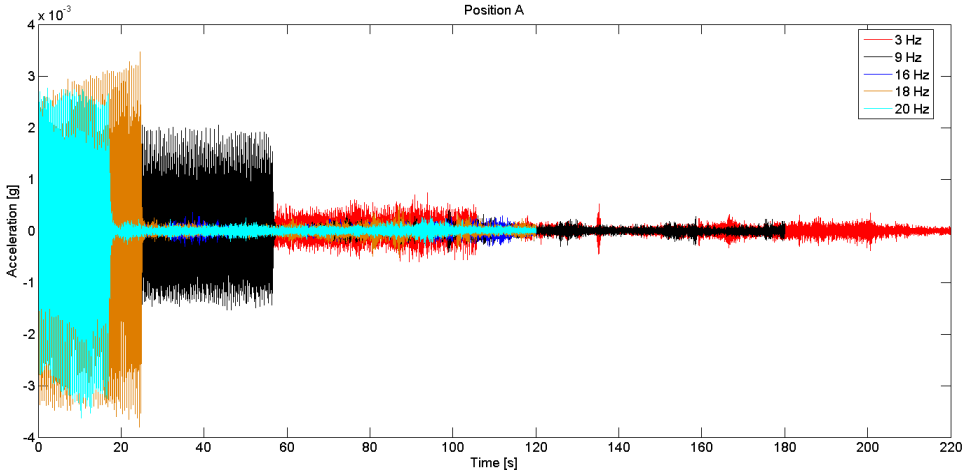

Fig. 17: Time histories in position A with different shaker frequencies

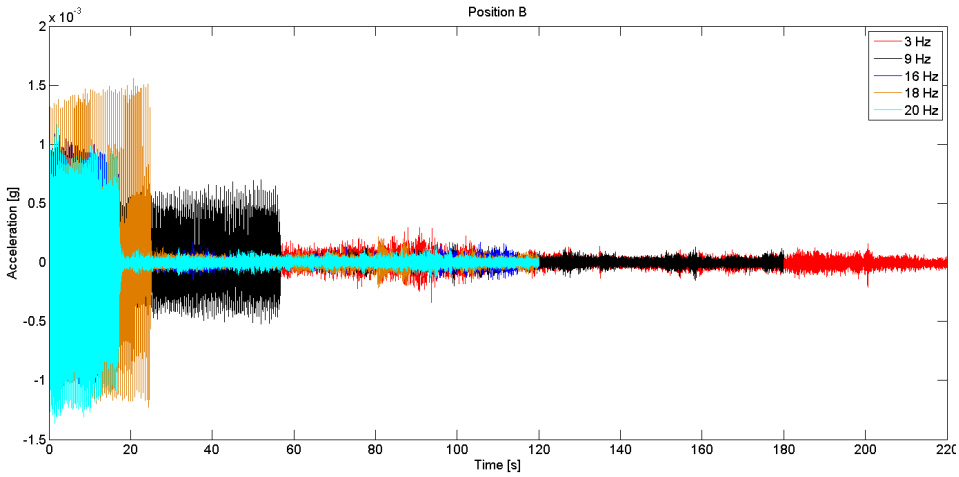

Fig. 18: Time histories in position B with different shaker frequencies

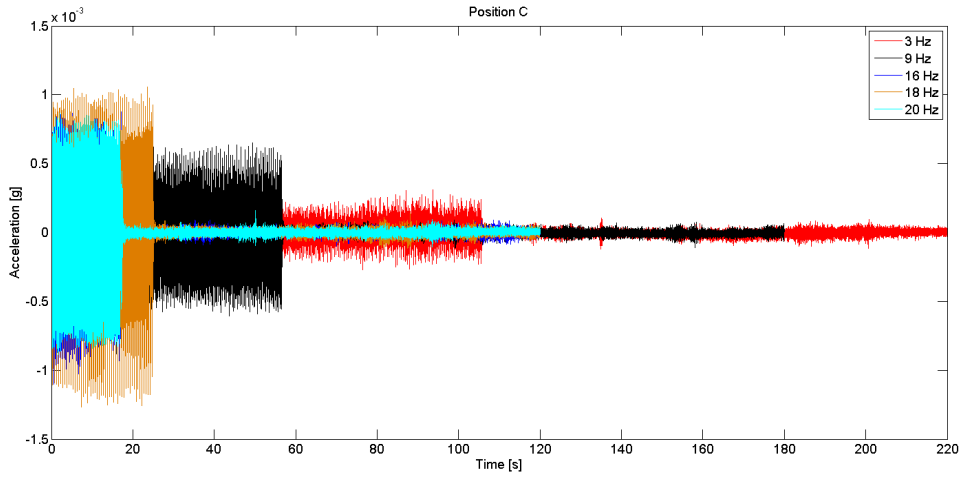

Fig. 19: Time histories in position C with different shaker frequencies

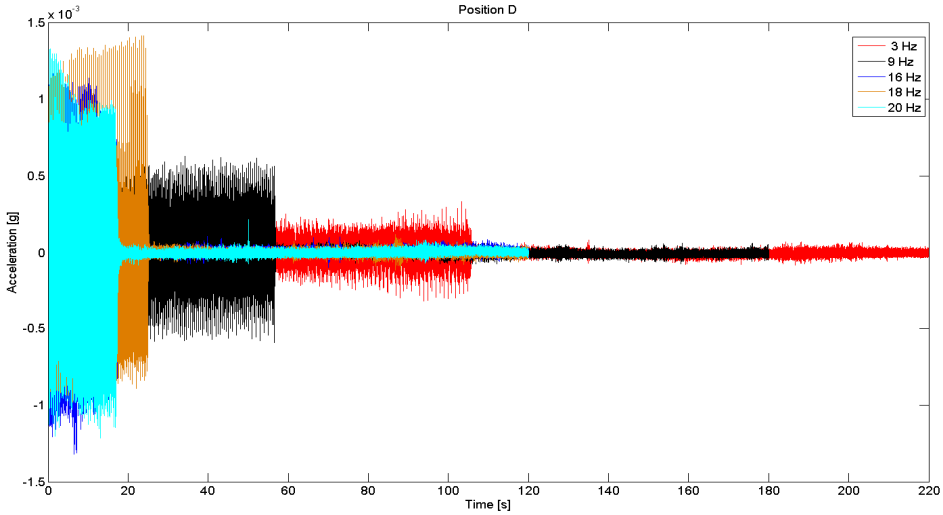

Fig. 20: Time histories in position D with different shaker frequencies

5. Conclusions

In this paper the efficacy of an experimental setup, that was *ad hoc* designed for the dynamic tests of a squat structure, is investigated. In particular, the setup has the possibility of forcing the structure with excitations having different frequencies and amplitudes; the real effect of the frequency variation on the structural response recorded at different levels of the tower has been extracted, giving useful

information on the dynamical behaviour of the clock tower. The here presented data demonstrate the possibility of the designed experimental setup of amplifying the oscillations of the tower also when the shaker cannot be directly connecting the examined tower, as in the case here discussed.

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Bibliographical References

[1] D. Foti, M. Debernardis, V. Paparella, Structural Safety Control of Masonry Buildings: Non-Linear Static Seismic Analysis with a Non-Linear Shear Strength Criterion, In: B.H.V. Topping, (Editor). *Proc. of the Eleventh International Conference on Computational Structures Technology*. Dubrovnik, 4-7 sept. 2012, STIRLINGSHIRE: Civil-Comp Press, ISBN: 978-1-905088-54-6, doi: 10.4203/ccp.99.

[2] A. Castellano, P. Foti, A. Fraddosio, S. Marzano, M.D. Piccioni, Mechanical Characterization of CFRP Composites by Ultrasonic Immersion Tests: Experimental and Numerical Approaches, Composites Part B, DOI 10.1016/j.compositesb.2014.04.024 (2014).

[3] C. Modena, M.R. Valluzzi, R. Tongini Folli, L. Binda, Design choices and intervention techniques for repairing and strengthening of the Monza cathedral bell-tower, *Construction Building Materials*, 16(7) (2002) 385–395.

[4] D. Foti, On the numerical and experimental strengthening assessment of tufa masonry with FRP, *Mechanics of Advanced Materials and Structures*, 20(02) (2013) 163-175.

[5] A. Castellano, P. Foti, A. Fraddosio, S. Marzano, G. Mininno, M.D. Piccioni, Seismic response of a historic masonry construction isolated by stable unbonded fiber-reinforced elastomeric isolators (SU-FREI), *Key Engineering Materials*, 2014.

[6] D. Foti, M. Diaferio, N.I. Giannoccaro, M. Mongelli, Ambient Vibration Testing, Dynamic Identification and Model Updating of a Historic Tower, *NDT&E Int*, 47 (2012) 88-95.

[7] D. Foti, S. Ivorra, D. Bru, G. Dimaggio, Dynamic Identification of a Pedestrian Bridge using OMA: Previous and Post-Reinforcing, In: B.H.V. Topping, (Editor). *Proceedings of the Eleventh International Conference on Computational Structures Technology*. Dubrovnik, 4-7 sept. 2012, STIRLINGSHIRE: Civil-Comp Press, ISBN: 978-1-905088-54-6, doi: 10.4203/ccp.9.9

[8] M. Diaferio, D. Foti, N.I. Giannoccaro, Identification of the modal properties of a building of the Greek heritage, *Key Engineering Materials*, 2014.

[9] D. Foti, V. Gattulli, F. Potenza, Output-only modal identification in unfavourable testing conditions and finite element model updating of a seismically damaged building, *Computer-Aided Civil And Infrastructure Engineering*, 2014, Online ISSN: 1467-8667, doi: 10.1111/mice.12071.

[10] D. Foti, Non-destructive techniques and monitoring for the evolutive damage detection of an ancient masonry structure, *Key Engineering Materials*, 2014.

[11] M. Diaferio, D. Foti, M. Mongelli, N.I. Giannoccaro, P. Andersen, Operational Modal Analysis of a Historical Tower in Bari, in: *Proc. of the Society for Experimental Mechanics Series, "IMAC XXIX".* 7 (2011) 335-342, doi: 10.1007/978-1-4419-9316-8_31, 31 Jan.-3 Feb.2011, Jacksonville, Florida, USA.

[12] M. Diaferio, Dynamic analysis of a historical fortified tower, *Key Engineering Materials*, 2014.

[13] M. Diaferio, D. Foti, V. Sepe, Dynamic Identification of the Tower of the Provincial Administration Building, Bari, Italy, in: *Proceedings of the Eleventh International Conference on Civil, Structural and Environmental Engineering Computing*, Malta, 18-21 Sept. 2007, paper n. 2.

[14] M. Lepidi, V. Gattulli, D. Foti, Swinging-bell resonances and their cancellation identified by dynamical testing in a modern bell tower, Engineering Structures, 31(7) (2009) 1486–1500.

[15] D. Foti, S. Ivorra, M.F. Sabbà, Dynamic Investigation of an Ancient Bell Tower with Operational Modal Analysis, *The Open Construction and Building Technology Journal*, 6 (2012) 384-391.

[16] M. Pieraccini, F. Parrini, D. Dei, M. Fratini, C. Atzeni, P. Spinelli, Dynamic characterization of a bell tower by interfereometric sensor, *NDT&E Int*, 40 (2007) 390-396.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The octagon, the hendecagon and the approximation of pi: the geometric design of the clypeus in the enclosure of Imperial cult in *Tarraco*

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Abstract
The ancient temple dedicated to the Roman Emperor Augustus on the hilltop of *Tarraco* (today's Tarragona), was the main element of the sacred precinct of the Imperial cult. It was a two hectare square, bordered by a portico with an attic decorated with a sequence of clypeus (i.e. monumental shields) made with marble plates from the Luni-Carrara's quarries. This contribution presents the results of the analysis of a three-dimensional photogrammetric survey of one of these clipeus, partially restored and exhibited at the National Archaeological Museum of Tarragona.
The perimeter ring was bounded by a sequence of meanders inscribed in a polygon of 11 sides, a hendecagon. Moreover, a closer geometric analysis suggests that the relationship between the outer meander rim and the oval pearl ring that delimited the divinity of Jupiter Ammon can be accurately determined by the diagonals of an octagon inscribed in the perimeter of the clypeus.
This double evidence suggests a combined layout, in the same design, of an octagon and a hendecagon. Hypothetically, this could be achieved by combining the octagon with the approximation to Pi used in antiquity: 22/7 of the circle's diameter. This method allows the drawing of a hendecagon with a clearly higher precision than with other ancient methods. Even the modelling of the motifs that separate the different decorative stripes corroborates the geometric scheme that we propose.

Keywords: Tarraco, clypeus, Augustus, geometry, hendecagon, Pi-approximation.

1. Investigation context
This article suggests the existence of a geometric model used for shaping monumental clypeus of the sacred enclosure of *Tarraco*, which are preserved at the National Archaeological Museum of Tarragona. This proposal is a result of collaboration between architects from the Technical Superior School of Architecture (ETSA) from *Rovira i Virgili* University (URV) and archaeologists from Catalan Institute of Classical Archaeology (ICAC), from the interchange of knowledge applied to photogrammetric documentation of architectonical heritage as a previous step of the functional and chronological analysis of their structural elements.
The enlargement of the Imperial cult developed in provincial capital a homogenous architectural and artistic language, which was based on the monumentality of Imperial Forum in Rome. In the case of Tarraco, the attractiveness of the hilltop sets up a true religious acropolis, where, through centuries, the main worship building of the city had been superimposed. In this context, the current investigation locates, under the medieval cathedral still in use today (fig. 1e), the worship octastyle temple devoted to Emperor August (fig. 1d), built from Tiberius' period emulating *Mars Ultor* Temple. Afterwards, this *aedes* was preserved during the final transformation of the acropolis into monumental headquarters of the *Concilium Prouinciae Hispaniae Citeriores*. So that Augustus Temple was kept in use in the centre

of a new square erected in the Flavian period (fig. 1a); image and likeness of *Forum Pacis,* in this case. So was introduced a new model of imperial urban sanctuary with formal similarity as Cigongnier in Avenches or Courseul Forum [5].
The new sacred square was delimited by a monumental portico completely made of marble from Luni Carrara and whose colonnade held up an entablature compounded of architrave, frieze and cornice. Over the entablature an attic showed a succession of clypeus with Jupiter-Ammon's figure, clearly inspired in the portico of *Forum Augustum*. Most of the clypeus recovered from Tarragona correspond a syncretic image of Jupiter-Ammon while, for the time being, the identification of another mythological figure is doubtful. A possible fragment of clypeus could reproduce a model of Medusa, although it is not entirely sure (see [6] fig. 3.5). If it is so, this model is related with other emblems of Medusa decorated in base of straight and oblique tabs [3] [8]. This possibility could be related to an iconographic programme of porticoed gallery with attics decorated by an alternation of Jupiter and Medusa clypeus, documented for first time in Flavian period (see [8] p. 575). In Tarraco, and unlike the first model of *Forum Augustum* or in the copies of Pozzuoli and Mérida, separation between clypeus would be performed through panels divided by vegetal candelabrum, as it is found in the cities of Avenches and Arles, or in the forum of Nyon (see [8] p. 567).
The analysis of the recovered fragments, either clypeus elements or candelabrum reliefs, show an average thickness around 16 cm. Regarding clypeus diameter, E. Koppel had achieved around 150 cm [3], this measurement was modified by R. Mar and P. Pensabene (1,35 cm [7] p. 135); our photogrammetric restitution shows around 160 cm.

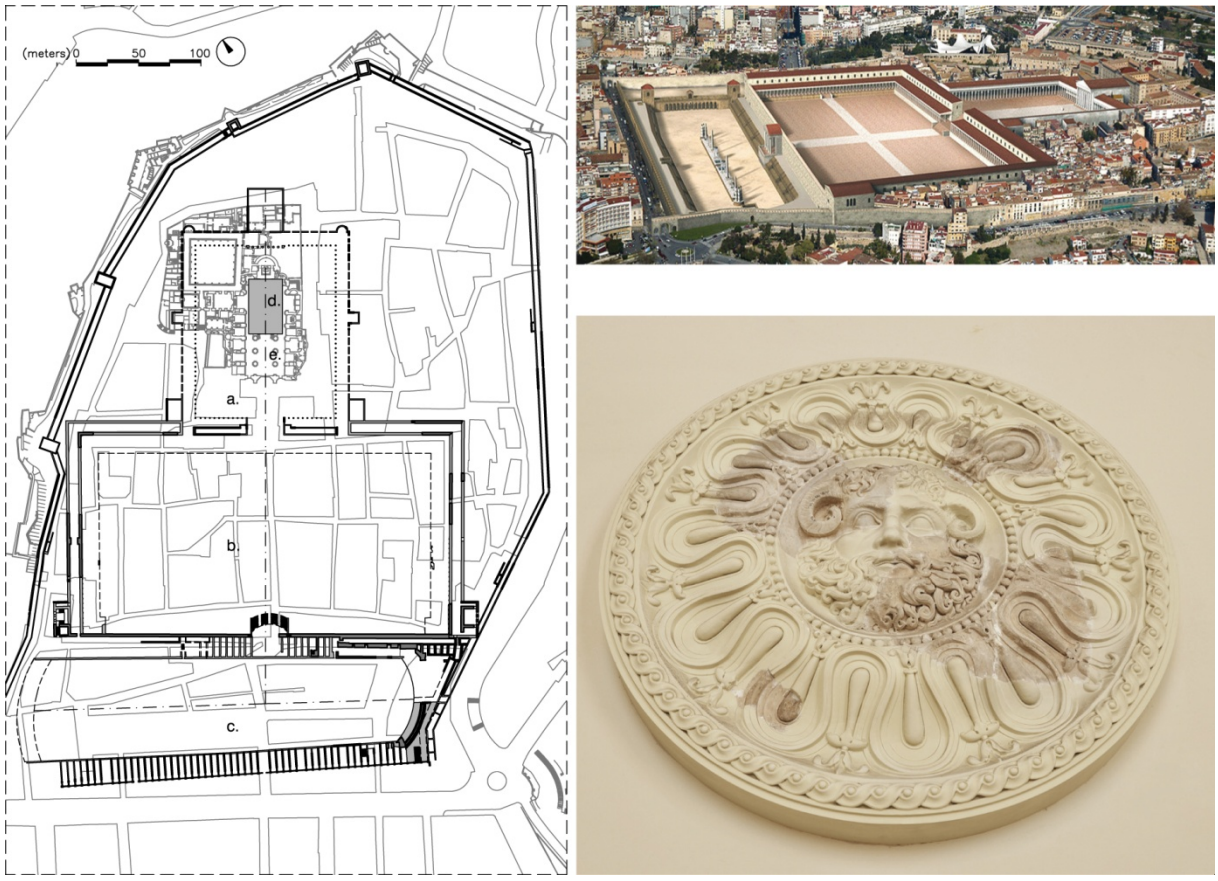

Fig. 1: At left: Building complex of the *Concilium Prouinciae Hispaniae Citeriores* (Provincial Forum), overlaid to the current urban trace and the plan of the Cathedral. Sacred Precinct (a.), Representation Square (b), Circus (c.), approximate position of the Temple of Augustus (d.), Cathedral (e.). Top right: virtual image, *Concilium* superimposed on the present city of Tarragona. Bottom right: photograph of the clypeus exhibited in the National Archaeological Museum.

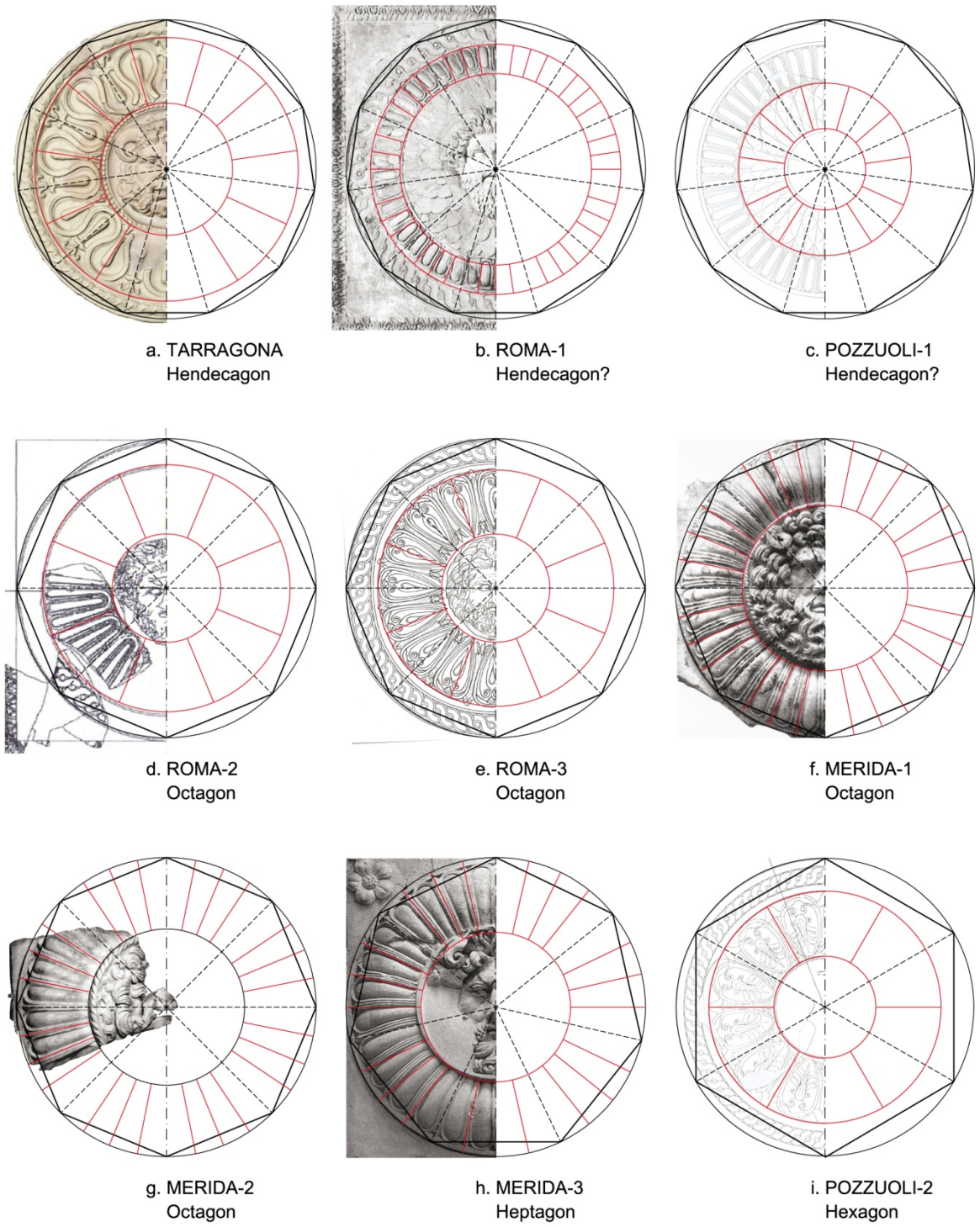

Fig. 2: Clypeus from Imperial Forums: a. Tarragona; b./d./e. Roma [9] [10]; f./g./h. Mérida [1]; c./i. Pozzuoli [13].

2. The singularity of hendecagon

Planimetry of Roman architecture used to be based on simple arithmetic operations, the layout of basic shapes (triangles, squares, rectangles, circles) and their manipulation with ruler and compass (fig. 3). This allows to easily obtain derived figures (e.g. the hexagon, the octagon), as well as immeasurable proportions (e.g. the golden section ratio Φ, √2, √3).

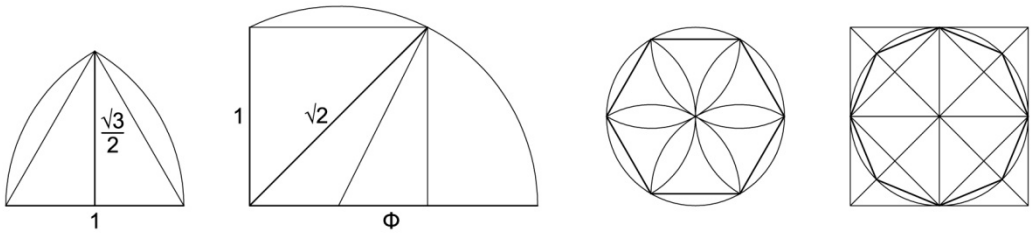

Fig. 3: Basic geometries of Roman architecture.

Typically, central plan Roman buildings (or interior spaces) are articulated from hexagon and octagon. Vitruvius, in the 6th chapter of the 5th book, describes the laying out beginnings of a Latin theatre using four triangles inscribed in a circle, forming a dodecagon, that is, the first subdivision of a hexagon. The Domus Aurea (fig. 4b.) and the Domus Augustana have octagonal rooms, the same geometry we find in the central islands of Leptis Magna Forum and in many rooms of thermal buildings. The 4th-century villa, constructed over the Baths of Trajan (fig. 4d), has a hexagonal layout, as it happens in a courtyard of the Jupiter Heliopolitanus Sanctuary in Baalbek or the columns that surround the inner courtyard of the rotunda-mausoleum built by Constantine in Rome (Santa Costanza Church). We can consider Hadrian's Villa as the culmination of this Roman geometric articulation system for architecture: the so-called *Academia* and *Teatro Marittimo* has a plan based on an intricate layout draft by circles centered at the vertices and axes of an octagon. In the tomb of Portus (fig. 4c.) we can even identify a simultaneous use of the hexagon and the octagon in the same building: the inner room is laid out by an octagon, while the outer peristyle consists of 24 columns, the result of dividing two times a hexagon. These considerations on the large scale can be transferred to architectural decoration, with column shafts with 24 (4x6) striae, vegetal decorations with hexagonal or octagonal flowers, etc.

The use of more 'sophisticated' regular polygons, as the pentagon, the heptagon or the hendecagon, is less common, but we can give some examples. The statue group known as the Dying Gaul in the Capitoline Museum has a pentagonal diagram inscribed on its base (see [12] fig. 3.7). The tholos by the Tiber at Rome (fig. 4e), at the Forum Boarium, has a peristyle of 20 columns, probably the result of subdividing 2 times a pentagon. The so-called Temple of Minerva Medica (fig. 4f), in the Licinianos Gardens of Rome, presents a plan structured through a decagon, the first subdivision of a pentagon.

We have only found a Roman building that we can attribute to a hendecagon based geometry. The tomb at Capua known as *Le Carceri Vecchie* has a circular base with 22 modules, the result of subdividing a triangle or, as discussed below, applying the approximation of Pi given by Archimedes to laying out an architectural plan: according to Mark Wilson Jones [12] (fig. 4.7d, p.75) its diameter is 70 feet, while the 22's intercolumniations of the facade are 10 feet, which leads us directly to the fraction 22/7.

We return now to the decorative element typology that concerns us here. Some of the clypeus from the Imperial Forums in Rome has a decorative crown articulated by an octagonal geometry, as we have verified in figures 2d y 2e. In both cases we have analysed reconstructive drawings published by Lucrezia Ungaro [9] (2007, p. 155, fig. 203) [10] (2004, p. 22, fig.15).

We also found the octagonal geometry in Mérida Forum clypeus fig. 2f/2g). Especially significant is the case of clypeus 2g: we have restored its geometry from the photograph published by José Luis de la Barrera [1] (lamina 83, Cat. 229), who considers that because of the fineness of its carving, and the fact of being the only Carrara marble clypeus of the whole Forum, can be attributed to a master stonemason that would set the model to follow. The clypeus 2f ([1] lamina 92, Cat. 243) is a piece almost entirely preserved; strangely, in the drawing provided by Barrera ([1] in fig. 26) the outer crown is divided in 34 parts, instead of the 32 (4x8) which can be counted in the picture.

Concerning the hexagon, we identify it in the geometry of a clypeus with *anthemion* at Pozzuoli (fig. 2i) that shows the reconstructive drawing published by Fausto Zevi and Claudia Valeri (in [13] figure 10, p. 457).

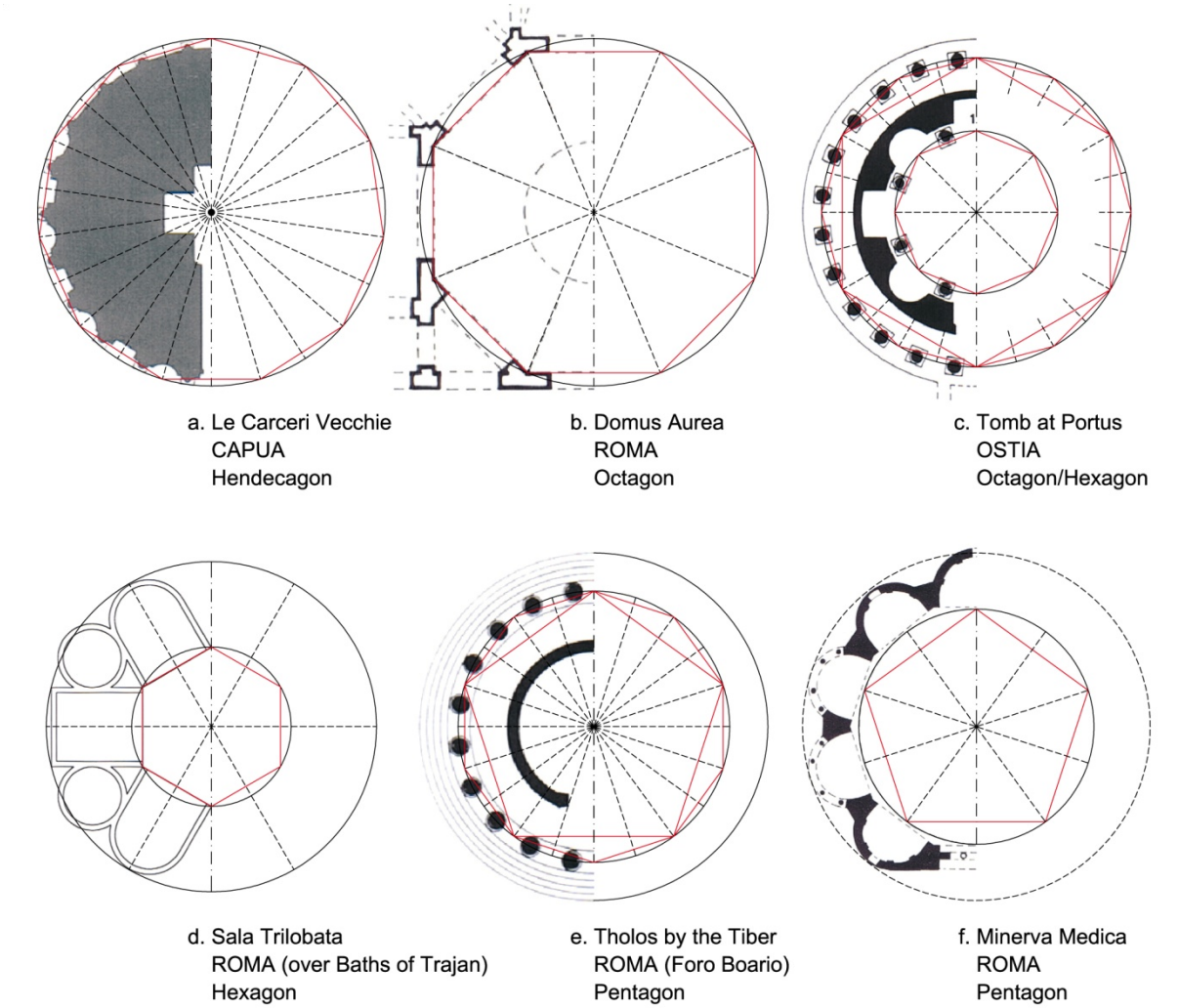

Fig. 4: Central plan Roman buildings. Key geometrical scheme overlaid to the drawings published by Mark Wilson Jones [12] and John B. Ward Perkins [11].

Can we mention clypeus based on more exotic regular polygons? Yes, but with some cautions. There is a Mérida clypeus which seems to correspond to a heptagonal geometry (fig. 2h). In the José Luis Barrera picture on which we base our geometric analysis [1] (illustration 95, Cat. 245) can be distinguished large reconstructed areas. However, we note a great uniformity in the size of the 28 pods that form the crown (4x7, two subdivisions of a heptagon), which gives us confidence in the validity of the restitution.

In the clypeus integrated into the reconstruction of the portico of the Mars Ultor Temple temenos, (fig. 2b) provided by Lucrezia Ungaro [9] (p. 154, image 202), we can distinguish two rings around the central medallion: the internal decorated with feathers and the external with pods. The second consists of 44 pods, a hendecagon divided twice.

The decorative scheme of Rome clypeus 2b is repeated on the clypeus of Pozzuoli 2c. On the basis of the reconstructive drawing published by Zevi and Valeri [13] (p. 459, image 12), we consider that in this case the hendecagon figure establish the geometry of the inner decorative ring.

Our initial hypothesis for the clypeus of Tarragona was that the reconstruction of the meanders crown shown at the National Archaeological Museum was wrong. We believed that an accurate survey of the original fragments would determine a decorative crown marking from a 12-sided polygon, a simple subdivision of a hexagon, or 10-sided, a subdivided pentagon. We were wrong.

We conducted a 3D survey of the reconstruction exhibited at the Museum through *Autodesk*'s *123D Catch* software, exporting the generated 3D model in OBJ format and analyzing it using CAD programs *Rhinoceros* and *Autocad*. A close examination of the original parts allowed us to determine that the pods between each meander module were arranged forming an angle between 32.5º and 33º, very similar to the 32.72º of a regular hendecagon, and sufficiently far from the 36° that would correspond to a decagon or the 30º of a dodecagon, so as not to have doubts about the figure that was used to compose the piece.

This finding led to a new question, and very interesting: how this hendecagon was laid out? We are not facing a building plan, the Clypeus is a decorative piece, yes, but its dimensions and the precision

of the execution seem to rule out a marking based on trial and error. Also has to be keep in mind that we refer to a series of quadrangular marble plaques of, approximately, ½ Roman foot thick (14.8 cm) and about 5½ feet sideways (162.8 cm), weighing nearly a ton. They all had to fit in the attic of the portico, and its design should articulate with the corresponding architectural modulation, while its carving obeyed standard parameters that involved an organizational template, previously to chiselling relief and repeated for each marble panel.

The exact construction of a hexagon or a regular octagon is obvious. In the first case is sufficient to mark the radius of a circle around its circumference. In the second has to be inscribed a square in a circle and then drawn the bisector of its sides. The pentagon can also be accurately plotted with ruler and compass, but with slightly more complicated operations, not obvious to someone without advanced knowledge of geometry. Does not exist, however, an exact design to draw a hendecagon [14] (nor for the heptagon and other regular polygons [15]). Therefore, to draw a hendecagon with ruler and compass it is necessary to resort to approximate constructions. In table 1, by the end of this paper, we summarize the length of the sides and the deviations from a regular hendecagon for all layouts discussed.

In figure 5 we show a first approximation, quite complex and unintuitive, that provides a construction with relatively small deviations: while a regular hendecagon inscribed in a circle of diameter Ø=1 has 11 sides of equal length L≈0.2817, with this *complex approximation* we obtain 7 sides with L≈0.2828 (a deviation of +0.37%) and 4 sides with L≈0.2799 (a deviation of -0.65%).

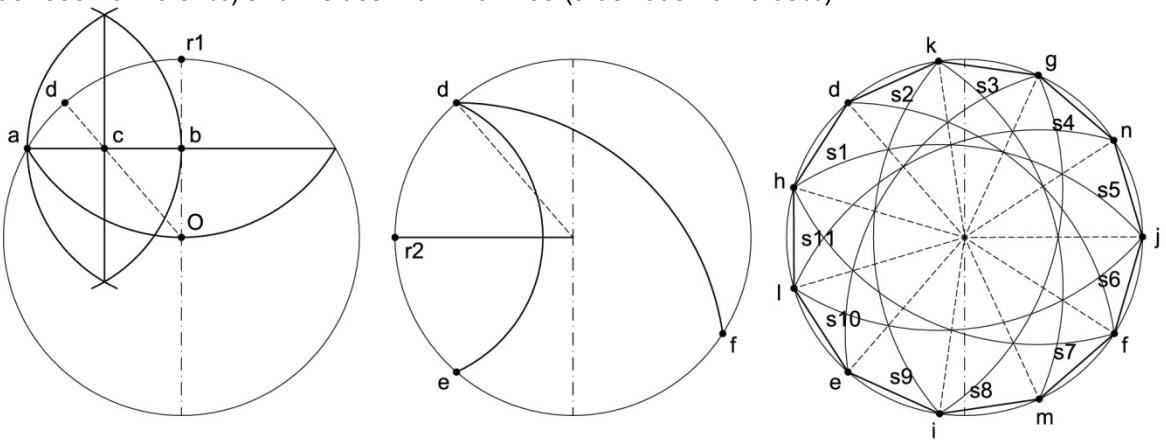

Fig. 5: *Complex approximation* to a hendecagon construction.

A simple approximation to the hendecagon construction involves dividing the radius of the circumference which is inscribed in 25 parts, and then take 14 to draw a side (fig.6). The resulting figure has 10 sides where L=0.28 (a deviation of -0.61%) and a side where L≈0.2990 (with a considerable deviation of +6.13%). According to Thomas Heath [2], this solution was already known in classical Greece, and is perfectly consistent with the Greco-Roman geometrics operations: is based on a simple fraction, 25/14, a formulation similar to approximations of Pi proposed by Vitruvius and Archimedes. Indeed, in the next section, we will rely on the Archimedes' approximation of Pi to propose various alternative constructions for hendecagon.

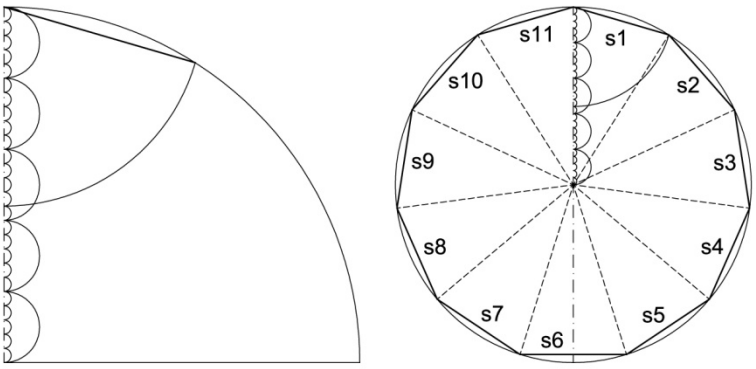

Fig. 6: *Simple approximation* to a hendecagon construction.

3. Hendecagon construction combining the octagon with the Pi approximation

As we have seen, some of the clypeus from the Forum of Augustus at Rome, the reference model for Tarragona's Sanctuary, clearly present a geometry derived from octagon (fig. 2d y 2e). Apparently this is not the case in Tarragona: meanders of the outer ring of the clypeus are not laid out, as expected, by a subdivision of the hexagon or octagon. Instead we found a hendecagon defining its geometry. However, if we inscribe an octagon in its outer perimeter the diagonals appear to define with a certain precision the ratio between the outer ring and the central medallion (see right half of fig. 9).

But, how can we relate both figures? Then we recall the approximation of Pi given by Archimedes through a numerical procedure for calculating the perimeter of a circumscribing/inscribing polygon of *2n* sides, once the perimeter of the circumscribing/inscribing polygon of *n* sides is known, based on the properties of the bisector of an angle of a triangle described in proposition III of book VI in Euclid's Elements.

Subdividing the hexagon 4 times, Archimedes succeeded in calculating the approximate perimeter of polygons of 96 sides ($6x2^4$) inscribed and circumscribed to a circle, establishing Pi value between (3+10/71)≈3.1408 and (3+1/7)≈3.1429. The upper limit can be expressed with a simple fraction, 22/7, that fits well with the practical procedures used by Roman builders to make measurements. Vitruvius himself gives an approximation of Pi expressed in similar terms: right at the beginning of the 9th chapter of the 10th book he describes a method to calculate distances by turning a cart-wheel: if it has a diameter of 4 feet at every turn it will travel about 12 and a half feet, that is, proposes assimilate Pi to the fraction 25/8, an approximation with an error of 0.5%. The Archimedes' 22/7 represents an error of only 0.04%, an order of magnitude lower; obviously his work was known in the Roman world, and it is reasonable to think that was within the mathematical background available for Roman builders.

On the other hand, we can use the Archimedes' fraction to perform an approximate hendecagon construction. We have already seen that Wilson Jones [12] proposes for *Le Carceri Vecchie* at Capua (fig. 3.a) a width of 10 feet for each of the 22 facade modules, while the diameter of its circular plan would be 70 feet; namely, he directly refers to the fraction of Archimedes. Obviously, a regular polygon of 22 sides allows us to draw a hendecagon joining vertices 2 by 2, but the direct application of the fraction 22/7 produces a considerable error in the layout. In the left construction of figure 7 we have divided the diameter of the circle which it is inscribed in 7 parts, an operation that can be easily performed with the theorem of Thales or picking a metrology that facilitates the division (e.g. the 70 foot diameter plant of *Le Carceri Vecchie*). If we mark Ø/7 along the perimeter of the circumference we obtain an hendecagon in which 10 sides have a length L≈0.2828Ø and 1 side where L≈0.2712Ø; regarding regular hendecagon (where L≈0.2817Ø) we have an approximation of its layout on which 10 sides have an error of +0.37% and 1 of -3.74%.

We can refine this system subdividing the diameter modulation. If we divide it into 14 parts and we mark Ø/14 along the circumference (central construction of fig. 7) we have 10 sides where L≈0.2821Ø (+0.12% deviation) and 1 side with L≈0.2783Ø (-1.22% deviation).

A new subdivision of the diameter, now up to 28 parts (right construction of fig. 7), improves the accuracy, with 10 sides where L≈0.2819Ø (a deviation of +0.06%) y 1 side with L≈0.2800Ø (a deviation of -0.60%).

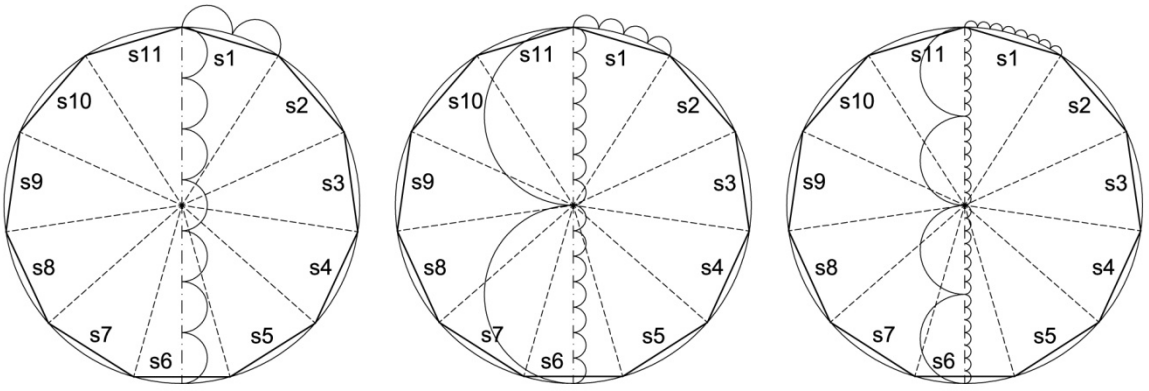

Fig. 7: Approximate construction of a hendecagon through Archimedes' approximation of Pi.

The subdivision process of the diameter of the circle may continue, getting better and better approximations to a regular hendecagon. But we stop at the second subdivision, which involves expressing the Pi approximation 22/7 by the fraction 88/28. For a circumference of 1 meter in diameter (Tarragona's clypeus are slightly wider, having an overall diameter of around 1.6 meters) we have, theoretically, a deviation of 2 mm in the worst side and of 2 tenths of a millimetre in the remaining 10 sides, an error within the graphic tolerances when drawing over a stone slab. The problem here would be the accumulation of errors: would be necessary to transfer 88 times on the circumference of a circle the subdivision in 28 parts of its diameter. This is where the octagon comes in. Since the numerator of the fraction 88/28 is divisible by 8 we can adjust the laying out by first drawing the diagonals of an octagon, a trivial and accurate operation, to restart the marking of 11 modules in each of the eight arcs of a circle defined by the octagon (see fig. 8), thus avoiding much of the possible distortion caused by the accumulation of errors.

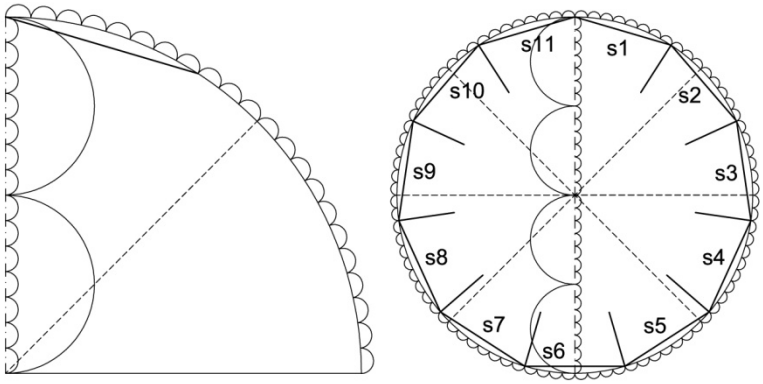

Fig. 8: Approximate construction of a hendecagon combining the octagon with the Pi approximation.

This solution provides an approximation to the hendecagon indistinguishable from the regular polygon in the laying out of a decorative piece with the size of the clypeus studied here, as can be checked in the table 1 in which we summarize the deviations of the constructions we have presented.

		sides length	deviation
regular hendecagon	11x	0,28173256	
complex approximation	7x	0,28278381	0,37%
	4x	0,27989206	-0,65%
simple approximation	10x	0,28000000	-0,61%
	1x	0,29900670	6,13%
approximation by Ø/7	10x	0,28278381	0,37%
	1x	0,27120167	-3,74%
approximation by Ø/14	10x	0,28207649	0,12%
	1x	0,27829128	-1,22%
approximation by Ø/28	10x	0,28190116	0,06%
	1x	0,28004603	-0,60%
approximation by Ø/28 + octagon	4x	0,28190116	0,06%
	6x	0,28166933	-0,02%
	1x	0,28143748	-0,10%

Table. 1: Deviations of the approximate construction of the hendecagon.

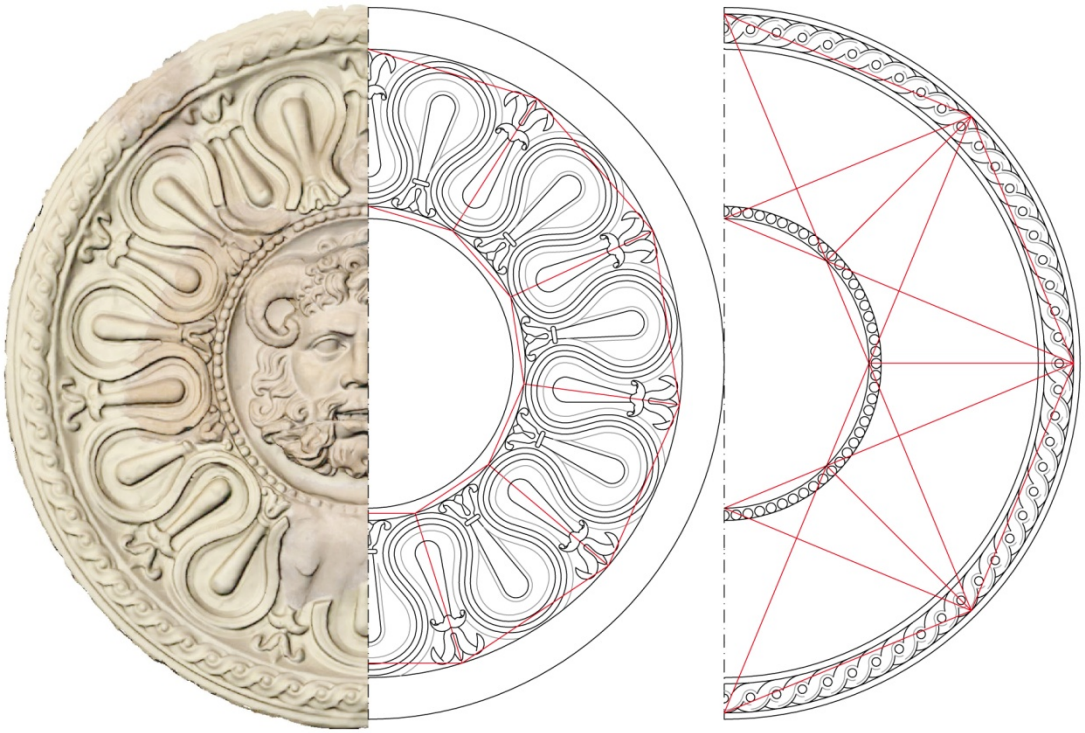

Fig. 9: Proposed geometrical scheme for the clypeus, compared to the orthophoto of the piece exhibited at the National Archaeological Museum of Tarragona.

4. Conclusions

The clypeus reconstruction of the National Archaeological Museum is correct. Therefore we are facing a singular case: the use of a hendecagon to fit an architectural decoration.

The Forum of Augustus in Rome was the reference parallel for building the Imperial Sanctuary of the *Conciclium Prouinciae* in Tarragona and other similar complexes, its reproduction served to transfer to the provinces a monumental architecture that exalted the Imperial cult. In the case of Rome the geometry of the clypeus that decorated the porticos was based mainly in the octagon, a common figure in the geometry of Roman architecture. In Tarragona we find a hendecagon, but we have managed to establish a possible connection between its layout and the octagon through a Pi approximation, well known in classical antiquity: 22/7. Moreover, the octagon diagonals seem to establish exactly the proportions between the outer ring and the inner medallion, so we could consider that the geometries of Tarragona and Rome clypeus were not so distant.

Alternatively, we propose a second hypothesis for drawing the hendecagon: to use the 14/25 fraction of the radio of the circle in which was inscribed, we call it the *simple approximation*. Finally, it could be proposed a combination of both solutions: the octagon would serve to establish the main proportions of the piece, while the *simple approximation* for the hendecagon construction would serve to inscribe the meanders ring.

Anyway, we can see how Tarragona's enclosure did not follow strictly the parameters of the original model, an aspect that is also seen in the use of panels with candelabrum as separation of clypeus, unlike the *Forum Augustum* in Rome and other monumental complex, that incorporated caryatids decorating their attics.

Bibliographical References

[1] BARRERA ANTÓN, José Luis. *La decoración arquitectónica de los foros de Augusta Emerita*. Ed. L'Erma Di Bretschneider, 2000, 480 p. ISBN 978-8882650346.

[2] HEATH, Thomas. *A History of Greek Mathematics*. Vol. 2. Clarendon Press, 1921.

[3] KOPPEL, E.M. *Relieves arquitectónicos en Tarragona*. Stadtbild und Ideologie (Madrid 1987), Bayerische Akademie der Wissenschaften, Supplements, New series 103, Munich, 1990, p. 327-340.

[4] LaROCCA, Eugenio; UNGARO, Lucrezia; MENEGHINI, Roberto. *I luoghi del consenso imperial. Il Foro di Augusto. Il Foro di Traiano*. Roma: Progetti Museali Editore, 1995, ISBN-978-8886512022.

[5] MACIAS, J. M.; MENCHON, J.; MUÑOZ, A.; TEIXELL, I. *La construcción del recinto imperial de Tarraco (provincia Hispania Citerior)*, In LÓPEZ, J., MARTIN, Ò. (ed.), *Tarraco: construcció i arquitectura d'una capital provincial romana*, Butlletí Arqueològic 32, Tarragona, 2011, p. 423-479.

[6] MACIAS, J. M., MUÑOZ, A., TEIXELL, I., MENCHON, J. J. *Nuevos elementos escultóricos del recinto de culto del Concilium Provinciae Hispaniae Citerioris (Tarraco, Hispania Citerior)*. In NOGALES, T.; RODÀ, I. (ed.), *Roma y las provincias: modelo y difusión* (Hispania Antigua, Serie Arqueológica, 3), XI Coloquio Internacional de Arte Romano Provincial (Mérida 2009), Roma, 2011, p. 877-886.

[7] MAR, R., PENSABENE, P. 2011: *Financiación de la edilicia pública y cálculo de los costes del material lapídeo: El caso del foro superior de Tárraco*. In LÓPEZ, J., MARTIN, Ò. (ed.), *Tarraco: construcció i arquitectura d'una capital provincial romana*, Butlletí Arqueològic 32, Tarragona, 345-413.

[8] PEÑA JURADO, A. *Decoración escultóric*a. In AYERBE, R.; BARRIENTOS, T.; PALMA, F.; (ed.), *El foro de Augusta Emerita. Genesis y evolucion de sus recintos monumentales*, Anejos de AEspA LIII, Anejos de Archivo Español de Arqueologia, Mérida, 2009, p. 543-581.

[9] UNGARO, Lucrezia. La memoria dell'antico. In *Il Museo dei Fori Imperiali nei Mercato di Traiano*. Ed. Electa, 2007, p. 130-169, ISBN 978-8837051587.

[10] UNGARO, Lucrezia; MILELLA, marina; VITTI Massimo. *Il sistema museale dei Fori Imperiali e i Mercati di Traiano*. In RUIZ de ARBULO, Joaquín. *SIMULACRA ROMAE Roma y las capitals provincials del Occidnte Europeo*. Tarragona: 2004, p. 11-48.

[11] WARD PERKINS, John. *Arquitectura Romana*. (Translated by ESCOLAR BAREÑO, Luis). Madrid: Aguilar S.A. de Ediciones, 1989. 207 p. Translation of *Roman Architecture*, Electa, 1980. ISBN 84-03-60129-8.

[12] WILSON JONES, Mark. *Principles of Roman Architecture*. 3ª ed., New Haven and London: Yale University Press, 2000, 270 p. ISBN 978-0300102024.

[13] ZEVI, Fausto; VALERI, Claudia. *Cariatidi e clipei: il foro di Pozzuoli*. In *Le due patrie acquisite. Studi di archeologia dedicati a Walter Trillmich.* Ed. L'Erma di Bretschneider, 2008, p. 443-464, ISBN 978-8882655082.

[14] http://mathworld.wolfram.com/Hendecagon.html

[15] http://mathworld.wolfram.com/ConstructiblePolygon.html

[16] http://itech.fgcu.edu/faculty/clindsey/mhf4404/archimedes/archimedes.html

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The fragile heritage of the second half of the 20th century

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Abstract
The architectural heritage of the late 20th century is still undervalued and isn't recognized enough to be protected, even if including precious pieces of work. Therefore it's even more vulnerable, so it requires specific considerations about the methods of intervention for its safeguarding.
For this reason, it has been important to conduct a project in collaboration with the Ministry of Cultural Heritage and Activities, that has taken a census through the whole country that identifies the consistency of this rich heritage, of which the necessary recognition that guarantees the process of conservation has not yet been made.
Basically the study focuses on the research carried out in Abruzzo and Molise from which a first selection of buildings spurt. They are registered on sheets that identify the relevant pieces of work present in the two regions under study, through standardized methodological criteria.
This investigation, now in the phase of completion and deepening, has partly been presented to regional and town institutions through a publication, in which there are 114 localised and georeferenced architectural complexes. They are shown on synthetic, descriptive sheets that allow easy consultation released in a handbook.
The aim of the research is to focus attention on the issue, to launch a process that avoids demolitions and transformations, in many cases already carried out or underway, including the missing information about the value of such works, regarding a common heritage, which is undeclared and particularly fragile.

Keywords: Heritage, Architecture, 20th century, Documentation, Protection.

1. Research and documentation

Attention to the recent architectural heritage, which lacks historical distance that allows legal recognition, pushes to consider the social and cultural values from which it is generated. The vast post war construction production has called in an incisive manner the appearance of contemporary cities, generating new urban heritage, widely disseminated throughout the country. Small and large cities, in central or peripheral places, preserve, often unknowingly, of relevant works by important designers, eclipsed within the ordinary building fabric.
The first step was therefore that knowledge, identification of architectures and infrastructures that are important pieces to reassemble in the overall design of the protection and promotion of the contemporary in Italy.
This is the search path started in 2002 by the "Direzione Generale per l'Architettura e l'Arte Contemporanee[1], continuing with updating and integration programs, now cared for by the Direzione-Generale per il Paesaggio, le "Belle arti", l'Architettura e l'Arte Contemporanee, devoted to determining the overall consistency of the contemporary architectural heritage in the national territory.
The cognitive process, derived from the evolution of regulations that overlooks the modern and contemporary architecture to enter fully into the universe of cultural heritage, has been activated to get

an overview of the different regional realities. The basic documentation needed to understand the distinctions of the different cultural areas that have not always had a homogeneous historiographical focus, which are intertwined political mechanism, geographical, and local realities , to consider in getting a shared cultural asset identification as a public value[2].
From these goals started the census of the architecture of the second half of the twentieth century got started and has already examined 17 regions, distributing them evenly preset search criteria by the "Ministero" and sought the territory in collaboration with universities, from which is derived a selection of 1,800 buildings and architectural complexes , including 300 products have been reported. The contribution covers specifically the experience conducted in Abruzzo and Molise, combining as was the case for other case studies, methodological aspects shared with the local analysis and readings that add specificity to the collective work.
The data refers to two distinct, geographically contiguous, although regional reality relate a selection of architectures, in appropriate descriptive cards, identified with standardized criteria and in relation to the territory. The analysis carried out initially by a group of professors [3] from the Facoltà di Architettura of Pescara, have faced the different study subjects with multidisciplinary contributions concerning specifically the project, and the state of preservation of the works surveyed, examined with specific references to typological, formal aspects and structural. The work done previously with field surveys, with direct investigations [4] carried out in the areas of study, was then evaluated and organized through the mentioned methodological reflections, on which was based the next phase of cataloging and critical analysis of selected architectures.

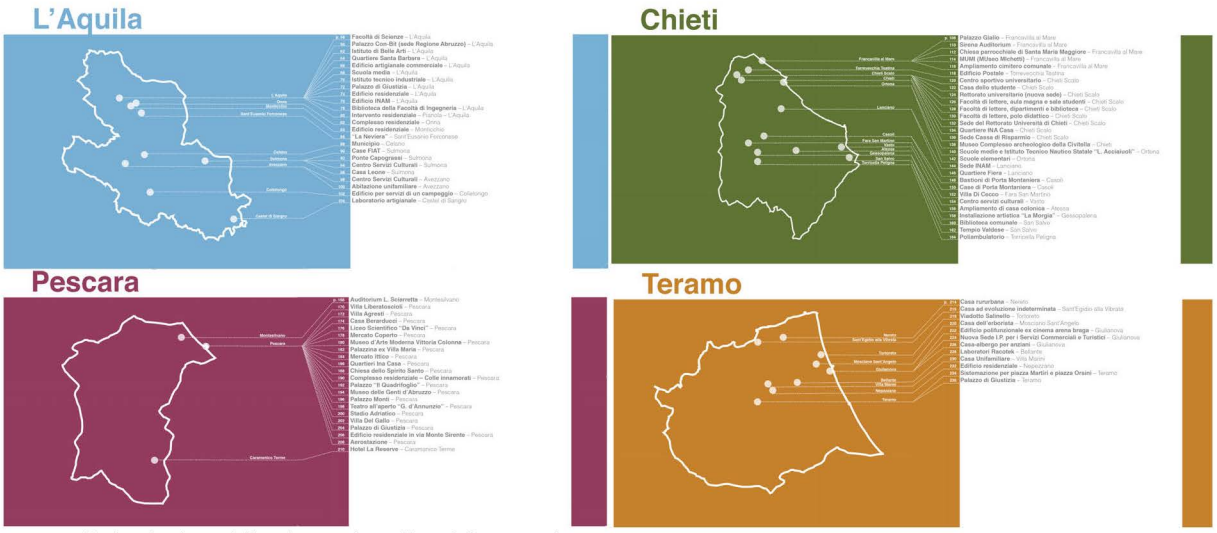

Fig. 1: Selected architectures localized for provinces



Fig. 2: Tab concerning one of the artworks surveyed.

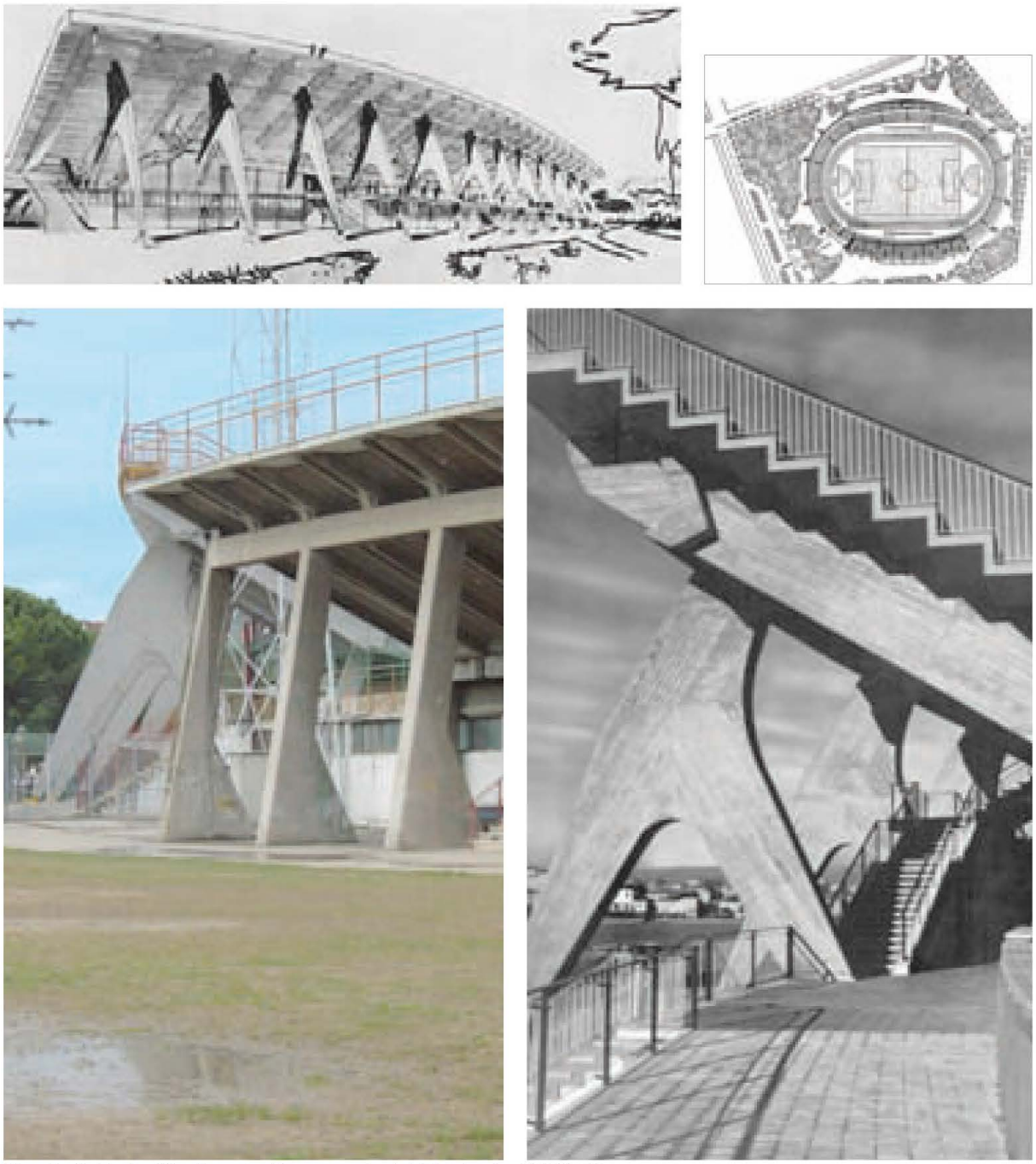

Fig. 3: Adriatic Stadium in Pescara, Luigi Piccinato 1952-56

These were transferred into a database, in a multimedia CD, delivered to the Ministry, which systematically explores the data collected during the various operational phases, through indexes that provide a reasoned system for the consultation of arguments contained in the cards.
A second operative intervention covered the spread of data collected, communicated through a publication that was spreading rapidly search outcomes subjecting them to a wider audience and to the attention of local administrators.
The idea of placing in a guide materials resulting from the local screening, manifested from the beginning, was welcomed and supported by the same promoters and coordinators of national research, which included the need to urgently provide a first level of caution on the subject, useful to initiate a process of development that avoids further dismantle and transformation, in many cases already occurred or are underway [5], including the lack of information on the values of such works ..
The primary objective was to communicate the results of research offering, with the scientific support of the basic material, a comprehensive overview of the first selected architectures in the two regions. The corpus of the tabs, revised for the occasion, provides an accurate geo-referenced location, through timely references useful for tracing architecture, often little known and not always easily visible inside the city context, in many cases built in outlying or outside urban areas. The selection offers 114 buildings and architectural complexes, organized by provinces, presented in



Figg. 4-5: Selected architectures tabs

summarized descriptive tabs allowing an easy consulting communicated in form guide. The exploration of the architectural heritage surveyed is further facilitated by the assignment of the QR code , acronym for Quick Response bar, a matrix barcode which contains readable information through smartphones or web platform. Users can thus have a tool to read that provides a general picture of the second half of the twentieth century architecture present in two regions, certainly not exhaustive but necessary to protect the fragile heritage, at this moment not subject to constraints.

The publication [6], in order to gain a greater awareness on the delicate issues of safeguarding was officially presented [7] deliberately affecting regional institutions, citizens and business operators should include the management of their cultural heritage, in the normal control mechanisms of the processes transformation of the territory.

The need for conservation programs for such high-risk assets, was repeated in the activities of Superintendents of the two regions concerned by the scientific officers of the national census, by some professors of the Department of Architecture of Pescara and by curators, involved in the documentation of modern.

The work, to be considered not as a point of arrival, but a starting point for the continuation of recognition for the protection, today resumed the search for moving toward in-depth analysis on the work carried out with reference to the different areas of investigation, with readings and supplemented, in part already implemented in the volume.

This analytical investigation, in the young city of the province, takes an essential significance relate specifically to the moment of their increased urban growth, transformation and experimentation of



Figg. 6-7: Selected architectures tabs

contemporary language, as occured in the cities of Abruzzo and Molise. Numerous public buildings, markets, schools, residential homes, examined revealed the presence of works by designers not only locally, but nationally active, selected through contests of ideas, from which are derived
interesting architectures such as the church of Quaroni Francavilla (CH) or the Court of Caniggia in Teramo, the modern museum of modern art of Montuori in Pescara, to name just a few, which today constitute a fragmented and fragile heritage to be enhanced, reconsidering in the right architectural and cultural values.

Bibliographical References

[1] Launched in 2002 by DARC, service architecture, was presented at the Venice Biennale in 2004 in the exhibition "contemporary “Sguardi contemporanei” 50 years of Italian architecture. The research is still progress with training programs and completion directed by the PABAAC, architecture and contemporary art.
[2] Cfr. GUCCIONE, Marita. *For the protection of the architectural heritage. Abruzzo and Molise: review and* perspectives, in *Abruzzo and Molise architecture from 1945 to today. Selection of works of historical and artistic* interest, Caterina Palestini, Carlo Pozzi (edited by), ed. Gangemi, Rome 2013, pp. 9-10.



Fig. 8: Cover page publication.

[3] The research entitled "*Architecture in Abruzzo and Molise from 1945 until today*", the result of an agreement between the 15.11.2004 Faculty of architecture in Pescara and the Ministero dei Beni e le attività Culturali, Direzione Generale per l'architettura e L'arte Contemporanee, coordinated by Mosè Ricci, collaborated by Francesco Garofalo, Caterina Palestini, Carlo Pozzi, Livio Sacchi and Claudio Varagnoli.

[4] The Census and surveys have been conducted, for the different areas of study, with the collaboration of architects: Vincenzo Di Florio, Michela Palermo, Aldo Pezzi, Viridiana Piccone Italiano, Chiara Ridolfi, Iva Tassoni.

[5] I am referring to the invasive processing carried out in Pescara's fish market structure, designed in 1950 by Barbera and Gardi; executing the next questionable changes planned to the indoor fish market of Largo Scurti of 1954, C.Aymonino and other buildings of the same period, demolished to make way for a more intensive construction on the Riviera, as happened for villa Maresca, of P. Pozzi and as might happen to villa Agresti, the same designer, which runs similar risks.

[6] Cfr. *The architecture in Abruzzo and Molise from 1945 to today. Selection of works .... cit.*

[7] The publication was presented on June 18, 2013, at the "Figlia di Jorio" of Palazzo della provincia in Pescara, in the presence of the Director of "Servizio Beni Culturali regione Abruzzo, degli assessori alla Cultura della provincia e del Comune di Pescara", the Executive Councilman of the recovery and enhancement of historic heritage with assistance of Supervisors of the two regions,
Alessandra Vittorini per L'Abruzzo e Carlo Birrozzi per il Molise, Margherita Guccione Direttore MAXXI Architettura e Maria Grazia Bellisario Direttore Servizio Architettura e Arte contemporanee PaBAAC – MiBAC.

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Redrawing Tarraco

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Abstract

The city of Tarragona houses an important architectural heritage mainly from its past as 'Tarraco', capital of the Roman province of *Hispania Citerior*, but also from its medieval and late 19th century history. The archaeological ensemble of Tarraco was inscribed as a UNESCO World Heritage Site in 2000, but although many efforts have been devoted by archaeologists and historians to unveil and understand the history and aspect of the Roman city, many aspects remain unknown.

This is largely caused by the absence of a coherent body of historiographical material, which is today scattered across several institutions and, specially, the lack of precise and useful graphical representations of the remains and of the existing city that allows in-depth analysis and interpretations of future findings.

In recent years, researchers from the Catalan Institute of Classical Archaeology (ICAC) and the Architecture School of the URV (ETSA) have teamed up to produce comprehensive, detailed graphic materials, including a new set of plans and sections of the old city, of the grandiose areas of representation of the Provincial capital, and of the hidden structures beneath the city's surface. These have been executed with the latest technologies (fotogrammetry, laser scanning) but also with traditional methods (measurement, topography), on top of a mixture of existing materials (hand-drafted cartography from municipal master plans) and of historical and archaeological documentation.

Keywords: Tarragona, Architectural heritage. Representation. Education. Archaeology.

1 Introdution

1.1 Archaeology and Architecture: a long history together

Architecture and archaeology are two disciplines that have had a long history together and a close relationship that dates, at least, from the late Middle Ages. In the past, the solidity of structures that were "made to last" (castles and fortresses, churches and cathedrals, and so on), built mostly in stone and with durable materials, has made architectural remains an important part of archeological sites.

The first intellectuals that took a decided look backward at history, and regarded it as an "open book for architectural and historic reference were the humanists in the Renaissance. For most of them, such as Alberti, Vignola [12; 13] or Palladio [9], to name a few, the study of the Roman remains became a sort of "ritual", and they all traveled to Rome to copy, survey, redraw and interpret the remains of the old roman buildings that still were visible in the metropolis of the Roman Empire. This was an "educational primer" in architecture, history and humanism, and this pedagogical scheme became a

standard in architectural education until well into the 20th century[1] (maybe one of the last examples, now under debate, was probably Le Corbusier himself [1]).

The major written source of scholarship on architecture during the renaissance was the study of Roman building treatises, of which only Vitrubius' *De Architectura* has survived. Vitrubius' book includes the term in its title, and this term was adopted fully by the Renaissance intellectuals as the name for the discipline that was taking shape with them: "architecture"[2].

Archaeology, on its part, also has its origins in a few early Renaissance authors who not only took an interest in ruins (i.e. "architectural" remains) but also in ancient remains[3]. The first excavations with a proto-scientific method were carried out by John Aubrey, in Stonehenge and other megalithic monuments in England [2], and also in Pompeii and Herculaneum in the late 18th century[4].

Hence, architecture and archaeology have had a very close relationship until the end of the 19th century, and probably part of the 20th [11]. For some reason, the education of architecture professionals progressively abandoned the study of history and archaeology. The reasons are many, and it is not in the scope of this paper to analyze them in depth. But we could mention, in favor of the argument, a few of these reasons. First of all, the so called Modern Movement and the architectural avantgardes approached a "new architecture" with a rupturist approach and a radical rejection of historical architecture of all kinds, be it classical, historicist or eclectic [5]. Second, a modern approach to architecture, also favored by the Moderns, substituted the study of history and traditional construction methods with the more modern building technology of concrete, steel and glass. And, last but not least, the deeper specialization trend of most disciplines, that made them abandon lesser interesting paths, like it is the case with the study of history for architects.

1.2 Tarraco, UNESCO World Heritage Site since 2000

Tarraco was the entrance port of Rome in the Iberian Peninsula. It was an ancient Iberian settlement that, due to its historical role, reached the capitality of the *Prouincia Hispana Citerior*, the largest in the Empire during the flowering times of the *Pax Augusta*. Its close relationship with the Emperor Augustus, and his exemplary role in the acceptance of the imperial cult, were the basis for the construction of the large monumental headquarters of the *Prouinciae Concilium*, the public office of half of the Peninsula. This area of 19Ha was articulated by a center of worship to the emperor, currently occupied by the medieval Cathedral, the great administrative square of the provincial forum – probably the second largest square in the entire Empire– and the Circus, defining the limit between the Municipal city and the provincial capital spaces (Figure 1). This arrangement pre-determines the medieval urbanism, and constantly reemerges in the current historical center. Besides, the Roman city of some 90Ha had a theater, an amphitheater, fifteen public or private baths and many economic urban facilities and services. This urban reality would only be surpassed after the second half of the 19th century [8].

After the decline of the Visigothic period, the city and the territory of *Tarracona* were occupied by the arab-berber invasion and, thanks to its geopolitical character, it remained institutionally abandoned for four centuries –i.e. no political or religious establishment–, as the boundary between Al-Andalus and the Catalan counties. After the Catalan reoccupation, the city recovered its urban condition, under the tutelage of the Count of Barcelona and the metropolitan Archbishop. But it never reached the vitality of other periods. Only after the debacle of the Napoleonic wars, the city gets back a socioeconomic vitality thanks to a growing port activity.

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[1] It is remarkable how classical architectural education, for centuries, included a trip to Rome. For example, the *École des Beaux Arts* in Paris awarded since 1663 the prestigious *Prix de Rome*, which included a stipend and a stay in the French academy in Rome for two to four years of study, to get acquainted with the models of antiquity.

[2] However, Alberti's book on architecture, the first renaissance treatise on architecture, is named "*De re aedificatoria*".

[3] Flavio Biondo (1392-1463) is dubbed as the first "archeologist". Humanist and historian, he published several works on the remains and the topology of ancient Rome, at the crossroads of archaeology and architecture: *De Roma instaurata* ("Roma restored"), 1446; *De Roma triumphante* ("The triumph of Rome"), 1459; *Italia illustrata*, 1474; and *Historiarum ab inclinatione Romanorum imperii decades* ("The historical decades of the decline of the Roman Empire"), 1483.

[4] Karl Jakob Weber, engineer and architect was in charge of the first methodic excavations of these towns by commission of king Carlo III of Naples [10].

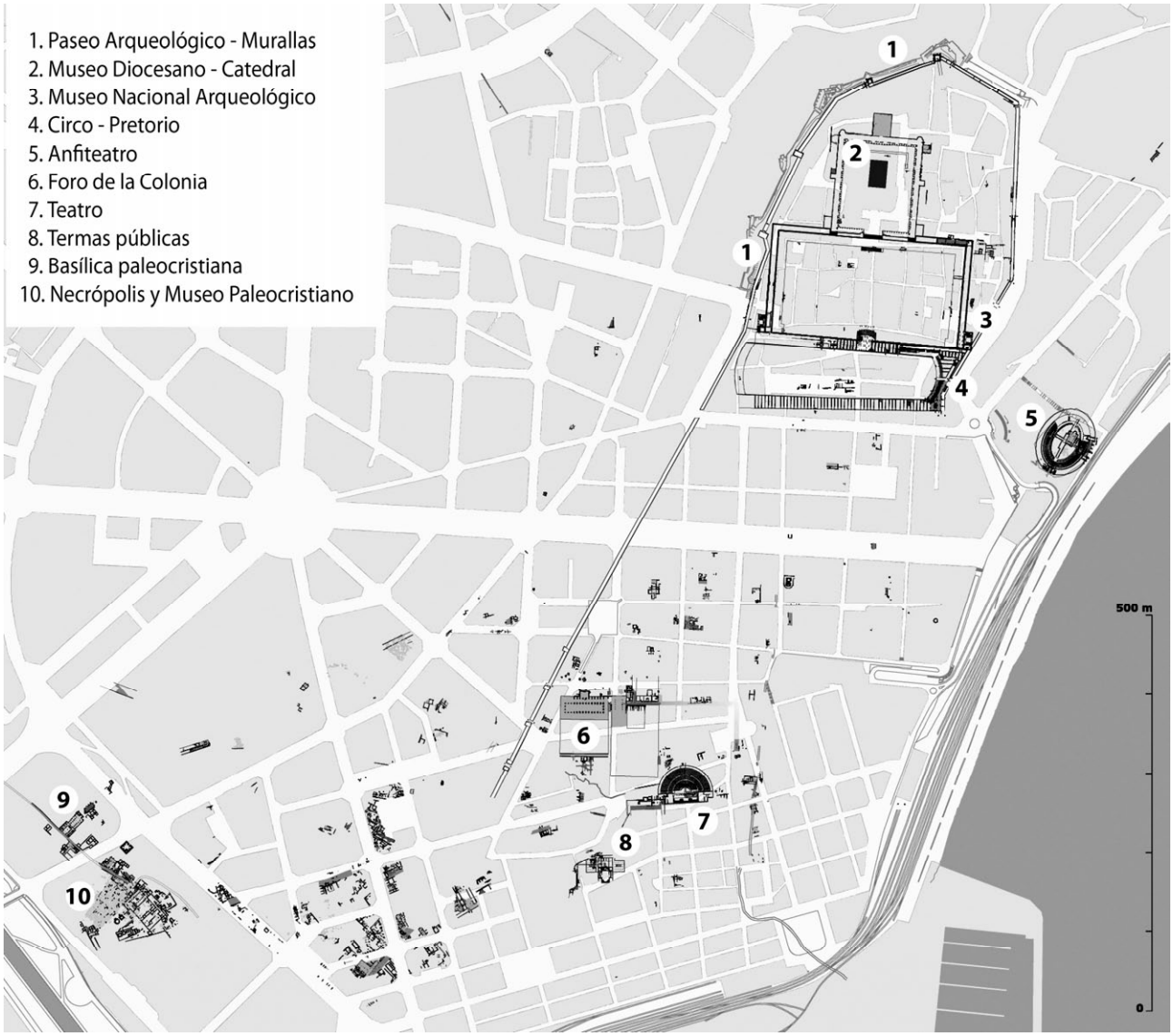


Figure 1: The scheme of the provincial forum in the Upper part of Tarraco

The first known early writings and compilations on the rich historical heritage of the city are dated from the Renaissance. The studies of Lluís Ponç d' Icart and the collection directed by Archbishop Antoni Agustí define the beginning of the interest on the local past, although the absence of stable institutions gave a central role to the concerns of local historians. The 19th century marks a definitive turning point in relation to the protection of heritage and the emergence of local institutions, such as the first Diocesan Museum, the Antiquities Museum, and other initiatives in the realm of local collectors. When Tarragona loses the status of military plaza the first great conservationist debate occurs, in relation to the destruction of the walls of the city, that constrained so far the new urban developments. A similar situation also occurred in the first quarter of the 20th century, with the discovery of the local forum and the great Christian necropolis. Finally, the debate on the conservation and restoration of architectural heritage is set in the mid- 20th century, with the rehabilitation actions undertaken by the Brigades of National Heritage (Pretori Tower, amphitheater, colonial forum, etc.). The return of democracy and economic development of the city leads to a new stage in the restoration of heritage, sometimes as an empowerment of museological enclosures, or as a dignifying of institutional spaces housed in historic buildings [7].

In the late 1990s the city felt that the maintenance of such a heritage deserved some important institutional support, and filed an application to the UNESCO. The “archaeological ensemble of Tarraco” was inscribed as a UNESCO World Heritage Site in 2000”, recognizing that “the Roman remains of Tarraco are of exceptional importance in the development of Roman urban planning and design and served as the model for provincial capitals elsewhere in the Roman world. Tárraco provides eloquent testimony to a significant stage in the history of the Mediterranean lands in antiquity”.

With or without the endorsement of the UNESCO nomination, many efforts have been devoted by archaeologists and historians to unveil and understand the history and aspect of the Roman city, but many aspects still remain unknown to date. This is caused by a number of different reasons, some of which are detailed here.

First of all, the remains are today very fragmentary and many are preserved under the present city and beneath more recent buildings. The medieval city was slowly built occupying the inside of the courts of the representation squares of the Upper part, and later the arena of the circus (Figure 1). Much of the material for the new city was scavenged from the old Roman monuments, mainly in the form of raw material to create lime mortars for construction (see also note 5). Then, the built structures such as walls, terraces and stands were used as supporting elements for new structures, and were left inside new constructions where they were modified, altered and, most of the times, damaged. Thus the original form of the city is difficult to understand and requires a very thorough understanding of the different existing structures, which are sometimes not visible.

Besides the diacronical evolution of the architecture of the city, the research efforts and archaeological tasks have been scattered across several institutions. Indeed, the agents involved in the study and preservation of Tarraco are, at least, five: the city hall of Tarragona, through its History Museum; The National Archaeological Museum of Tarragona, part of the state cultural institutions and administration; The Royal Archaeological Society of Tarragona, a non-for-profit organization established in 1844; The Catalan Institute of Classical Archaeology, a Catalan independent research center created a decade ago; and the University Rovira i Virgili, mainly (but not only) through its History and Archaeology department. The effect of so many agents has been the dilution of the efforts devoted to the study of the city. Sometimes, the differences in the respective policial agendas, diverging research interests (and, sometimes, personal confrontations) have affected the necessary collaboration relegating it to a very small thread –if any, altogether.

Finally, as a result of all these contingencies, there is an absence of a coherent body of historiographical material. In particular, there is a lack of precise and useful graphical representations of the remains and of the existing city that allows in-depth analysis and interpretations of future findings. A city like Tarraco, with so many hidden structures, built by the addition of several layers of history, and several waves of alterations and modifications, needs a solid set of drawings to be able to interpret and understand the relative positions of the concurring elements, the disposition in three dimensions of existing and disappeared structures, and to allow the crystallization of old structures into present forms to emerge.

To date, one of the best and more comprehensive record of the final state of archaeological documentation is the publication "Planimetria Arqueològica de Tarraco" [6], a systematic collection of documents and drawings, and a thorough index of bibliographical materials, known in 2004. Although this work has provided the basis for the development of a three-dimensional model with *Sketchup*, a graphic *corpus* of all the preserved Roman architecture does not exist, a visual archive that allows the realization of reliable architectural studies or, simply, the management, monitoring and control of the conservation of a heritage which is 2000 years old.

2 Redrawing Tarraco

2.1 The ETSA – ICAC Collaboration

Since its creation in 2005, the School of Architecture of the Universitat Rovira I Virgili, with its headquarters in the nearby city of Reus, has had a strategic planning that focuses on three interrelated lines: the study of the architectural heritage; the study of the local territory; and the advancement in modern construction technologies. These strategic lines inform the research lines of its professors and research groups, and therefore affect also the teaching at the school, which, besides the traditional and mandatory subjects, has a slant in these directions.

According to the school, the study of the architectural heritage has been a way to introduce interdisciplinarity into the sometimes closed world of architecture. The interaction with specialists from other areas, like art historians, and archaeologists. It is a way of bridging the traditional barriers of the architecture discipline, and reach out as architects to other areas of inquiry and offer their skills. This reinforces their disciplinary values, and puts them in contact with other valuable knowledge. On the other hand, the study of the territory connects the research to the needs of the peoples that live closer, while at the same time generating a universal knowledge that can be transferred to other areas of the world.

During the third year of the school, professors from the area of graphical representation, with an interest in architectural heritage, teamed with researchers at ICAC in order to collaborate and share skills and experiences. The architecture professionals were skilled digital draugtsmans, with

experience in research and teaching in architectural drawing, traditional C.A.D., 3D modeling and rendering, and digital imagery. They did not shy away, therefore, from all forms of new technology and its application to architectural representation. Alternatively, the professionals from ICAC were trained archaeologists, with an in-depth knowledge of historical sites and excavations, stratigraphy techniques and a background in history. Most of them came from the Graphical Documentation Unit at ICAC, and were also well trained in the use of CAD programs and digital representation technology. Besides, the team was completed with history specialists in Tarraco and its Roman and medieval past.

The first activity together was the proposal of an elective course on architectural heritage and architectural representation, which began during the academic year 2007-08 (see below for the description). The objectives of the course are threefold:

a) Use the most accurate and most modern technologies available to them in order to make detailed surveys of existing monuments and architectural structures. The limit for the use of technology was only the available budget. Furthermore, as is usual among technology lovers, the challenge to test and try out new possibilities was almost a necessity.

b) Redraw the surveyed elements, with the help of advanced architecture students, in order to reinterpret the data with architectural drawing. Redrawing architectural structures in plan and section, in 3D, and in different scales can put in context a lot of information, and allow for the comparison of elements. The reconstruction in drawing (manual or digital) or in three dimensional models of the existing (and the non existing) structures is a cheap way of testing hypothesis and combining and controlling insights. Finally, the rendition in a set of accurate drawings of the status of the present city allows the emergence of invisible and hidden structures, by inspection of the crystallized forms of the ancient remains in more modern structures.

c) Finally, putting in a historical context this graphical information, with the help of historians and academics with a good knowledge of the remains.

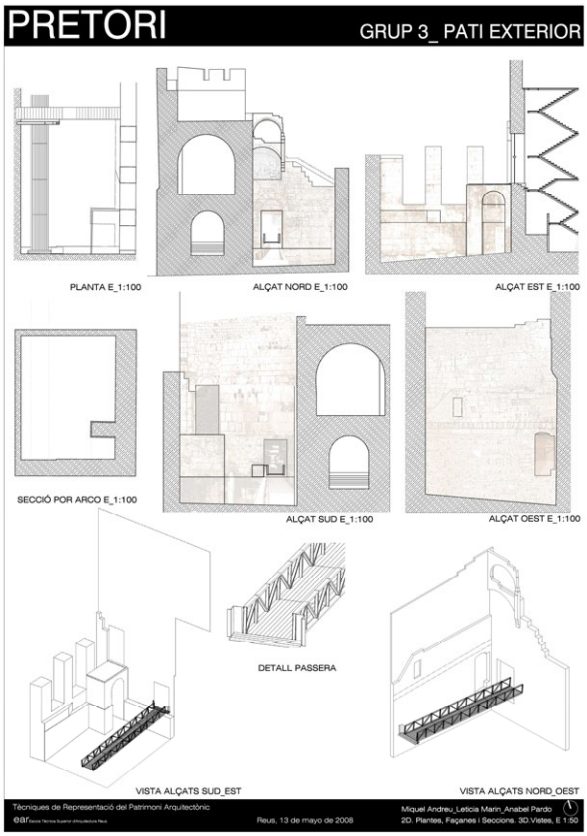


Figure 2: Architectural drawing of the Pretori Tower

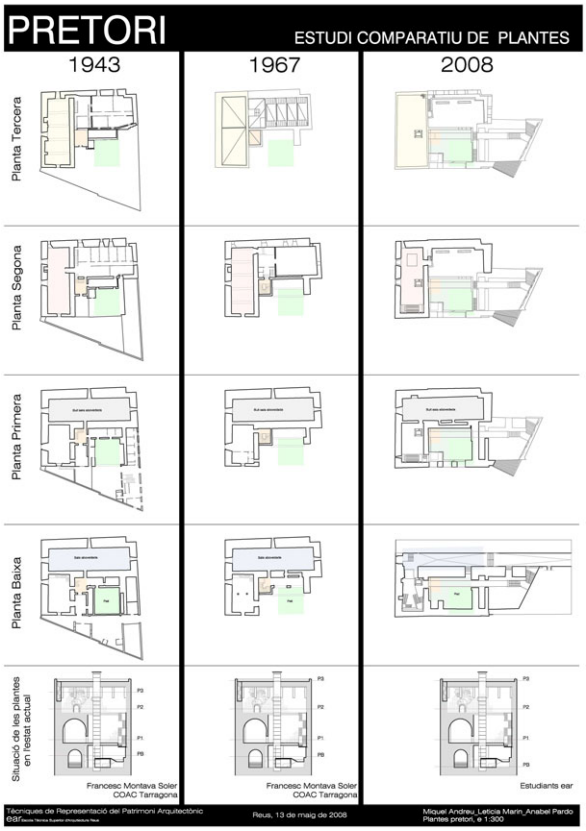


Figure 3: A historical comparative of the evolution of the plans of Pretori Tower

It is very important to stress that this elective course is not a simple “lecture course” but, on the contrary, intends to go far beyond mere teaching. While it is based on a sound pedagogical and academic basis (nothing else could be acceptable, of course), the course is, in fact, a platform that reaches into research areas, digs and experiments in real archaeological problems, and to tries out real surveying techniques. Every year, the teaching staff proposes to solve a particular representation problem, which is not naïvely selected (see below, section 2.3). Then, with the help of a group of

experts in the different areas involved, the students discover the surveying methodologies, the representation techniques and the solutions to the usual pitfalls in and around tangible surveying exercises of rather large proportions: “learn-by-doing”. For this reason, it is organized as a rather free-form atelier that knows the starting point, but ignores the end results altogether.

2.2 The area of study

By the name of “Pretori Tower”, “Castell del Rei” or “Tower of Pilates” we identify a solid building, which after 2000 years of history, and the architectural restoration works of the 1960s, is currently about 26.40m wide and a maximum height of 23 m. This is a tower-shaped body raised in the 1st century aD and performed in stonework as part of the monumental complex that housed the Concilium Prouinciae Hispaniae Citerioris (commonly known by the neologism of "Provincial Forum" of Tarraco). This vast urban complex, which occupied about 12 Ha, was the result of the sum of a *temenos*, a large square of representation and, on a lower platform, the circus, the latter constituting the element of separation from the residential town. This is a scheme evolved from the Hellenistic model composed of sequence “temple” > “public area” > “recreational area” extended from the time of emperor Augustus [4], where what is now known as the “Pretori Tower” is just the southern end of the eastern cryptoporticus of the representation square, as extended stairwell and whose main function was part of the communication backbone between Circus and the perimeter of the square. This urban scheme motivated the existence of another almost twin structure at the opposite angle : the tower of the former Audiència [3] (see Figure 1, Figure 2).

Other fragments of this scheme are today either hidden beneath the city, or fossilized in newer structures. The difficulty is not so much to discover and know about their existence, but to be able to compare new and old, side by side, to ascertain their correspondence. Hence the importance of accurate drawings.

2.3 The objects of stydy

The course co-organized by ICAC and ETSA, named “Heritage representation Techniques”, is celebrating in 2013-14 its seventh edition, and in the last six years a great deal of information has been generated:

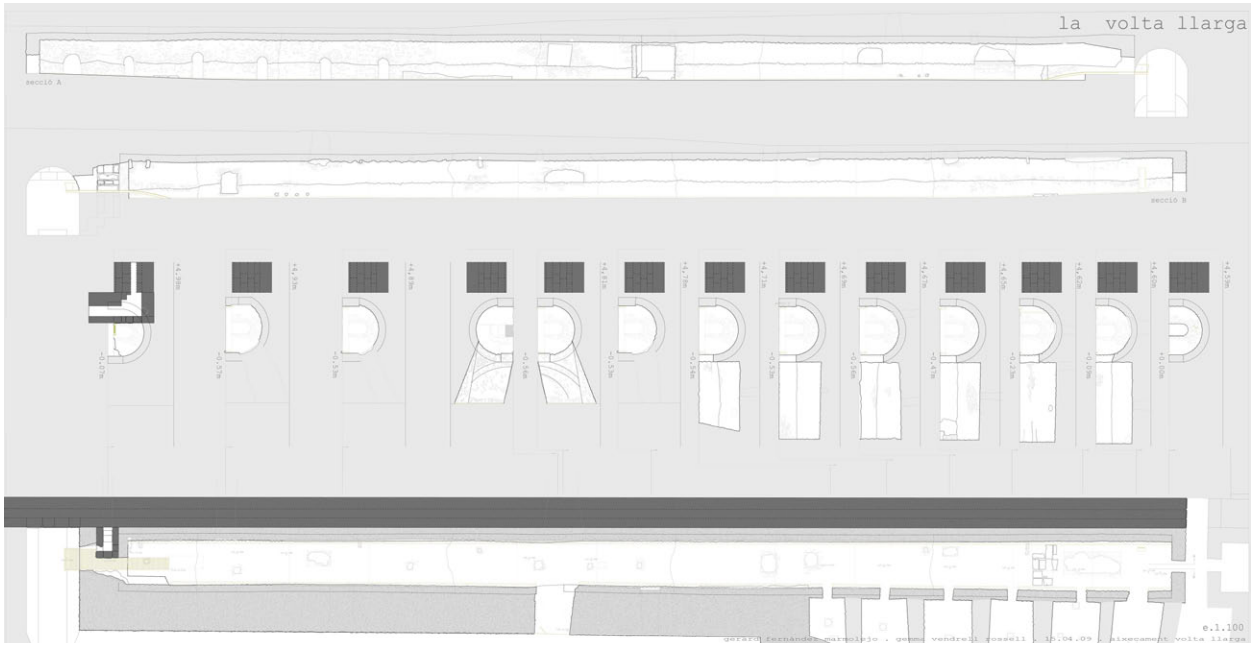


Figure 4: One of the drawings of the survey of the *Volta Llarga*, from which its main sections are cut **.**

2007-08: For the first edition of the course (only with a handful of students) a simple object was selected. The students surveyed in 2D and 3D the building of the tower of Pretori. The techniques were, this first time, rather conventional: topography, measuring tape, photography, etc. The resulting documents were a set of plans, sections and elevations of the building that yield an interesting representation of its complexity (Figure 2). Then, with the help of a great amount of historical documentation, in the form of plans and photographs, a historical analysis of the transformation of the building was prepared (Figure 3). Several interesting conclusions came out, like the definitive orientation of the stairs inside the building, which have been troubling researchers for a long time (not shown).

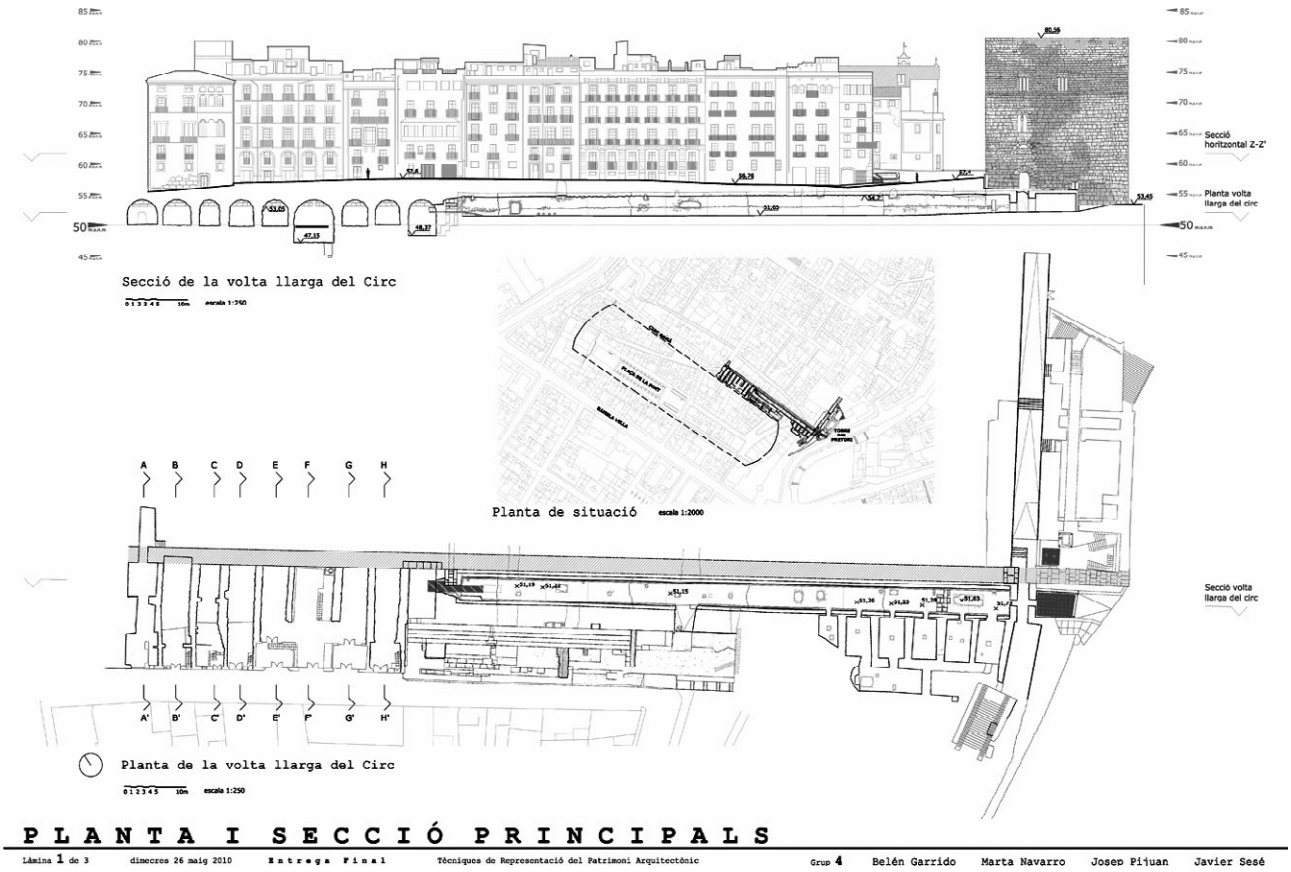
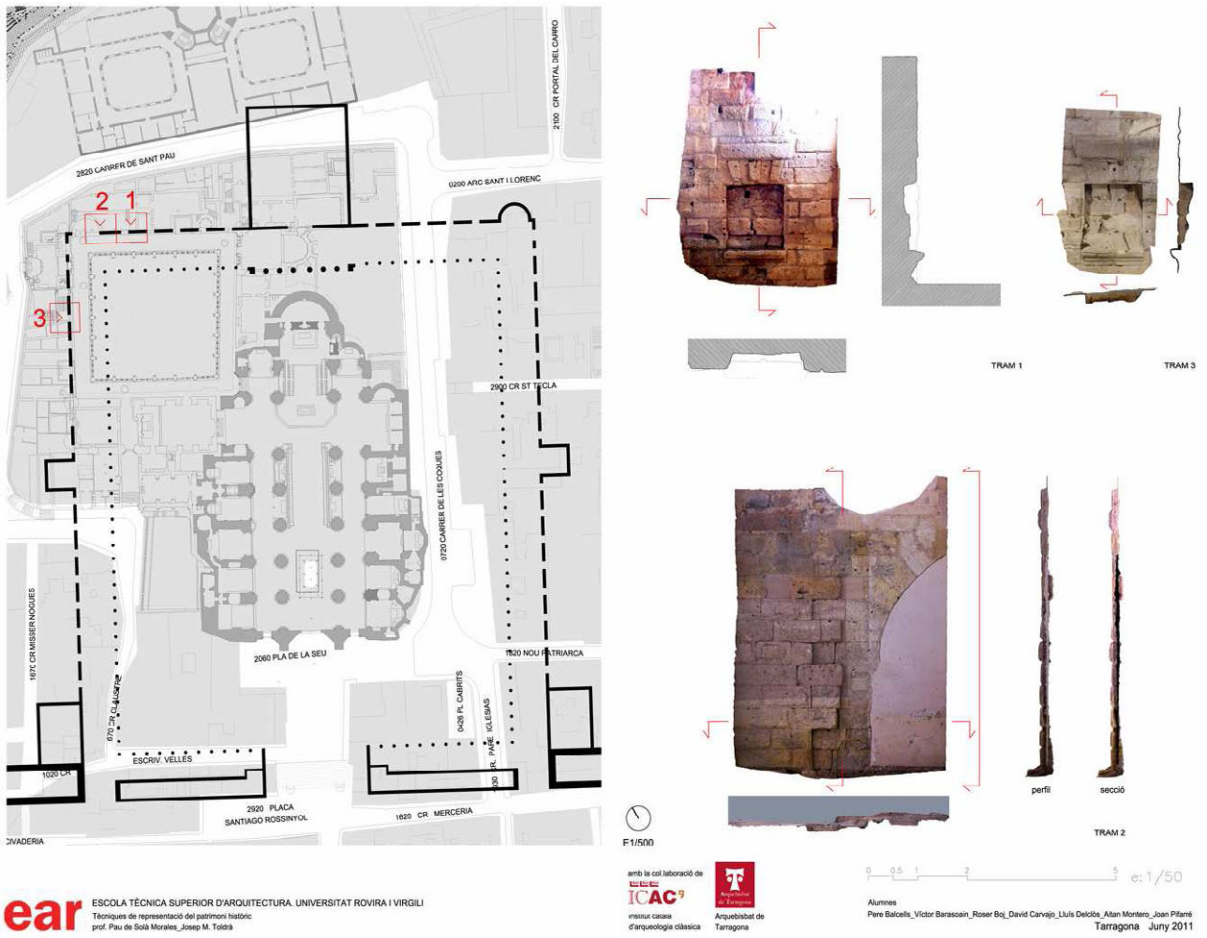


Figure 5: Underground plan and section/elevation of a fragment (about half of the distance) of the connection line between the representation square and the circus [from Pretori tower to the Antiga Audiencia tower]

Figure 6: Surveying of the Roman wall behind Tarragona's Cathedral cloister.



2008-09 The survey continued on the vaults beneath the Pretori tower and the circus ("volta llarga"), botht on the exterior and the interior. The result is the first elevation of this space and its accurate relationship with the city above (Figure 4). Although trtaditional topographic techniques were mostly used, we began experimenting with 3D scanning and photogrammetry, thanks to the acquisition of a robotized total station. To complete the drawing, existing materials of the city above, we reused: old plans (hand drawn in the 1980's, and part of the municipal documentation) and more accurate topographic materials (dating from and 1990's) were available. These had to be redrawn, corrected, and merged into the existing information.

2009-10: Continuing with the previous experiences, the following year the survey of the "hinge" between representation square and circus was continued. Thus, the complete elevation from Pretori Tower to Antiga Audiencia Tower was completed at several levels (plan of the upper streen, plan of the hidden structures, longitudinal sections at different points, transversal sections, elevations, etc. This time, a closer study of the relationship of the hidden structures (beneath the ground) and the existing city was carried out. In particular, the position of the façades (corresponding to the medieval city wall) was accurately measured to align them with the huge stone block wall known to exist below it (Figure 5).

2010-11: Encouraged by the success of the three elevation campaigns, the team decided to move to another location and try out new surveying techniques, always in an experimental manner. The object this time were two sections of the enclosing wall of the cloister of the city's cathedral, that have a fragment of some 30-40m of the original Roman enclosing wall of the sacred precinct (see areas 1, 2 and 3 in Figure 6, left). These techniques, coupled with topographic and traditional measurement, allowed us to survey these wall fragments, and also to locate them with great precision in Tarragona's plan. An impressive section of the city and the hill on which the old Tarragona was built was also drawn (Figure 7).

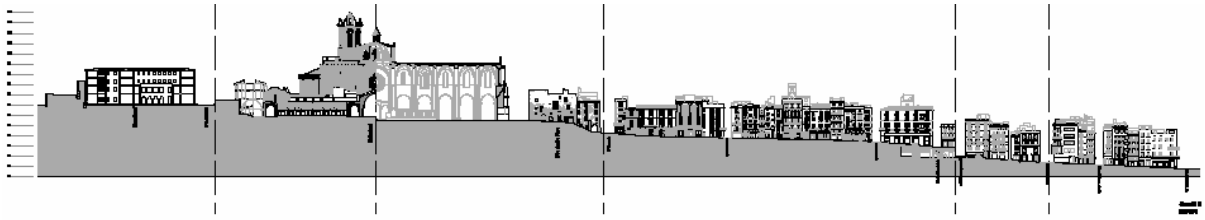


Figure 7: Section of the hill of Tarragona ("Part alta") through the cloister and the nave of the Cathedral.

2011-12 and 2012-13:

To continue with the works in the sacred precinct (also known as the "worship square", or the higher square of the provincial area), the team went with a group of students to the National Archaeological Museum of Tarragona, that holds an important collection of marble and limestone fragments from several monumental zones of Tarraco[5] (Augustus temple, worship and representation squares, forum, etc.). Most of these pieces were photographed all around and were modeled using photogrammetry techniques. During 2011-12 several pieces from the museum's warehouse were scanned; during 2012-13, pieces from the museum's permanent exhibition and pieces hung up on the museum's walls were photographed and modeled with photogrammetry. The resulting 3D models were then measured, analyzed, and checked against some of the most widely known treatises of antiquity: Palladio's *Four Books* [9], Serlio's *Seven Books* [12] and Vignola's *Book of five Orders* [13].

The result (Figure 8) was a thorough study of the pieces and the classical orders (in this case, a composite order), with which we attempted to make a full 3D representation of the whole decoration program of the sacred square. This attempt to a complete redrawing of the façades, plans and

[5] It is important to remember that marble (of which all the monumental areas of Tarraco were made), and also limestone, are a mineral compound of calcium carbonate ($CaCO_3$). This material is one of the main sources of lime mortar. Unfortunately, most of Roman ancient and other ancient remains were ravaged to produce this construction material, and Tarragona is no exception. For this reason, very few remains of Tarraco's monuments have arrived to our days.

sections of the whole square opened several questions, and allowed the students, professors, and collaborating experts to test out hypothesis and different solutions.

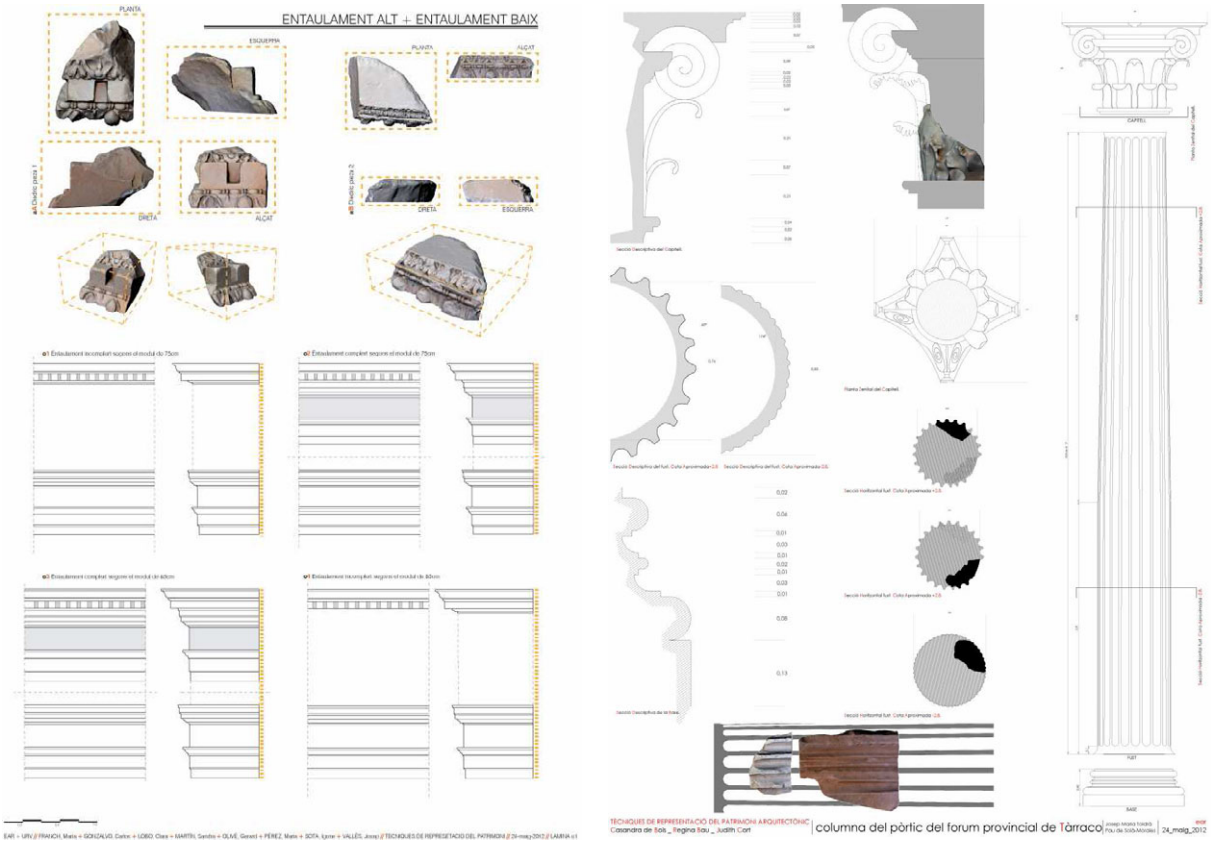


Figure 8: Two samples of photogrammetry 3D modeling of pieces from the MNAT, and an interpretation (together wit hypothesis and conjectures) of the possible size and features of the resulting decorative program

3 Conclusion

With the help of fourth year architecture students, who are well versed in representation tecnniques, and utilizing modern and traditional surveying techniques the authors have been able to redraw different heritage remains in the city of Tarragona, the old Roman Tarraco. Learning and teaching these techniques has been fairly easy, and obtaining 2-dimensional and 3-dimensional, data-rich and accurate representations of Tarraco's remains fairly simple. Thius, from a pedagogical point of view, the courses have been useful and sound, more if we understand that we have also taught the students new ways of interacting, analyzing and understanding the history of their territory. .

But from the point of view of the professors and researchers involved in the course, we have been able to obtain valuable materials: well drawn, precise representations of historical "objects". Or, in other cases, we have been able to locate them with the use of these drawings: as the city evolves, it "crystallizes" or "fossilizes" the old city, and through good representations, we are able to undo this process. Finally, with good surveys and representations of fragments and pieces, we are able to or test hypothesis or reconstruct the original city form.

In any of these cases, accurate and precise architectural representation is used as a support for archaeological and historical analysis of the past, establishing a useful interdisciplinary relationship that we hope will yield many results in the near future.

Bibliographical References

[1] L'Italia di Le Corbusier 18/10/2012 - 17/02/2103. Rome: MAXXI, Museo nazionale delle arti del XXI secolo, 2013.

[2] AUBREY, J. AND J. FOWLES *Monumenta Britannica: or, a miscellany of British antiquities*. Sherborne, England: Dorset Pub. Co., 1980.

[3] DUPRÉ, X. AND J. M. CARRETÉ *La "Antiga Audiència". Un acceso al foro provincial de Tarraco*. Madrid: Excavaciones Arqueológicas en España, 1993.

[4] GROS, P. Le modéle du forum d'Auguste et ses applications italiques ou provinciales. État de la questions aprés les dernières découvertes. In M. NAVARRO AND J.M. RODDAZ eds. *La transmission de l'ideologie impériale dans l'Occident romain. Colloque Bastia 2003.* Bordeaux-París: CTHS, 2006, p. 115-128.

[5] LOOS, A. Ornament and Crime. Cahiers d'aujourd'hui, 1913, (5).

[6] MACIAS, J. M., I. F. FERNÁNDEZ, L. P. MASGORET, et al. *Planimetria Arqueològica de Tàrraco*. Tarragona: ICAC, 2007. ISBN 978-84-934698-4-9.

[7] MACIAS SOLÉ, J. M. The Integrated Management of Archaeological Heritage in Tarragona (ancient Tarraco, Hispania Tarraconensis). In S. SANTORO ed. *Skills and tools to the cultural Heritage and cultural tourism management (TEMPUS IV-CHTMBAL).* Teramo, IT: D'Errico, 2013, p. 215-236.

[8] MAR, R., J. RUIZ DE ARBULO, D. VIVÓ AND J. A. BELTRÁN *Tarraco. Arquitectura y urbanismo de una capital provincial romana*. Tarragona: DAC 5, 2012.

[9] PALLADIO, A. I Quattro Libri dell'architettura. Venetia, 1570.

[10] PARSLOW, C. C. *Rediscovering antiquity : Karl Weber and the excavation of Herculaneum, Pompeii, and Stabiae*. Cambridge: Cambridge University Press, 1995. ISBN 0521471508.

[11] RUBIÓ, J. *Visions del Taber Mons Barcinonensis*. Barcelona, 1927.

[12] SERLIO, S. Regoli generali di architetura sopra le cinque maniere degli edifici, cioe, thoscano, dorico, ionico, corinthio, et composito con gli essempi dell'antiquita, che per la maggior parte concordano con la dottrina di Vitrubio. MDXXVII. Venetia: Francesco M da Forli, 1537, vol. 1.

[13] VIGNOLA, J. B. D. Regola delli cinque ordini d'Architettura di M. Iacomo Barozzo da Vignola. Roma, 1562.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Create "Urban·Ecological·Cultural" Symbiosis Space: Conservation Practice of Historic Riverfront in Turin and Shanghai

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Abstract
Each river is a history, witnessing historical changes of the city. As the earliest area of urban development, the riverfront contains rich culture information, which forms fluvial culture of different regions with different features. The riverfront is an important resource in urban development, which plays a key role in improving urban environment quality, enriching regional features and promoting urban economic development. With the continuous evolution of cities, many historic riverfronts are facing with various problems caused by economic development, environment governance, cultural aspiration and etc. This paper took the Murazzi of Turin and the Bund of Shanghai as cases to compare the conservation idea and method of historic riverfront based on different contexts. Through the comparative research, this paper aimed to put forward methods to solve the contradiction between protection and development, protect the continuity of historical culture, and further carry forward the city's features in the process of urban regeneration.

Keywords: conservation, historic riverfront, Turin, Shanghai

1. Introduction
Each river is a history, witnessing historical changes of the city. As the earliest area of urban development, the riverfront contains rich culture information, which forms fluvial culture of different regions with different features. The riverfront is an important resource in urban development, which plays a key role in improving urban environment quality, enriching regional features and promoting urban economic development. With the continuous evolution of cities, many historic riverfronts are facing with various problems caused by economic development, environment governance, cultural aspiration and etc., which has increasingly become an important issue being paid great attention by international cultural heritage research.
The Washington Charter (1987) firstly proposed the definition of "historic urban areas"[1], those areas including urban historic and landscape characters in aspects of natural environment, artificial environment and humanistic atmosphere etc., which could reflect the diversity of social lives and cultures. The protection of "historic urban areas" is the protection of cultural relics and historical sites more comprehensive and integrated, as well as the protection of urban features. When it comes to "historic riverfront", some relevant protection elements are more focused because of the existence of the river, which could be divided as: historical space organization, historical architectures and structures, biological cultural resources and unique cultural tradition and custom, according to composing elements of space structure of "historic riverfront".[2]
This paper studied two cases, the Murazzi of Turin in Italy and the Bund of Shanghai in China, to compare the conservation idea and method of historic riverfront based on different contexts. The Murazzi is a belt area along the Po River in urban center of Turin, an area with high environmental, architectural and historical value. Likewise, The Bund is a linear open space along the Huangpu River in the center of Shanghai downtown, which has always been a symbol of the city. Both of these two cities have practices regarding to the conservation of historic riverfront, while the ideas and methods

are not always the same due to different cultural background. Through the comparative research, this paper aimed to put forward methods to solve the contradiction between protection and development, protect the continuity of historical context, and further carry forward the city's features in the process of urban regeneration.

2. Conservation practice of the Murazzi in Turin

2.1 Historical changes of the Murazzi

Turin located in northwest Italy, encircled by mountains and hills. The Po River, originated in western Alps, passed through the whole city from south to north, joined by three tributaries. Turin city was built probably in 16th century, located with a certain distance to the river. Natural terrain, slopes in the north and east to the river, enhanced the security defense system of the city at that time. Until the mid-19th century, the city developed across the Po River to the east, since this the Po became a river inside the city, in other words, the city closely contacted with the river.[3]

With the continuous expansion of the city to the Po River direction, Since 1860, the Municipal Council of Turin recognized the necessity of the order on the left bank of the Po River. Based on two purposes, regeneration and landscaping, the construction of the Murazzi began from 1872.[4] The project conducted with the demolition of old villages and the embankment along the river. Since then, previous urban fringe area converted to the most beautiful and attractive places in the city. The embankment conformed to the natural topography. The lower layer was set approximately 2 meters above the ordinary level of the water; the upper layer was built almost at the same level of urban road, with about 9 meters gap between these two levels, forming a row of rooms facing the river, most of which were rented as storages for transportation on the river as well as industries (such as laundries ect.) that need continuous clean water. (Fig. 1)



Fig. 1: Turin – on the Po River, in Lorenzo Artusio, Mario Bocca, Mario Governato, Mario Ramello, *Mille saluti da Torino*, Edizioni del Capricorno, Torino 1990, p. 128

2.2 Conservation practice of the Murazzi

The Murazzi was a belt area along the Po River with high environmental, architectural and historical value, characterized by a row of rooms facing the river, which are used to fill up the gap between the city and the river. The original function of these rooms was linked to traditional service activities on the bank: laundries, storages for fishing boats and transports etc. With the development of society and the changing of lifestyles, the traditional activities on the bank had been transformed and reduced, some even had completely disappeared. So these rooms were idle and the whole area showed a rundown scene, which even bred criminal activities. Since this, the Murazzi, experienced nearly a century of prosperity, became a “dark area” in the city, which seriously affected the image of the city and citizens’ lives.

From 2006, a renovation project of the Murazzi was implemented in order to clear off all kinds of inappropriate activities, recover the original environmental features, create a comfortable and relaxed place for the public, so as to enhance the overall space quality of the embankment. The project mainly dealing with two problems:

① Develop new functions in accordance with modern lifestyles to win economic benefits and improve the quality of the environment.

② Defense periodic flooding to guarantee the physical security of the place and personal safety of users.

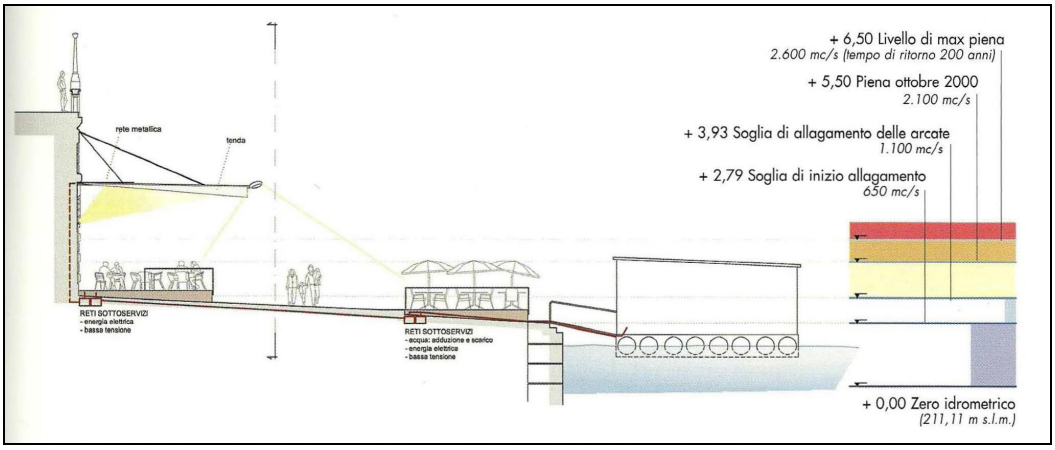

Fig. 2: Schematic section of the conservation project of the Murazzi, in Gianfranco Cavaglià [et al.](edited by). *Progetti integrati d'ambito a Torino: complesso dei Murazzi del Po, via Giuseppe Garibaldi, piazza Vittorio Veneto*. Torino: Celid, 2009, p. 49

2.2.1 Riverfront space

Bi-layer space with a row of rooms facing the river was the most typical feature of historical space of the Murazzi. Because of the location, the lower layer space, close to the river surface, was very attractive while threatened by periodic flooding at the same time. (Fig. 2) In order to solve this contradiction, the conservation project proposed a Guideline against the flood risk, in which doors of rooms should be strictly selected by material and structure for excellent performance in sealing capacity, and outdoor furniture should be removable that could be removed within 30 minutes when flood came. In this way, the risk of flooding on the site was effectively avoided, at the same time the historical space feature was conserved.

2.2.2 Riverfront activities

Abundant waterside activity is a symbol of vitality of waterfront space. The conservation project was characterized by the introduction of the concept of "time" in riverfront activities, which means that activities should change over time and continue to update. Current situation of the use of the rooms was detailed investigated, then the feasibility of adding new activities was evaluated according to the spatial characteristics and regional features. The Urban Design Guideline stated: current functions and activities along the river in the rooms should not be the limiting factors of the development of other new activities, on the contrary, these activities should gradually change over time, or even be replaced; activities that may occur in the future should not only adapt to environmental, historical and architectural background conditions, but also help to improve these conditions.

After conservation, this riverfront area recovered as energetic urban space, the place for canoeing once a year, the place for fireworks show on holidays, and the place for public recreation on weekdays.

2.2.3 Pedestrian system

The Murazzi connected two pieces of important urban areas, the urban square (Vittorio Piazza) to the north, and the urban park to the south (Valentino Park). After conservation, the pedestrian system along the river was rationalized, so a continuous regional pedestrian system was formed, which improved the quality of environmental space of riverfront in urban center. Besides, in the vertical direction, the upper and lower layers were connected by steps, ramps and green slopes, providing multiple paths for tourist to get close to the river, which help people to have rich experience of urban riverfront space. (Fig. 3) The rational allocation of sculpture, structure, street furniture and other elements contributed to a multi-level and interesting pedestrian system.



Fig. 3: Vertical transportation system on the Murazzi, photographed by the author.

2.2.4 Embankment

Most part of the Murazzi was vertical rigidity embankment due to the tense space in urban center, which often generated unapproachable feeling for people. In order to make up the shortcoming of this kind of embankment, the conservation project made full use of the green part near Valentino Park to construct ecological embankment, also known as flexible embankment. In this section, the gap between urban road and the surface of the river was filled up by green space, among which interspersed pedestrian and bicycle lanes. (Fig. 4) Such linear space in urban center combined by rigidity and flexible embankment could contribute to meet the requirements of flood defense as well as increase the opportunity of close to nature.



Fig. 4: The embankment of the Murazzi, photographed by the author.

3. Conservation practice of the Bund in Shanghai

3.1 Historical changes of the Bund

Shanghai located in the extreme east of the Yangtze River Delta, on the midway along the China east coast. Huangpu River, originated from Dianshan Lake originated in the west of Shanghai, passed through the city from south to north, joined by Suchou Creek in a T shape in Shanghai downtown. The river system made Shanghai a traffic hub for land and water transportation in the area south of the Yangtze River and an important gateway to inland China from the east coast. Superior geographical location and convenient inbound and outbound transportation provide a sound foundation for the emergence and development of the city.[5] The old town was built on the west of the Huangpu River.

Then the city developed to the east, From 1850s, areas along the river were constructed by foreign settlements into “a modern city”. Until the announcement in 1990, that the land to the east of the Huangpu River was opened for development, the city developed across the river from west to east.
The Bund was originally a piece of barren land along the Huangpu River outside the town. With the opening of Shanghai Port in 1843, the Bund was selected by foreign merchants to build houses and private wharfs, due to its geographical advantages. [6] The architectures and facilities developed by foreigners in the early 20th century, especially the historical buildings built in western style along the Bund, has always been a symbol of Shanghai. (Fig. 5) From 1959, a flood-control wall began to be fixed along the Bund, and be heightened for several times, from 4.8 meter to 5.8 meter until 1974. At that time, the riverfront set on the same level with the road, which enabled tourists to get close to the Huangpu River easily. From 1989 to 1993, a new flood-control wall of reinforced concrete dual-layer culvert structure was built along the 1700-meter riverfront of the Huangpu River, thereby the riverfront was raised to one-storey height above the road. In this way, the problem of flood was well controlled, the parking pressure was released as the inner space of the culvert structure could be used as public parking, while a serious of functional and environmental problems were generated accordingly.



Fig. 5: Scene of the bund in 1920s, in Shanghai Zhangming Architectural Design Firm(edited by), *Shanghai Waitanyuan Historical Buildings (Phase 1)*, Shanghai Far-East Press, Shanghai 2007, pp. 34-35.

3.2 Conservation practice of the Bund

The last reconstruction has solved problems of transportation and flood defense in some degree, but along with increasing citizens and visitors’ demands for the quality of public space and activities, many problems gradually appeared. Firstly, busy transit traffic occupied a large amount of riverfront space, which increased the difficulty to cross the road and reach the riverfront. Secondly, public activity space was constraint. Thirdly, insufficient leisure facilities caused that tourists could not stay on the riverfront for a long time. Fourthly, places for appreciating the historical architectures are not enough. Fifthly, such a high flood-defense wall blocked tourists' sights towards the river.[7] In 2007, Shanghai Municipal Government started the "Bund Comprehensive Renovation Project", aimed to fulfill tourists’ demands and enhance the quality of urban riverfront space. This Project initiated with the construction of a underground expressway, in which the ground driveway was reduced from 11 lanes to 6 lanes, which has released more than 40% urban space on the ground.

3.2.1 Riverfront space

The dual-layer culvert structure was the typical feature of the Bund from today’s point of view. In view of problems mentioned above, some transformation has been done. The reduction of driveway on the ground expanded the space for pedestrian, so the widest part of pavement at west side of the Bund was widened to 12m. Besides, with regard to issue of appreciating historical architectures and river, some new levels were added on the culvert structure: a middle layer sightseeing floor (FL+4.7m) was added between the ground floor (FL+3.5m) and the platform of the structure (FL+6.9m), thus three-layer sightseeing space system was formed for appreciating historical architectures and leisure (Fig.

6); on the side of riverfront, concerning the difficulty to get close to the water brought by the gap between platform with the river surface, a row of platforms close to the river was constructed at intervals, which enhanced tourists' feeling of nature.

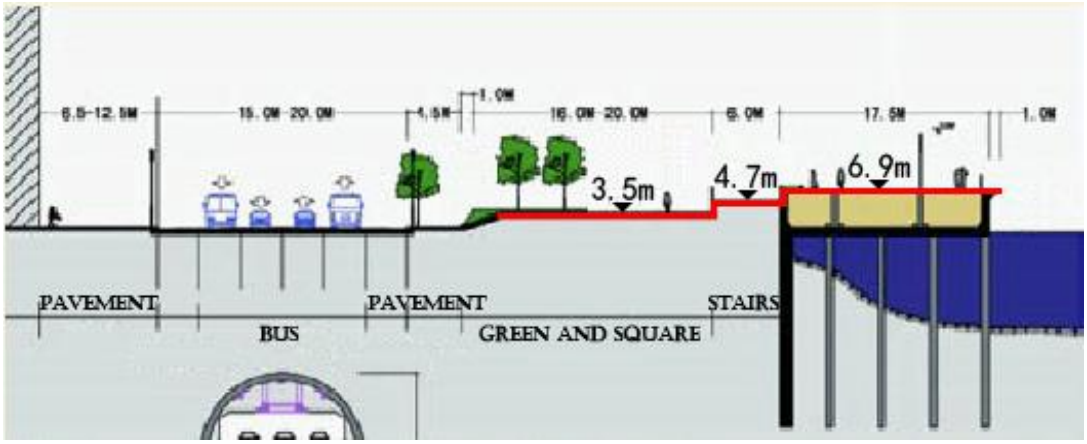

Fig. 6: Three-layer sightseeing space system, in XI Wenqin, XU Wei, *Remodeled Classic, the Centenary Shanghai Bund: Detailed Plan of the Urban Design and Site Plan of Shanghai Bund Waterfront*, in «Urbanism and Architecture», n.s. Feb. MMXI(2011), n. 77, p. 45.

3.2.2 Riverfront activities

With regard to problems of disordered arrangement of various kinds of facilities and low quality of public services, the conservation project optimized and integrated public service facilities for parking, tourist, leisure and celebration activities. Structures of facilities have been redesigned and relocated according to tourists' requirements and the characteristic of the space. After conservation, the Bund could accommodate a variety of activities, from daily recreation to celebration activities on vacations. On each New Year's Eve, a 4D light show, taking historical architectures as the background, staged on the Bund, often accompanied by an evening party. (Fig. 7) In addition, many historical buildings were protected and endowed with modern functions, such as the Gutzlaff Signal Tower was restored as a coffee bar on the ground floor and a small museum on upper floor, the former British Consulate was transformed as the "Bund history museum". The establishment of cultural facilities promoted the aggregation of cultural activities within this area.



Fig. 7: The night scene of the Bund after renovation, photographed by the author.

3.2.3 Pedestrian system

By reasonable arrangement of the pedestrian system, the accessibility to the Bund in vertical direction and the consistence in horizontal direction has been improved to a large degree. As the ground space was released for pedestrians, walking space was greatly increased. Pedestrians from west of the Bund could cross the East Zhongshan Road on the ground level directly, which changed previous embarrassed situation that pedestrians have to cross the Road through an underground passage. Besides, in order to solve problems caused by height difference between the ground and the top of the flood defense structure, many height difference treatment measures, like steps, ramps, elevators etc., has been added, connecting three layers of sightseeing platform, which increased the density of vertical transportation and provided many interesting and selective accessible paths for tourists. Thus, a safe, comfortable and natural height difference transition has been formed.

3.2.4 Embankment

The Bund was the central riverfront space in the downtown, which stretched in north-south direction and cramped in east-west direction. Before conservation, the green space distributed uneven on the bank, mainly gathered in Huangpu Park, the northernmost of the Bund where the Huangpu River and the Suchou Creek converged. The conservation project completely reserved substrate-vegetation system in Huangpu Park, and took special treatment to improve local ecology in the whole Bund area, like suitably adding arbors and making it form three-dimensional greening system with bushes, establishing tree array on the ground, setting up green wall, on the basis of ensuring public activities and showing historical scenes. Thus, the integral ecological environment has been improved to a large degree. Besides, based on the analysis on the architectures and landscape vision from the Bund, deciduous trees were selected in specific area where historical architectures were most excellent, which could provide shade during hot summer days and provide sightseeing convenience during cold winter days. In the southernmost of the Bund, the original culvert structure was replaced by natural embankment, which brought a great vitality to urban space. (Fig. 8)



Fig. 8: The embankment in the southernmost of the Bund, photographed by the author.

4. Comparison and conclusion

By comparison of Tuin and Shanghai's cases, two cities sometimes had different measures to deal with the contradiction of protection and development, while the ideas were mostly in consistent, "protecting historical site memory on the one hand, and fulfilling contemporary requirements on the other hand".

4.1 Comparison

4.1.1 Riverfront space

Due to natural terrain and historical changes, the space of the Murazzi and the Bund was different. The conservation project of Murazzi made full use of the natural terrain to establish two-layer platform for leisure and sightseeing activities, one close to the river surface which was designed to be flooded

occasionally, the other one on the same level as urban road. The space under the road was opened to the river which provided more space for waterside activities on the bank. On the Bund, the conservation project added platforms between ground floor and the top of the flood- defense culvert structure to provide multi space for appreciating historic buildings with great historic and cultural values and enjoying the scene of river. The inner space of culvert structure was opened to the urban road, used as public parking.

4.1.2 Riverfront activities

Both the Murazzi and the Bund stimulated activities on vacations and on weekdays, including cultural or traditional activities as well as leisure and entertainment, by optimizing and integrating public service facilities. The conservation project of Murazzi even creatively introduced the concept of "time" in riverfront activities, which ensured the type of activity to continuously update with time.

4.1.3 Pedestrian system

Both the Murazzi and the Bund strived to improve the accessibility to the riverfront from the city by increasing the density of vertical transportation, such as steps, ramps and green slopes or elevators etc., providing multiple paths for tourist to get close to the river. In horizontal direction, these two cases both created a continuous regional pedestrian system by reasonable arrangement of the pedestrian system to improve the quality of environmental space of riverfront in urban center.

4.1.4 Embankment

Both the Murazzi and the Bund were linear riverfront space in urban center, most part of which was vertical rigidity embankment. In order to make up the shortcoming of this kind of embankment, ecological embankment should be combined as far as possible in order to meet the requirements of flood defense as well as improve integral ecological environment. In addition, the case of the Bund also stressed that the selection of tree species should consistent with spatial characteristics, and the growth of trees should not influence viewing.

4.2 Conclusion

In conclusion, the historic riverfront concludes urban historic and landscape characters in aspects of natural environment, artificial environment and humanistic atmosphere etc., reflecting the diversity of fluvial cultures. In view of these characteristics, the ideas and methods of conserving historic riverfront could be concluded as follows:

① Create multi-layer space to enrich sightseeing and increase space vitality.
② Stimulate activities for the requalification of urban space and cultural continuity which should be continuously updated with time.
③ Optimize the accessibility to the river and establish continuous and pleasant pedestrian system in regional scope.
④ Combine the ecological embankment with the rigidity embankment for the sake of safety and ecology.

Bibliographical References

[1] "Historic urban areas, large and small, include cities, towns and historic centers or quarters, together with their natural and man-made environments. Beyond their role as historical documents, these areas embody the values of traditional urban cultures (Washington Charter, 1987)."

[2] WANG Zhifang, SUN Peng, *Landscape Features and Treatments in Historic Waterfront Preservation*, in «Journal of Chinese Landscape Architecture», n.s. Nov. - Dec. MM(2000), n. 16, pp. 36-39.

[3] CAPELLINI Lorenzo, COMOLI Vera, OLMO Carlo, *Turin*, Allemandi, Torino 2000, pp. 15-16.

[4] CAVAGLIA Gianfranco (edited by), *Progetti integrati d'ambito a Torino: complesso dei Murazzi del Po, via Giuseppe Garibaldi, piazza Vittorio Venento*, Celid, Torino 2009, p. 33.

[5] WU Jiang, *The History of Shanghai Architecture (1840-1949)*. Tongji University Press, Shanghai 2008, p. 1.

[6] YUEMAN Yeung, SUNG Yunwing, *Shanghai: transformation and modernization under China's open policy*. The Chinese University Press, Honkong 1996, p. 2.

[7] XI Wenqin, XU Wei, *Remodeled Classic, the Centenary Shanghai Bund: Detailed Plan of the Urban Design and Site Plan of Shanghai Bund Waterfront*, in «Urbanism and Architecture», n.s. Feb. MMXI(2011), n. 77, pp. 42-45.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The Shrine of Pompeii. Packaging of the sacred and politics

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Abstract
The Shrine of Pompeii is one of the most sacred places dear to the Christian religion and its building is an expression of spiritual revival movement that was present in Europe during the course of the nineteenth century.
The proximity to the pagan city buried by the eruption of Vesuvius in 79 AD, was the stimulus for the creation of a city inspired by religious principles. These ideals, in fact, led the activity of Bartolo Longo, the lawyer by Salento who founded the new town of Pompeii.
The commitment to promote and grow a new community of men supported by the principles of faith has also been the success of the initiative expressed by the spread in the whole world, devotion to the Virgin of the Rosary.
The simple character of the architecture of the old nineteenth-century shrine was eliminated in the first half of the twentieth century, during the Fascist period, with the expansion of its size up to five times higher, making use of the technology of reinforced concrete.
The experience of enlargement of the church Pompeii was linked to similar experiences in Europe were born also to support and enhance the totalitarian political regimes that exercised power.

Keywords: sacred architecture, extension Pompeii shrine, concrete, traditional architecture

Sacred architecture end rhetoric of political

The Shrine of Pompeii is one of the most sacred places dear to the Christian religion and its building is an expression of spiritual revival movement that was present in Europe during the course of the nineteenth century. The simple character of the architecture of the old nineteenth-century shrine was eliminated in the first half of the twentieth century, during the Fascist period, with the expansion of its size up to five times higher, making use of the technology of reinforced concrete.
An case history is Pompei's basilica, where the expansion, in the second half of the nineteenth century, is a complex attempt to combine the traditional needs of worship with the most modern instances linked to the enhancement of sacred art.
The proximity to the pagan city buried by the eruption of Vesuvius in 79 AD, was the stimulus for the creation of a city inspired by religious principles. These ideals, in fact, led the activity of Bartolo Longo, the lawyer by Salento who founded the new town of Pompeii.
The commitment to promote and grow a new community of men supported by the principles of faith has also been the success of the initiative expressed by the spread in the whole world, devotion to the Virgin of the Rosary.
The Church founded by Bartolo Longo to the east of the ancient city of Pompei has been an important Marian and charitable centre since its foundation in 1876, forming a kind of Christian "New Pompeii" and a symbol of salvation amid todays positivist world.

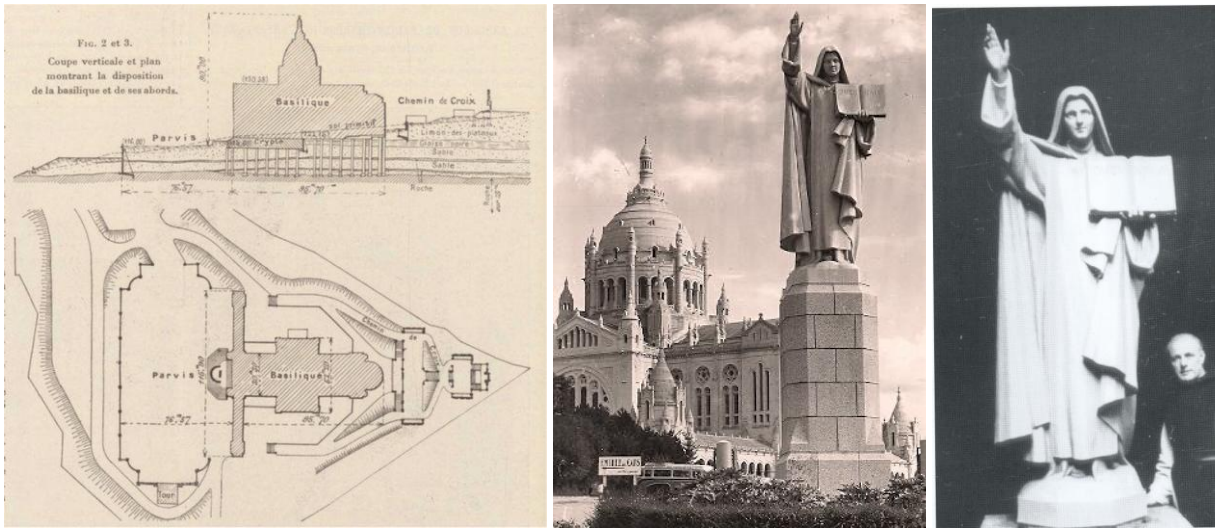

Fig. 1-2: **Lisieux**, **Poject and statue of St. Therese Shrine;** 3: **statue with his author, father B.M. Richomme**

The rebirth of the Vesuvian town, after long centuries of oblivion, had its symbol in the building that, by means of its Baroque style, it seemed likely to confirm the deep commitment to the spiritual connotations responsive to the needs of the territory of Naples. The result is a singular discrepancy, a sign of exceptional cultural richness, but also of Campania's resistance, wealth that characterizes the area of Naples. By virtue of it, while Enrico Alvino predisposed the project for the facade of the cathedral of Naples in a version *tricuspidata*, in the city buried by the eruption of 79 AD, the patron Bartolo Longo chose a formal language close to the Renaissance.

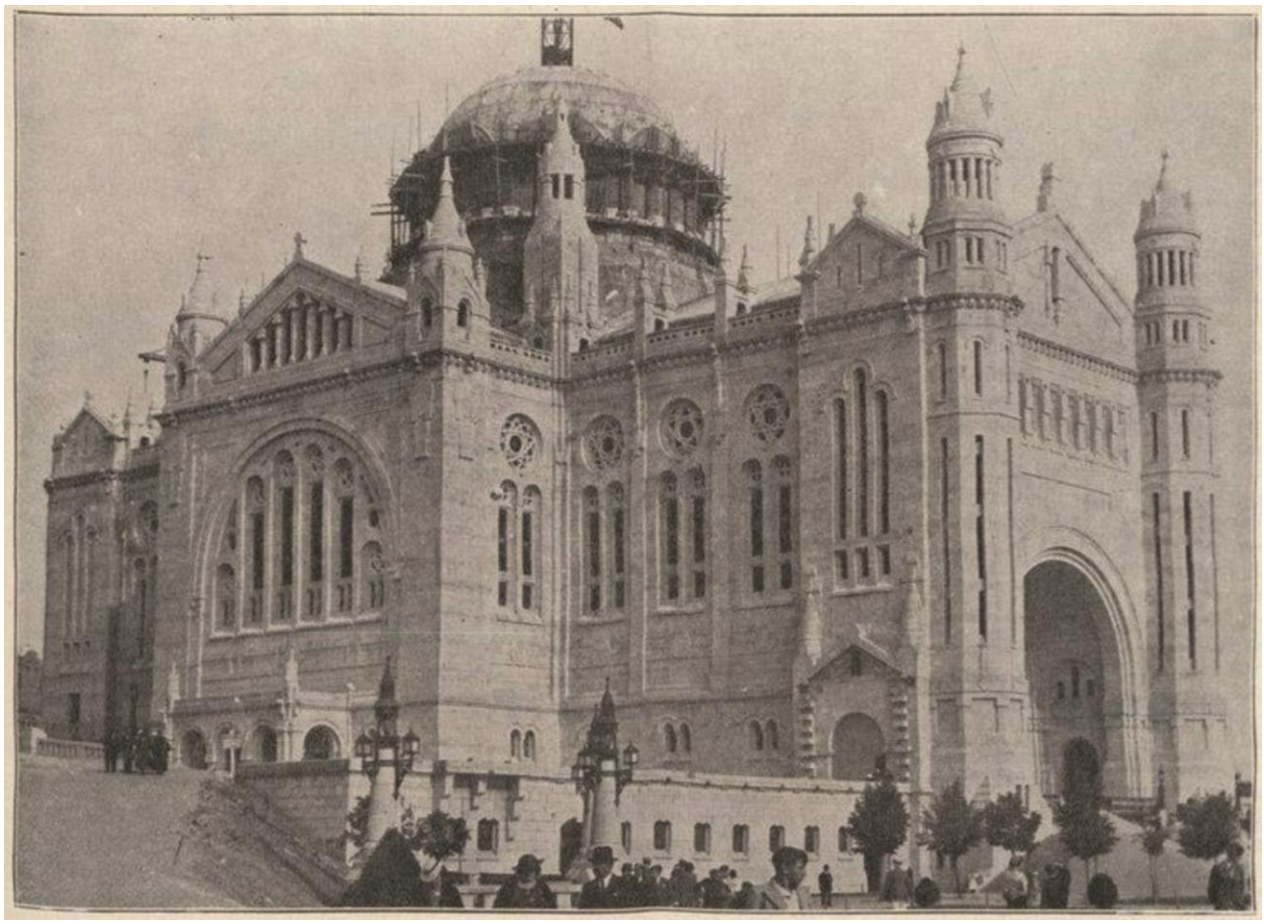
Fig. 4: **Lisieux**, **St. Therese Shrine**





Fig. 5: **Pompeii, cast ancient Pompeian;** 6: **Book of extension work**

In this way, the temple tended to retrieve, even visually, a golden age for Italian art and architecture. The choice is not random, but responds to client's decision to oppose symbolically to the pagan city (the *imago* of the Roman *orbis*) another that, similarly, to oppose to the first, embodying an formal prototype encoded by a centuries-old tradition.
In this way, Pompeii's experience tends to materialize the Catholic faith in a building that had a clear



Fig. 7: **Rome: ancient photo of the pavilion of the Ara Pacis**



Fig. 8-9: **Devotional postcards to the First World War Neapolitan devotion to S. Anna alle Paludi**

metaphorical character. The occasion of the increase is placed at the beginning of a decade, the thirties, particularly significant in the context of architectural reflection of the time, marked by a substantial controversy between those in charge of sacred art, about the formal aspects and materials of new buildings.

The enlargement's realization of the basilica, whose author was Spirito M. Chiapetta, fits perfectly in the cultural environment of the time: the project in fact summarizes a series of cultural and technical

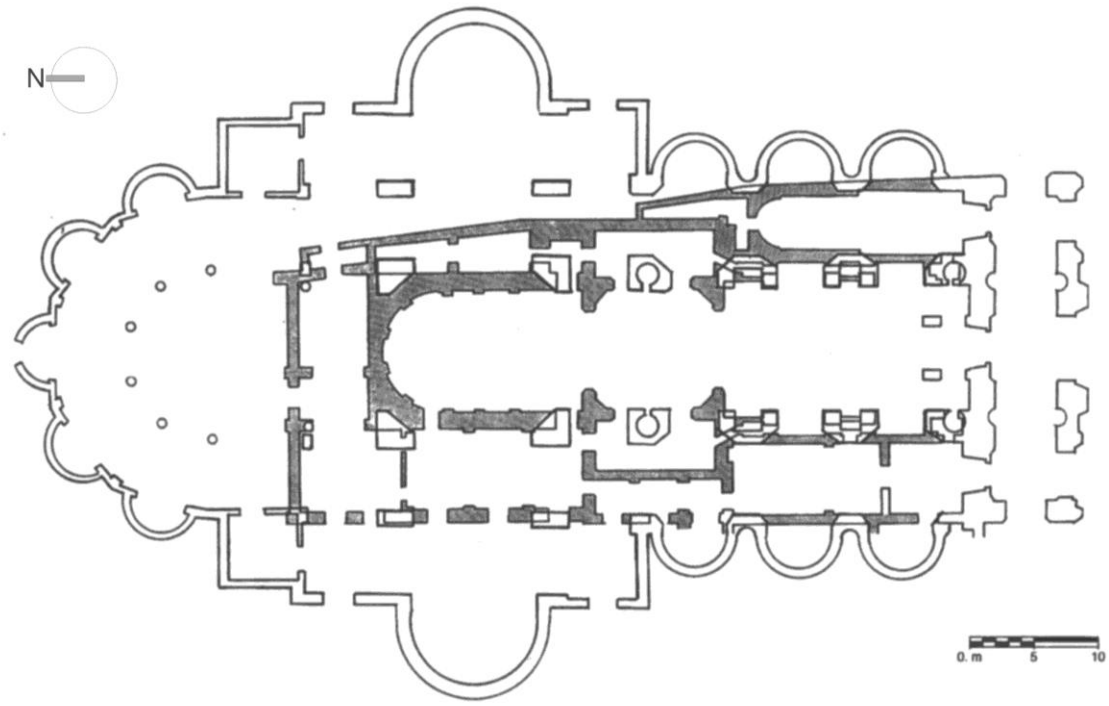

Fig. 10: **Plant enlargement of the Shrine of Pompeii**

problems, the result of a problematic attitude towards modernity. In fact, using modern materials, the engineer showed openness towards new technologies, opposed by the client, while trying to match them with the aesthetic language of the factory

The pontifical Prelate Delegate, Anastasio Rossi, carried out work to expand the now inadequate church in the mid 1970s. The plans of Chiapetta, who had first trained as an architect and at the time was president of the central Pontifical Commission for sacred art, were assessed and revised by Gustavo Giovannoni, undoubtedly the greatest authority of the period. Giovannoni not only approved Chiapetta's designs, but produced a lenghty reasoned opinion with observations and suggestions. As has been noted[1], the recovery of that document, published entirety, shows how the problems of treating sacred spaces were considered. The change of plan, with the transformation of the original single room in a large temple with three naves, and the choice of a large dome, which barely hides the implicit reference to the previous Michelangelo, demonstrate an attempt to combine the old and modern in a project for promote the image of the "new Pompeii." Recently, the recovery of document, published in its entirety[2], shows how the problems of treating sacred spaces were considered. It also makes clear how the existing buildings on the site were allowed to influence the new plans.

The experience of enlargement of Pompeii's church was linked to similar experiences in Europe were born also to support and enhance the totalitarian political regimes that exercised power. In view of the personalities involved in the project, the Pompeii sanctuary provides an interesting opportunity for a detached study of the architectural design of the period.

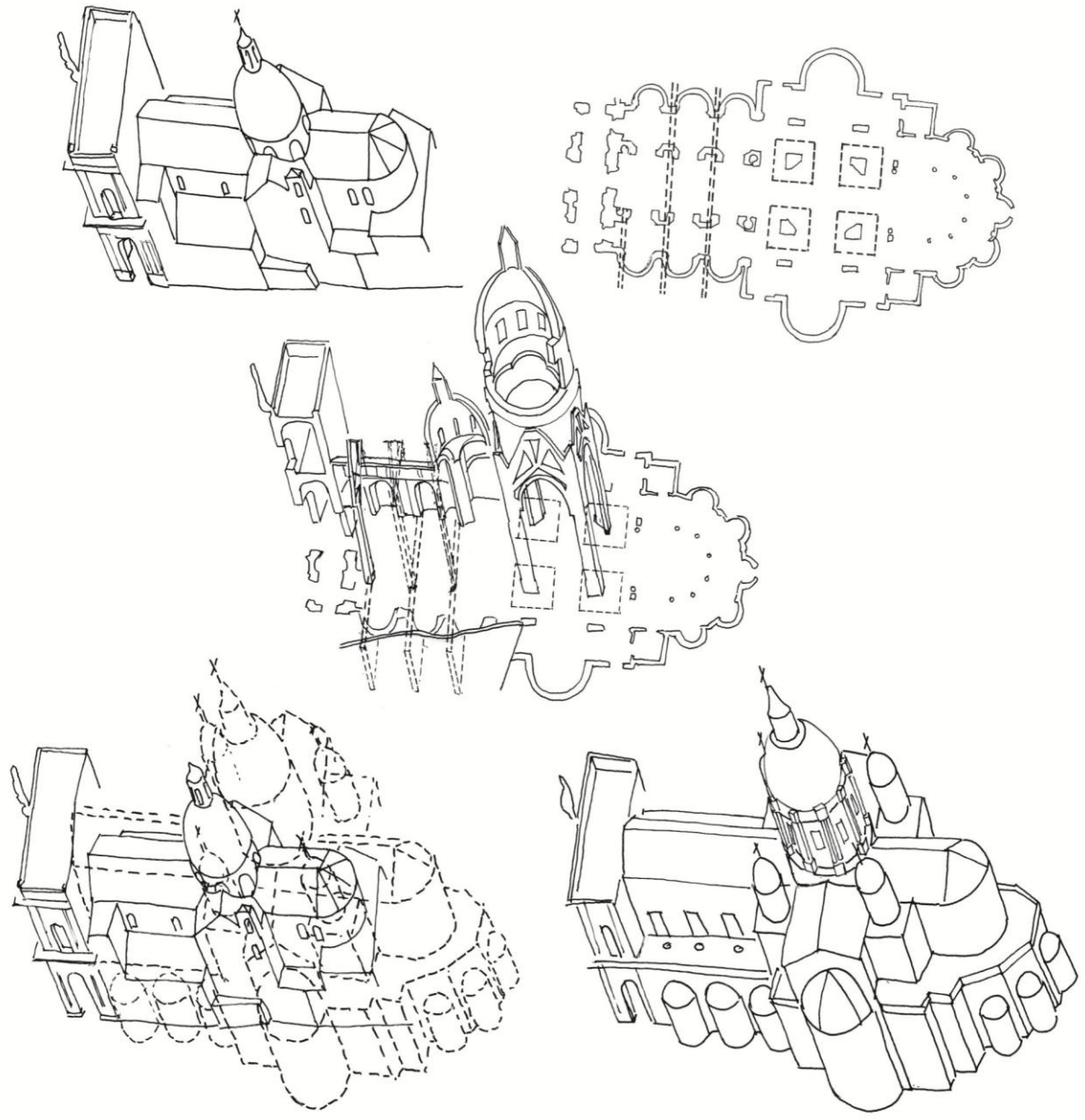

Fig. 11: **Enlargement of the Shrine of Pompeii**


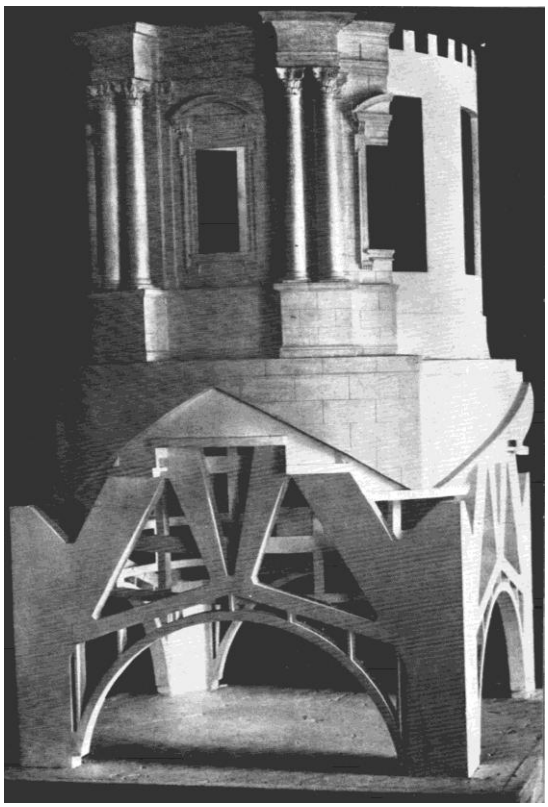

Fig. 12-13: **Models enlargement of the Shrine of Pompeii**

The expansion of the Shrine of Pompeii constituted an important initiative for the promotion and celebration of the Marian cult in Italy. It, in many ways, it connects to other significant experiences and to contemporary European efforts, in the two decades following the First World War, to rebuild the social fabric of the individual states in supporting national identity through the promotion of shared values.

In the same years in which they set up in Pompeii is the work of enlarging the small nineteenth-century church (1933-39) to Lisieux was being built, perhaps modeled on the Sacred Heart of Paris, the great basilica dedicated to the petite Carmelite nun Teresa.

To her already the Austrian novelist Joseph Roth, settling his novel in the period of construction of the church Vesuvian, had dedicated his beautiful writing The Legend of the Holy Drinker.

The same story seems to describe, through the protagonist suspended between alcoholism and virtuous intentions, the existential malaise of that era that needed to find a way inspired by the great social values of solidarity.

No different from the French, Italy, during the second decade of the fascist regime were activated significant works of architecture that were going to move to seal the political course of a state that, in the meantime, had also chosen to operate a policy of imperialist address.

What had happened in 1929 with the creation of the Lateran, was hailed as an experience of national reconciliation and, therefore, as a significant opportunity to undertake the investiture of political experience of the dictatorship which complete reliability.

The historian Emilio Gentile notes: «Cattolici e protestanti furono concordi nel ritenere che l'avvento degli Stati totalitari non fosse un fenomeno contingente della vicenda politica del dopoguerra, ma il culmine di un lungo processo, il prodotto della secolarizzazione e della espansione del potere dello Stato nella società moderna, che aveva costretto le Chiese ad arretrare verso la dimensione privata o a conformarsi ai miti della politica dello Stato laico. La Grande Guerra, le rivoluzioni politiche, le crisi economiche avevano esteso, attraverso la centralizzazione e la pianificazione, l'autorità e il controllo dello Stato sulla società e sulla vita collettiva, fino a sfociare nella concezione totalitaria della politica»[1].

The route, however, could not be a path through the promotion of the company's time instruments which derive directly from the religious tradition. The goodness of the individual social histories that were living in Europe in those years had to be certified by a process that as defined the historian of fascism, was to sanctify the political moment.

Among the traditional tools of communication of religious languages were identified as a priority the liturgy and iconography.





Ricordo della Statua di S. VITALE

Soldato e Martire Protettore di Fuorigrotta,

fatta scolpire in legno dal Parroco **Antonio Cangiano** e spedita in Africa Orientale il di 8 Novembre 1936 anno XV quale valida protezione per i nostri soldati e vigile custodia per il nuovo Impero Etiopico Italiano, fondato dal l'eroismo delle nostre schiere armate, dagl'invitti e gloriosi Condottieri **Badoglio** e **Graziani,** dalla saggezza del nostro **Re** e dal sapiente e glorioso Governo del nostro Duce **Benito Mussolini.**

Con l'approvazione del nostro Ecc.mo Monsig. ALFONSO CASTALDO Vescovo di Pozzuoli

Fig. 14: **Roma, Bronze door of San Paolo Fuori Le Mura**; 15: **Naples, Church of St Vitale a Fuorigrotta: card devotional for war in Africa**

For the latter material has a special meaning very complex, almost of disturbance, the statue of St. Therese a Doctor of the Church, near the basilica French, placed in 1938 to welcome the pilgrims visiting the shrine. The work, created by the Trappist Father Marie-Bernard Richomme, shows petite Thérèse bearing in his left hand the book of the Gospel, while the right arm is stretched out in a Nazi salute to the faithful[3]. In Italy, otherwise, some artistic interventions, in terms of the production of functional images to the rhetoric of the party, emphasize the sacred nature of certain stories meant to legitimize the absolute value of the state.

Singular experience in this regard is that of the bronze door of the sculptor Antonio Maraini for the church of San Paolo Fuori le Mura, the work that sealed, with the delivery of that ancient Benedictine foundation to the Holy See, the highest moment of conciliation, in 1929, between the Vatican and the Italian State.

The sculpture, suggested theologically by the Abbot Ildefonso Schuster, provides a Christian interpretation of reality through the Roman figures of St. Peter and St. Paul. Just the future Archbishop of Milan will also firm believer in the educational value of works of art in the Christian reinterpretation of the archaeological heritage, pointing also to the proposed actualization of those values through the identification of the Duce as a new Constantine[4].



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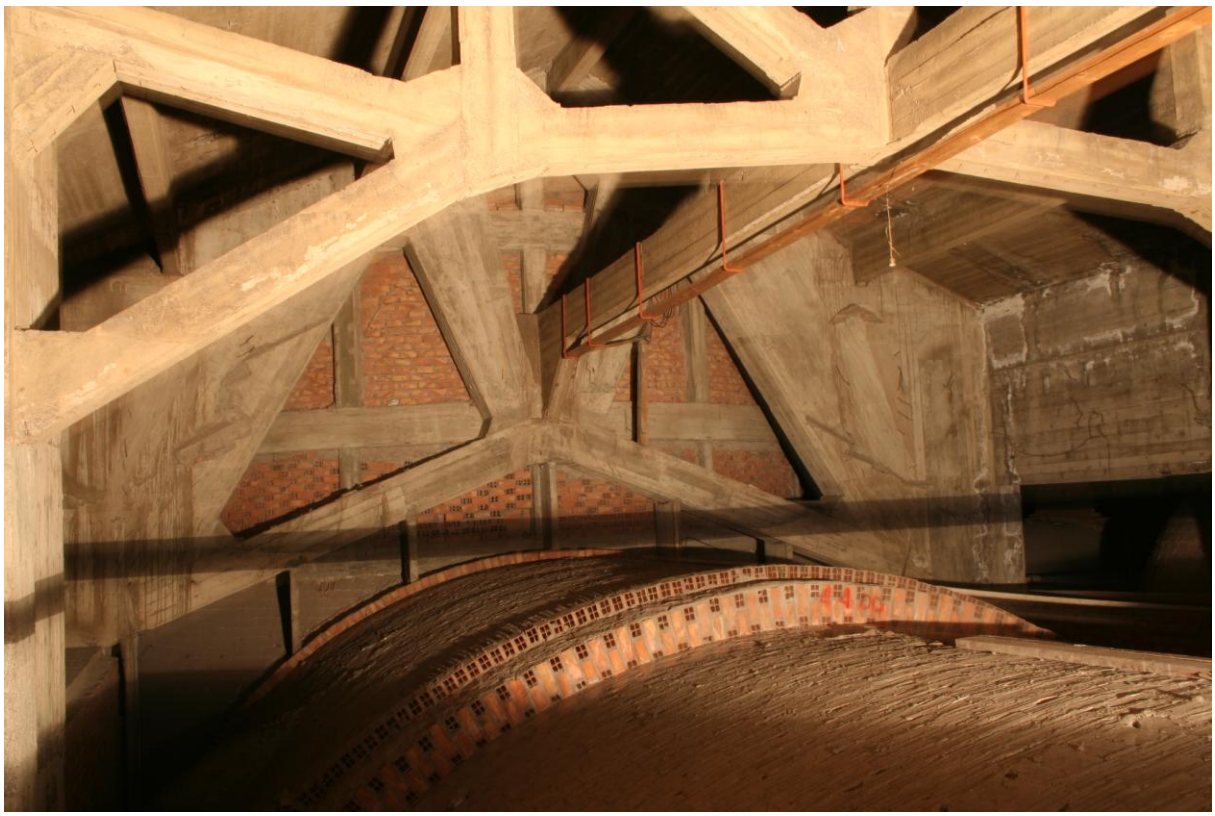
Con l'approvazione del nostro Ecc.mo Monsig. ALFONSO CASTALDO Vescovo di Pozzuoli

16: **Naples, Church of St Vitale a Fuorigrotta: card devotional for war in Africa (detail of the invocation)**



17: **Pompeii, Enlargement of the Shrine of Pompeii, details structural for roofing**

The insistent call to the transformation of places support the opportunity of interpretations up-to-date that, in tourism's key are likely to do one with political propaganda. In fact, the Benedictine Alfredo Ildefonso Schuster, certainly the most prominent Catholic intellectual of the time, offering his exegesis of an ancient monument, he argued: «La teoria dei ricorsi storici ha qualche cosa di pericoloso, perché pretendendo di ridurre la storia, che è vita, a delle tesi, che significano dei sistemi scolastici, si corre il rischio di falsare colori, affinché un quadro rassomigli ad un altro. Se non fosse così, io volentieri paragonerei la situazione di Roma alla morte di Giulio Cesare, alle condizioni disastrose d'Italia dopo Caporetto, coll'indebolimento dell'autorità statale di fronte ai partiti cozzanti fra loro. Ma come allora la "Divina Mens" inviò Ottaviano, così anche in Italia sorse "l'Uomo provvidenziale" di genio, il quale salvò lo Stato, fondò l'Impero e diede alle coscienze italiane la più perfetta unità nazionale in grazia della pace religiosa. […] L'"Ara Pacis Augustae", quale ora viene restaurata presso i portici dell'antica via Flaminia, per me ha un significato analogo a quell'ara dedicata al "Dio Ignoto" che si ritrova anche sul Palatino o quell'altra di cui discute S. Paolo all'Aeropago di Atene. […] Ho detto da principio, che io temo dei ricorsi storici; ma qui ce n'è uno che balza fuori dai fatti medesimi». On February 11, 1929, at the same shrine of the Lateran which is the novella "ara Pacis" of the renewed Empire, the Legate of Pope Pius XI and Mussolini, dux of new Italy, subscribed together an fatidical agreement, recalling too closely the 'edict of Milan in 313, the Constantine peace[5].

In closing, mention should also be a kind of tourism found in inverse relationship with the inmates entertained by Longo: «La fondazione dell'Ospizio per i figli dei carcerati, suscitò un'eco di simpatia negli stabilimenti penali di tutta Italia, nei quali Longo faceva arrivare le sue pubblicazioni […] pubblicò una *Guida del carcerato*, stampata in 3600 copie. L'opera si proponeva di "confortare" i detenuti nelle lunghe ore di solitudine del carcere, suscitando in essi "la rassegnazione e il pentimento cristiano" […] Il Commendatore, in una lettera indirizzata ai "fratelli carcerati" … rammentava "a questo libro hanno lavorato i vostri figli"»[6].

Similarly, Gabriele De Rosa, one of the greatest scholars of the Italian Catholic Movement, summed up the experience of Longo's Christian restoration -centuries later- of the ancient city Sunni buried by the Vesuvius in 79 AD.

In fact, the archaeological motivation was, however, an integral part of the creative process of the new city-although, as has been shown acutely Danila Jacazzi, the site of Pompeii has continuously maintained a continuity of frequentation[7]- since it was widely present in the insights of the founder of the new urban aggregate, especially for the significant contribution made by Giuseppe Fiorelli in the method of archaeological excavation: «Stamane dunque siamo andati a Pompei una brigata per vedere un nuovo miracolo del nostro Fiorelli, che fa risorgere i Pompeiani […] sono morti da diciotto secoli, ma sono creature umane, che li vedi nella loro agonia. Lì non è arte, non è imitazione […]



18: **Pompeii, Enlargement of the Shrine of Pompeii**

Finora si è scoverto templi, case, mura, dipinti, scritti, sculture, vasi, arnesi, utensili ed altri oggetti che interessano la curiosità delle persone colte, degli artisti e degli archeologi; ma ora tu, o mio Fiorelli, hai scoverto il dolore umano, e chiunque è uomo lo sente»[8].

The synthesis of Luigi Settembrini reads, in the romantic the suggestion of the perception of human suffering, the track of rehabilitation which is the *specimen* urban, around which matures the hypothesis and the contextualization of the restoration to life, according to the Christian ideals of the men who lived in the desolate Valley of Pompeii.

If the contribution offered by the science of antiquity, in the approach of an intellectual renaissance as Settembrini, legitimized, together with the address of the ideological work of excavation of Giuseppe Fiorelli-which was also the first Director of Central as well as the inventor of the protection service of the monuments of the newborn Italian state- the aspirations for the creation of a unitary state, Longo's commitment expressed in ideological terms Catholic, the same expectation for which the small town of Vesuvius became an 'experimental laboratory' of new Italian sociality.

On the other hand one of the great Italian intellectuals of the twentieth century, Benedetto Croce, likened the experience of Pompeii to that previous French that took place in a small town in the Pyrenees and that assumed, for their religious content, an international reputation defining, therefore, the site of Campania as the Italian Lourdes[9]. Similarly to the case side of the Alps, is significant at the site of Campania the remarkable wealth of miraculous events, of miracles, which has also become attractors, even "tourist", to a visit dedicated to the city that was reborn.

In this regard it is of interest to note that the lawyer Longo prepare a sober and very precocious history of the Shrine of Pompeii, with the intention of providing objective data about the miraculous events that were happening around the Marian devotion in the site at the foot of the volcano. Longo wrote: «Ed invero il Tempio del Rosario a Pompei non era solo un edificio santo che sorgeva, ma era ancora un'opera più eminente, più spirituale, più universale»[10], arguing, so ideological, that the construction of the Shrine coincided with the spiritual edification of the people present to religious Opera.

If, therefore, the French experience can boast a kind of literature in this regard, with the publication of statements that make the journey to Lourdes[11], a kind of plot exposition, with the involvement of top-class intellectuals as Émile Zola or later, Mario Soldati, or even scientists such as Nobel laureate Alexis Carrel, Pompeii relies, in a unified way, at his own architect and ideologue of the reading and interpretation of their experience through writing a history of the sanctuary which is a statement of the events related to the invocation of the unique and miraculous Marian protection and, for that reason, strong motivational tool for the option of religious tourism.



18: **Pompeii, Enlargement of the Shrine of Pompeii, working in progress.**

Bibliographical References

[1] CARILLO Saverio, *Spes contra spem. Gustavo Giovannoni e Gino Chierici tra* Liturgismo *e* Conservatorismo colto*. Teorie, storiografia, metodologie, interventi*, «Dipartimento di restauro e costruzione dell'architettura e dell'ambiente. Seconda Università di Napoli. Strumenti», n. 2, Istituto Grafico Editoriale Italiano, Napoli 2007 (ISBN 978-88-905979-1-6).

[2] CARILLO Saverio, *Gustavo Giovannoni, Spirito Maria Chiapetta e l'ampliamento del pontificio Santuario di Pompei*, in «Arte cristiana», n. 792, 1999, pp. 217-231(ISSN 0004-3400).

[3] Cfr DESCOUVEMONT Pierre, *Sculpteur de l'âme. Un trappiste au service de Thérèse*, Editions Gieldé, Wailly 2000 (ISBN 2-914222-01-7).

[4] Cfr GENTILE Emilio, *Contro Cesare. Cristianesimo e totalitarismo nell'epoca dei fascismi*, Giangiacomo Feltrinelli Editore, Milano 2010 (ISBN 978-88-07-11107-5)

[5] SCHUSTER Alfredo Ildefonso, *Nel Bimillenario di Augusto* (discorso tenuto al Castello Sforzesco per la Gioventù Universitaria Fascista Milanese, il 26 febbraio 1937) in BELTRAME QUATTROCCHI Paolino, *Al di sopra dei gagliardetti. L'Arcivescovo Schuster: un asceta benedettino nella Milano dell'"èra fascista",* Casale Monferrato, Marietti Editore, 1985, pp. 214-215.

[6] ILLIBATO Antonio, *Bartolo Longo*. *Un cristiano tra Otto e Novecento*, pontificio santuario di Pompei, Pompei 2002 (ISBN 88-85291-62-7).

[7] Cfr JACAZZI Danila, *Pompei e la "valle diruta". Tracce e memorie della città antica nelle fonti medioevali e moderne,* in C. Gambardella, *Atlante di Pompei*, Napoli, La Scuola di Pitagora, 2012, pp. 65-80 (ISBN 978-88-6542-171-0).

[8] SETTEMBRINI Luigi, *I pompeiani,* (1863) in *Scritti vari di Letteratura, politica e arte,* riveduti da F. Fiorentino, v. I, Napoli, cav. Antonio Morano Editore, 1879, pp. 334-336.

[9] Cfr CROCE Benedetto*, Storia d'Italia dal 1871 al 1915*, Bari-Roma, Laterza, 1961, p. 89.

[10] LONGO Bartolo, *Storia del Santuario di Pompei* (dall'edizione del 1919), Pompei, Pontificio Santuario di Pompei, Pompei 1981.

[11] Cfr ZOLA Emile, *Lourdes*, Paris, Eugene Festquelle Editeur, 1901; SOLDATI Mario, *Un viaggio a Lourdes* (1934), Palermo, Sellerio Editore, 2006; CARREL Alexis, *Viaggio a Lourdes*, Milano, Morcelliana, 1980.

XII International Forum Le Vie dei Mercanti
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Aversa / Capri, 12,13,14 June 2014

Engaging Visitors: Developing Presentation as a Tool for Site Preservation at Pompeii

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Abstract

Often presentation and interpretation of archaeological sites are overlooked as important elements of site management planning despite their potential to aid in site preservation. This is particularly relevant at Pompeii, where mass tourism negatively impacts the site. Improved site presentation at Pompeii would help communicate the site's significance and raise awareness of conservation problems. However, for presentation to be effective it needs to be the result of collaboration between numerous stakeholders, and needs to use the site to its potential. I have assessed the current status of presentation at Pompeii through extensive visitor observations and interviews, movement mapping, and in-depth interviews with stakeholders. The results show that the current presentation of Pompeii, including visitor itineraries, signage, and guides, does not adequately orientate and engage visitors in the ways needed to make it a sustainable tool for site management. This is due to a number of reasons, including an unclear understanding of what visitors want when visiting Pompeii and a lack of collaboration among stakeholder groups. From this data the foundations for developing a presentation and interpretation strategy at Pompeii emerges; one that uses the site to its potential and creates a forum for open collaboration among the key stakeholders.

Keywords: Presentation, Interpretation, Conservation, Management, Pompeii

1 Introduction

The goal of modern site management is to ensure that archaeological sites and their associated values are preserved for future generations. The presentation and interpretation are often overlooked elements of management planning and regarded in a secondary capacity to other elements like conservation and on-going research [1,2,3]. Presentation is primarily linked to services related to the visitor experience and thus, presentation is associated with economic benefits or visitor numbers [4]. This can lead to problems in site management if the presentation is not understood alongside other elements like conservation and research. Archaeological excavations and conservation are complex and often debateable processes that play a major role in deciding what is valued [5]. Both archaeological research and excavation are interpretative choices that are 'presented' but are not often considered in presentation and interpretation theory. This gap between viewing presentation as 'entertainment' and understanding the deeper, multi-disciplinary relationships is a problem that needs to be addressed to ensure integrated and sustainable site management.

This results in an antagonistic relationship between site presentation, conservation, and research as visitors can cause decay to the physical fabric. Recently presentation and interpretation have been recognized as instruments for preservation by helping to mitigate the negative impacts caused by visitors [6], communicating the values and significance of site to various audiences, and serving as a tool for increased collaboration among stakeholders. Silberman and Callebaut suggest that the

modern social function of presentation plays an integral role in the success or failure of the preservation of a site [4]. The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage sites addresses these social roles of presentation and interpretation through standardised terminology and professional principles [7]. However, it is still necessary to look at specific case studies to test the viability presentation and interpretation as tools for preservation in real world settings.

This research is concerned with developing a deeper understanding of the visitor-conservation-research relationship at Pompeii in order to develop a foundation for using the presentation and interpretation as a tool for preservation at the Vesuvian sites (and across the globe). Pompeii is one of the most famous and visited archaeological sites in the world. Over the past few years the state of conservation at Pompeii, and the effectiveness of the current management have come into question. This has prompted an international discussion how best to manage the Vesuvian sites including, new management plans, privatization, and EU funded large-scale conservation projects. However, no amount of planning or external funding will be sustainable if the management framework in which it is implemented is fragmented and ineffective. As this discussion is on-going it is important to continue to look for alternatives. It is equally important to look at what smaller-scale changes can be made that work within the current management. It is only then that viable and sustainable changes to the management planning process can begin to be made.

This paper presents the results of research I conducted into the current presentation of Pompeii. Data was collected during a number of field sessions from 2011-2013 though primarily qualitative methods, including observational studies, interviews, and analysis of documents and text. Observational studies were conducted using three primary methods: ethnographic observations, visitor movement tracking, and recording linger-time (how long visitors stayed or 'lingered' in a certain area or property). A series of semi-structured interviews were conducted with visitors, tour guides, and academics at Pompeii. Professionals and academics were also interviewed at Herculaneum and Stabia. The literature review included studying various interpretation aids, guide books, audio guides and on-site signs. Further explanation of the full methods used can be found in Wallace 2013 [8]. From this data I have begun developing a presentation and interpretation strategy for Pompeii that would aid in the conservation of the site, as well as serve as an avenue for increased collaboration among the wide range of stakeholders at the Vesuvian sites. The results of this research show that only small, inexpensive changes need to be made to help address some of the conservation concerns at Pompeii.

2 Mindful Visitors at Pompeii

It is assumed that a good visitor experience will encourage visitors to be more aware and respectful of archaeological sites, and thus be more inclined to see it conserved for future generations. However the relationship between the visitor and archaeology is difficult. The closer the visitor gets to the archaeology (physically and intellectually) the deeper the visitor experience but this can have negative impacts on the sites conservation. Moscardo states that presentation should aim to create mindful visitor [9]. Rooted in the social cognation research of Ellen Langer mindfulness is a state where the mind actively process information and is more receptive gaining knowledge [10]. Mindlessness is the opposite and is often the result of boredom, repetition or a loss of control. There are a number of factors that can affect how receptive a visitor is including the visitors' level of interest, fatigue, heat, and size of the site. Some of these cannot be easily controlled but other factors like visitor facilities, exhibitions, signage, and content of the interpretation can be.

Visitor studies at cultural sites in the past have focused on the demographic or geographic factors, over the psychographic factors to identify visitors [11]. While demographic and geographic factors are much easier to measure, they provide limited information. Psychographic factors, like visitor attitudes and values, are much more difficult to quantify but reveal deeper, more meaning results. In this research I conducted 66 in-depth interviews with visitors at Pompeii who were primarily international. At the start of each interview, visitors were asked why they decided to visit Pompeii, and if there was anything in specific that drew the visitor to the site. Based on their responses, they were divided into four levels of motivation based on Silberberg's Levels of Cultural Tourist [12]. Of the respondents 34% were Greatly Motivated, 30% were Adjunct visitors, 21% In-Part, and 15% Accidental visitors. What these results indicate is that a majority (64%) of visitors to Pompeii visit due to cultural motivation, and an interest in Pompeii or cultural sites. However 46% of the visitors interviewed indicated that they simply visited the site due to its being in the region of their holiday or because someone recommended it but had no real interest in the site itself. This indicates that a large number of the visitors arrive to the site without a high level of interest or background knowledge.

When visiting the site, visitors have four main interpretation options available:

- using only the information provided with the purchase of a ticket (map, Brief Guide, signs and panels)
- using a guide book or travel book
- purchasing an audio guide
- joining a guided tour (either on-site or pre-booked before arrival).

Each of these provides different ways of receiving information and engaging with the site. For this research I chose to focus on visitors who were not part of an organised excursions as they often have set itenaries that are organized by their excursion company and are informed of these before arriving to the site. Of the 66 visitors interviewed, 28 used a guide book or travel book to complement their visit, including the site specifc guides and general travel books like Lonley Planet. These respondents explained that they wanted the freedom to wander around site and enjoy the experience on their own. Eighteen visitors chose not to use any interpretation aids, and relied only on the information provided onsite and with the purchase of a ticket. This is limited to on-site panels, a map and the information in the brief guide which includes a small paragraph and small photos of 69 properties, although the map and brief guide were unavailable during the summer when these interviews were conducted. Most of these visitors indicated cost as a factor for not purchasing interpretation aids as well as an expectation that there would be more on-site interpretation, like signs or a visitor centre. Fifteen visitors purchased an audio guide indicating that they felt an audio guide provided more information than a guide book, and more freedom than a guided tour. The remaining five groups had been a part of a guided tour.

While those who participated in guided tours tended to feel satisfied with the information they received and didn't feel any barriers with accessibility, the other visitors I interviewed indicated a range of factors that impacted their experience. Some of these, like the heat or the size of the site, cannot be controlled—however, by addressing some of the others, changeable factors there is the potential to create mindful visitors at Pompeii and the Vesuvian sites. In this research I was interested in understanding what visitors wanted from their experience at Pompeii. The words *know, learn* and *understand* were present in a large number of interview responses, but they were often used with other words like *experience, feel, visualize, see* and *touch*. These sensory and emotive responses indicate that visitor motivations occur on multiple levels, both educational and a more personal, internal experience. Thus the presentation and interpretation of Pompeii should aim to engage visitors on both of these levels and provide visitors the tools to make decisions and be in control of their visit.

Observations conducted revealed that, on average, visitors spend less than five minutes in a property. Many visitors were observed entering and leaving in less than a minute, particularly during peak times or when they were without interpretation aids. Levin-Richardson found similar behaviors at the brothel where visitors went through the property in an average of 30 seconds, and thus were reliant interpretation aids for information [13]. With non-guided visitors, the limited time spent in an area is a possible indicator that the current interpretation is failing effectively engage visitors. Visitors to Pompeii expect the experience to be personal and interviews and observations have revealed that the current presentation does not provide the elements and information that visitors want and expect, thus does not provide the factors needed to create mindful visitors. In the interviews there emerged four primary problems with the current presentation and interpretation:

The availability of information and services: Visitors expressed how they "expected there to be more signs" and services available. As a World Heritage Site visitors arrive with a preconceived expectation of a certain level of services and information being available. The absence of information resources at Pompeii was frustrating to many visitors who were unable to get answers for some of the questions they had which resulted in an unsatisfactory visit.

The ease of use if the interpretation: By far the most common comment by visitors interviewed was expressing frustration and difficulty with finding places on-site and navigation. The lack of onsite signage, orientation, and clarity was an issue expressed by a majority of the interview subjects. The inconsistent numbering of properties, as well as English/Italian translations were seen by visitors as a barrier as they were not always able to tell where they were. Visitors with the audio guide indicated difficulty following the tour when inside a property.

The accessibility of information: Visitors also pointed out the information provided in the guide books and audio guide was too technical and that they often didn't know what it was talking about. Additionally, signs on-site frequently use Latin terms without providing a translation. Visitors felt that there was an assumption of knowledge about the site, Roman history and archaeology.

The content of the interpretation: Visitors interviewed expressed a strong interest in daily life and social aspects of the city, particularly in the people who lived there and what they did. Multiple visitors commented in interviews that they wished for more in-depth interpretation in the audio guide, and in guide books. Visitors also expressed interest in the development of the city and broader topics, such as social and civic life which is absent from the current presentation.

Visitor interest in the daily life of Pompeii's citizens can be explained by the similarities many visitors found to modern cultures and themselves. For some, this was one of the most impressive and memorable elements of their experience; many expressed awe and surprise at how similar the Pompeians were to us. One visitor, who expressed that he was not particularly interested in the site, stated that this link to modern society is essential for a visitor like himself. However, he felt that the current presentation did not provide this.

> *Here, they don't think about that not everyone is interested in archaeology. But they might be interested in the courthouse, or something, because it relates to their work. It works real well if it's two-way traffic, if it reflects a bit about your life and reflects about their life. And this [current interpretation] is one-way traffic. And I think that's okay for people who are interested in it but for [indicating himself], it doesn't work.*

In summary, the current presentation of Pompeii does not address the expectations of visitors. Visitors find that it does not provide the information that they desire and it is neither physically or intellectually accessible to them. While this is not the case for every visitor, with around 3 million a year, it can be assumed that many feel the same way. When combined with things like visitor fatigue and heat, visitors can become "mindless." In the next section, it will be shown that many of the negative visitor impacts result from this feeling of mindlessness and could easily be addressed though enhanced presentation.

3 Visitors and conservation: a shaky relationship

In the 2011 mission report, UNESCO and ICOMOS highlighted six major conservation problems that are present at Pompeii: ordinary decay, inadequate water management, damage from ultraviolet radiation, overgrown vegetation, incompatible conservation and restoration work from earlier generations, and visitor impacts [14]. While sustainable managment of the sites needs to address all of these problems this research is concerned with the visitor impacts as visitation to the Vesuvian sites increase and available resources decrease. Currently the *Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano e Stabia* (SANP) has no effective condition assessment system in place so it is difficult to identify visitors impact but these have been better documented at Herculaneum by the Herculanuem Conservation Project. They found that visitor impacts primarily enhance decay that is already present, either through direct physical damage or by limiting the resources available for conservation work. This results in more and more areas of the sites closed each year, thereby concentrating the growing number of visitors in smaller areas and thus accelerating the rate of decay. Over the past half century, the number of properties, roads, and areas accessible to the public at Vesuvian sites has decreased by 1/3 (see Fig.1 for a map of the current distribution of open and closed areas in Pompeii). Furthermore, areas not open to the public tend to be neglected as the limited resources are diverted towards those areas accessible to visitors [15]. This is reflected in the more recent collapses on site which have been in areas that are not open to the public and recieve little visitor traffic as they are not on the main itenaries. It is this circular cycle that this research is concerned with addressing. In order to identify areas of Pompeii that were impacted by visitors, as well as *how* and *why,* I carried out a number of observational studies. These revealed is that there are two major areas of concen that need to be adressed; 1) visitor movement and itenaries, 2) visitor behaviour and management. All of these can have negative impacts on the conservation of the site but enhanced presentation and interpretation can be used as tool for addressing them.

3.1 Visitor movement and itineraries

In Fig. 1 the propreties included in the SANP imperpretation are identified. This includs on-site panels and singae, and the propreties included in the audio guide and guide books. In theory the current interpretative infrastructure should eneourage visitors to spread throughout the site, if they were to follow reccomonded itenaries provided in the interpretation (Fig.2). Visitor tracking and observation identified common visitor movement patterns which show that visitors are, in fact, isolated to a small section of the site (Fig. 3). From this, I was able to identify areas of the site that recieved high-medium-low visitor traffic and some of the causes for this movement (Fig. 4). The visitor tracking and observations suggest a few possible causes for overcrowding at Pompeii. The first is that many of

these properties are considered ‘must-see locations’ and are included in all types of visitor information and interpretation materials. Some of these properties, such as the Forum and the Theatre complex, are unique to Pompeii as similar buildings at Herculaneum remain buried. Propreties like domestic houses, the Follonicas (laundries) and the baths are types of buildings that are common throughout the city. There are 515 houses in Pompeii, 93 of which contain substantial decorative elements, but only about seven are regularly open to visitors. Most guided tours consist of the highlights of Pompeii; for this reason most tours lead visitors along the same path through the site. When asked why they visit these specific places, the guides interviewed for this study replied with three main responses: 1) the popular locations are what visitors are interested in and expect to see; 2) the buildings represent the best examples or best-preserved of each type of property; 3) those buildings are open and available to visit. Guided indicated they would diversify their tours if there were alternative but often the decision on where to go varies day to day, and not always by choice. Guide 3 said, “I never know what will be open. One day I visit a house and the next [day] I take a group there and it is closed. It’s always a mystery.” Similar responses behaviours were recorded in other research on tour guide itenaries at Pompeii [16]. Visitors who did not elect to take tours were just as unaware of closures and as a result there was increased traffic around closed houses as visitors were not aware of closures. For example, visitors looking for the closed House of the Vettii and House of the Meander spent a significant amount of time creating higher traffic and crowding in those areas (areas 6 and 9 on Fig. 4). These houses had been closed for a number of years (though House of the Meander has since re-opened), and this could easily be addressed through active communication like signage at the ticket office. The relationship between overcrowding and site presentation is easily seen. Visitors tended to go to propreties that were open thus putting more pressure on these areas. Overcrowding could be lessened at the most popular buildings if the site offered alternatives, and through clearer communication of which propreties are open. The current interpretation for Pompeii is outdated and a number of the propreties included in it have been closed for years. Others are open or closed depending on factors like on-going conservation work and personnel. As a result, certain houses are open irregularlly, often only a few hours one day and none the next depending on the availability of on-site personnel although it is not within the scope of this paper to address the human resouce side of site presentation and accessibility. Instead, there needs to be an multi-disciplinary and collaborative development of new visitor itenaries that take visitors through other parts of the site and to alternative propreties. While at a site like Pompeii, there will always be times of overcrowding andvisitor impacts it is possible to lessen the severity and spread the impacts tohroughout the site

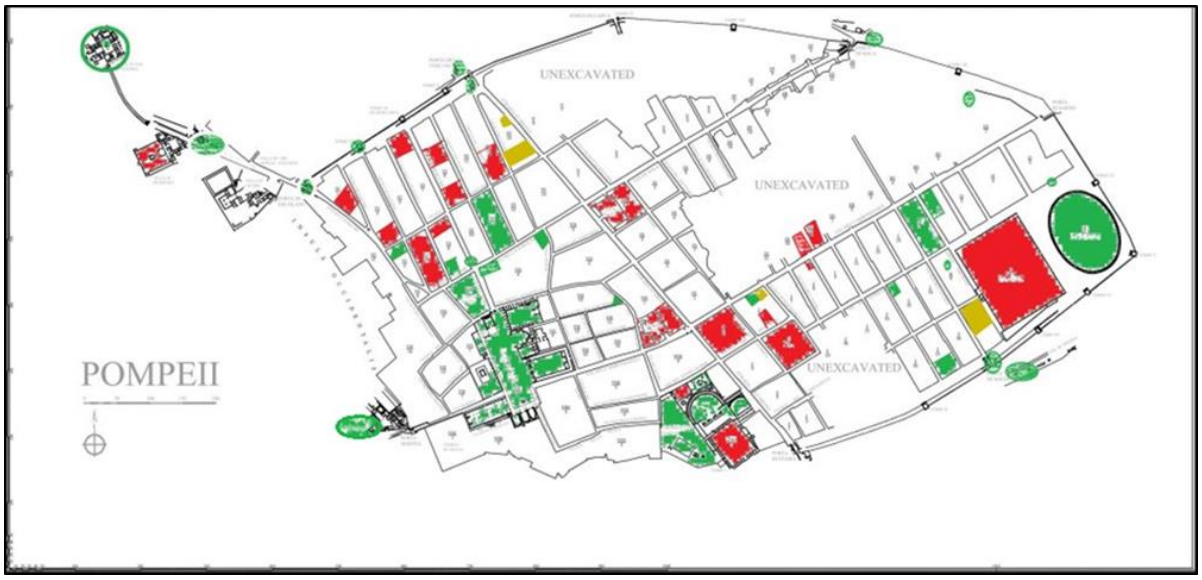

Fig. 1 Schematic map of the distrubution of on-site interpretation (provided by the SANP). Green indicates open propreties, yellow indicates those open occasionally, and red indicates closed propreties (as of Summer 2011)



Fig. 2 GPS mapping of all on-site interpretation at Pompeii. Includes audio guide, guide book and recommended itineraries provided on map. Also includes the PompeiViva itineraries which include signs and interpretation panels



Fig. 3 Distrubution of GPS tracking of the movement of 100 visitors during summer 2011.



Fig. 4 Map of Visitor Tracking. Numbers 1-5 represent high visitor traffic, 6-10 is medium visitor traffic and 11-15 is low/no visitor traffic.

3.2 Visitor behaviour and mangement

It is human nature to investigate using our senses and the tactile link to the past provided by Pompeii is important to visitors. One visitor I interviewed stated that she enjoyed being able to touch the walls and the frescoes, despite knowing that she shouldn't;

> *There were some you could just touch, and I know you're not supposed to but I did it. I'm a very touch-oriented person so it really brings it home [to] reach out and think about the life that painted this.*

If not actively managed visitor behaviours like this can negatively impact on the conservation of the site. Ethnographic observations revealed that the most common bevahiours that can have a negative impct on the sites conservation are touching frescos and walls, sitting, standing or leaning on walls, and entering closed off areas. Visitors were also observed splashing water on mosaics to "freshen them up," as recommended by the Fodor's guide book and numerous tour guides. While most of these behaviours did not tend to be malicious, there is also evidence across the site of modern grafitti, although this was not observed in action during this research. At Pompeii, this freedom for visitors to interact tactilely with the sites is more a result of inadequate visitor management than of providing an intentionally engaging experience. Upon entry to the site, there is a small sign at each ticket window that lists the rules and regulations (n213 dated 22.01.01) for the site; the rules are also printed in the official Brief Guide when it is available. Few, if any, visitors take the time to read these regulations and the enforcement of the rules and regulations is minimal. There are a maximum of twenty-three custodi on duty at any given time. During the field observations, custodi were observed entering properties less than fifteen times, and their enforcement of regulations varied. For example, in the Follonica di Stephanus the custodi will tell visitors to watch their bags but will not advise visitors not to use a flash when photographing the frescoes. Similar variation of enforcement was also observed on guided tours, where some guides would actively enforce rules and other would not.




Fig. 5 and Fig. 6 Examples of visitor behviours that can impact negativly on the site. Fig.5 is modern graffitti on a fresco in the Fullonica di Stephanus and Fig. 6 is a visitor standing on a wall to take a photo. Note that the area is meant to be closed off but due to a broken gate, the visitor entered.

The active visitor management is minimal at Pompeii. Visitors are kept out of certain buildings and areas by fences, barricades, and locked doors; these vary from the newer metal fences and gates to old wooden fences what are often falling apart. Inside the buildings, visitor movement is restricted by rope barriers, plastic tape or barricades. This mish-mash of barriers is often confusing to the visitor, as a broken gate can be interpreted as open or closed. Observations and interviews revealed that many visitors moved temporary barricades or stepped over ropes. When this happened other visitors would often follow. As one visitor said:

> *There were broken barriers and you could go into it. And to be honest we did go into them. But there were footprints before, and you know that someone else had been in there. Not to mean that this makes it any better but if they were fixed you wouldn't go, you'd obviously know that was a no-go zone.*

For the most part, visitors obeyed the barriers and accepted that certain parts of the site are closed. Some visitors interpreted the locked doors as a sign that excavation or conservation work was occurring. However some visitors, the closed and broken gates also represented neglect and a lack of adequate maintenance and this left them with unsatisfactory visits.

> *Some of the sections were really well-preserved and well-presented and some were much more dilapidated than I expected. I think it's a fine balance between having this site as an ongoing archaeological dig and a tourist attraction and I don't think they have found that balance quite right. It didn't feel as though it was there. It did seem like it wasn't really cared for that much…I think I was expecting to be in awe more than I was. I mean it was fascinating and really, really interesting, but I don't think I was as blown away as I was probably expecting.*

The negative impact from visitor behaviour and management are due to visitors being unclear as to what is or is not acceptable. Much of this damage could be lessened through active communication of appropriate behaviours, providing clearer and more up-to-date information before they begin their visit, and regulating the enforcement of rules and regulations. While an initial investment would be necessary to replace broken barriers and provide informational signs and panels, the long term

benefits would outweigh the costs. It must be kept in mind that barriers, fences, and a lack of regulations are all communicating interpretive messages to visitors, even if not intentionally. Visitors take this to mean that certain behaviours are acceptable, and feel that a distinct message of neglect towards the site that is present which impacts how the visitors experience the site.

4 Presentation as a result of 'meaningful collaboration'

In emerged in this research that visitors feel that the most valuable aspects and elements of Pompeii are the ability to get close with the site, its openness, the ability to 'visualize' the city as a whole, and the intact nature of the ruins. The potential to "bring the past to life" is central to the value visitors hold in their experiences while at Pompeii. However, the current visitor experience at Pompeii does not provide the necessary elements; thus visitors are left feeling frustrated and some are even disappointed. On-site interpretation should aim to orientate, engage and inform the visitor of a range of themes while diversifying the visitor experience thematically and physically. Directional signs and more detailed maps can be used to orientate and direct the visitor, while on-site panels can provide information on a variety of different topics. However, decisions regarding signs and other interpretation materials need to consider the varying backgrounds and expectations of visitors, as well as how any changes will affect the visitor experience. While this research has provided a starting point, it is essential that further visitor studies be conducted prior to any decisions being made otherwise the results can be catastrophic to the site.

The ICOMOS Charter for the Interpretation and Presentation of Archaeological Sites says that presentation and interpretation should be the result of 'meaningful collaboration.' This research shows just how important that is. While there is a need for a more complex interpretation strategy that utilizes the site more effectively and communicates to the diverse audiences to the site, this cannot be achieved without collaboration between various stakeholders. Pompeii is an active archaeological site, not a "city frozen in time." Conservation work, condition assessments, and new research should be integrated into the current on-site interpretation but the decentralized approach to site management does not encourage collaboration between stakeholders and thus hinders the development and availability of interpretive information. While visitors have shown interest in these topics, there is currently no formal requirement for researchers to make their work available to non-academic audiences. Thus those who are producing the interpretation (tour guides, outsources companies) do not have the ability to stay up to date with current information, whether new research or house closures. Most importantly, for any interpretation and presentation strategy to be sustainable it must be continually assessed and reassessed, otherwise it risks becoming ineffective and outdated like the current presentation. This strategy would require active involvement from all aspects of site management and thus has the potential to create a forum for increased collaboration, which can only benefit Pompeii and its stakeholders.

Bibliographical Refrences

1 CASTELLANOS, C. & DESCAMPS, F. *Conservation Management Planning: Putting Theory into Practice*. The Case of Joya de Cerén, El Salvador. Los Angeles, The Getty Conservation Institute. 2009.

2 CUNLIFFE, S.. Tourism and Cultural Risk Management. In: BRIDGLAND, N. A. a. J. (ed.*) Of the Past, For the Future: Integrating Archaeology and Conservation.* Los Angles: Getty Conservation Institute. 2006.

3 DEMAS, M. Planning for Conservation and Management of Archaeological Sites: A Values Based Approach. In: PLAUMBO, J. T. a. G. (ed.) *Management Planning for Archaeological Sites.* Los Angles: Getty Conservation Institute. 2002.

4 SILBERMAN, N. & CALLEBAUT, D. Interpretation as Preservation: Rationale, Tools, and Challenges. In: BRIDGLAND, N. A. a. J. (ed.) *Of the Past, For the Future: Integrating Archaeology and Conservation*. Los Angles: Getty Conservation Institute. 2006.

5 MASON, R. & AVRAMI, E. Heritage Values and Challenges of Conservation Planning. In*:* TEUTONICO, J. M. & PALUMBO, G. (eds.) *Management Planning for Archaeological Sites.* Los Angles: The Getty Conservation Institute. 2000.

6 Jones, K. & Maurer Longstreath, J. Pursuing the ZiNj strategy like there's no tomorrow. *I*n: LITTLE, B. (ed.) *Public Benefits of Archaeology.* Gainesville: University Press of Florida. 2002.

7 ICOMOS The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites 2007.

8 WALLACE, Alia. Presenting Pompeii: Steps towards Reconciling Conservation and Tourism at an Ancient Site.*Papers from the Institute of Archaeology*, v. 22, p. 115-136, feb. 2013

9 MOSCARDO, G *Mindful Visitors: Heritage and Tourism.* Annals of Tourism Research 23(2):376-397, 1996

10 LANGER, E. *The Power of Mindful Learning*. Cambridge, MA: Da Capo Press. 1997.

11 TIMOTHY, D and BOYD, S *Heritage Tourism.* Harlow: Prentice Hall. 2003.

12 SILBERBERG, T. *Cultural Tourism and Business Opportunities for Museums and Heritage Sites*, Tourism Management v16 n5: 361–365. 1995.

13 LEVIN-RICHARDSON, S. Modern Tourists, Ancient Sexualities: Looking at Looking in Pompeii's Brothel and the Secret Cabinet. In: HALES, S. & PAUL, J. (eds.) *Pompeii in the Public Imagination from its Rediscovery to Today*. Oxford: Oxford University Press. 2011.

14 UNESCO Report on the Mission to the Archaeological areas of Pompei, Herculaneum and Torre Annunziata. Paris. Available online http://whc.unesco.org/en/list/829/documents/. 2011.

15 THOMPSON, J**.** Conservation and management challenges in a public/private partnership for a large archaeological site (Herculaneum, Italy). *Conservation and Management of Archaeological Sites,* 8**:** 191-204. 2007

16 CEVOLI, T*. I Flussi Turisici Come Fatore di Degrado del Bene Archeologico. Il casodi Pompei: Dati, Problematiche e Prospettive.* Diagnosis for the Conservation and Valorization of Cultural Heritage. 2011

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From the *pompeiana domus* to the Early Christian Basilica

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Abstract
According to a widely accepted theory, which considered the West, particularly Rome, the *fulcrum* of Early Christian Art and Architecture, the christian Basilica derives from the Roman. Mutated purposes and functions, it retain the original longitudinal development. The basilica has a plant common from the V century, when the buildings have a scansion tripartite: atrium, nave, sanctuary. A comparative analysis of the sources and surviving buildings shows that even in V century the problem of orientation is not generally perceived in the West and does not existing a specific terminology in order to indicate the various parts of a religious building. In light of the centrality, for the birth of early Christian architecture, of the eastern regions of the Empire, a detailed comparison between the *Pompeiana domus*, some Roman buildings and other northern Africa demonstrates how the *ecclesia* originates from the private *domus*. An examination of the two types of building demonstrates surprising analogies and explains some peculiar elements of the primitive churches, as the presence of one or more *atria* and numerous annexes, the location of the faithful in the smaller aisles, the altar at the center of the greater aisle, certain peculiarities of the apse, sometimes the absence of the roof in the nave. In forming a complex organism such as the basilica, had to intervene multiple cues and factors, but the link with the house, the *oecus* and the various environments is critical to understanding the subsequent developments of the model.

Keywords: Roman domus, early Christian basilica, paleochristian architecture.

1.1 Introduction
The studies on the early Christian architecture and its origins traditionally indicate the prototype of the religious basilica in the civil basilica of the Roman period, from which it had derived some characteristic features such as the strong longitudinal development, the presence of a porch, the use of columns or pillars to mark the aisles. This explanation, however, does not seem entirely acceptable even today, mainly because of two sets of factors: on the one hand, it would seem to take their cue from typological analysis exclusively linked to the development of a basilica in the West and especially in Rome, while industry studies have gradually recognized the growing importance of some areas gravitating around the Mediterranean basin, primarily the North Africa, in the early centuries of Christianity[1]. From another, it is useful to illustrate the type basilica which seems formed from the late Middle Ages, while not explain completely the disparity of the elements that characterizes the Christian places of worship to their birth and the different geographical distribution of the same. In identifying the matrices of the Christian par excellence, the church, can't be neglected, next to the archaeological and architectural, literary sources, confirmed by recent excavations, which located in the *domus ecclesiae* the germ of the future church. As is well known, Doura Europos's plant by separation of the various liturgical rooms arranged around a central courtyard, already indicates the roads of the future typological development. With the growth of the community was inevitable that a major part of the house was reserved for the performance of the liturgy and rites, with a process of "typing" of the liturgy in a domestic environment.

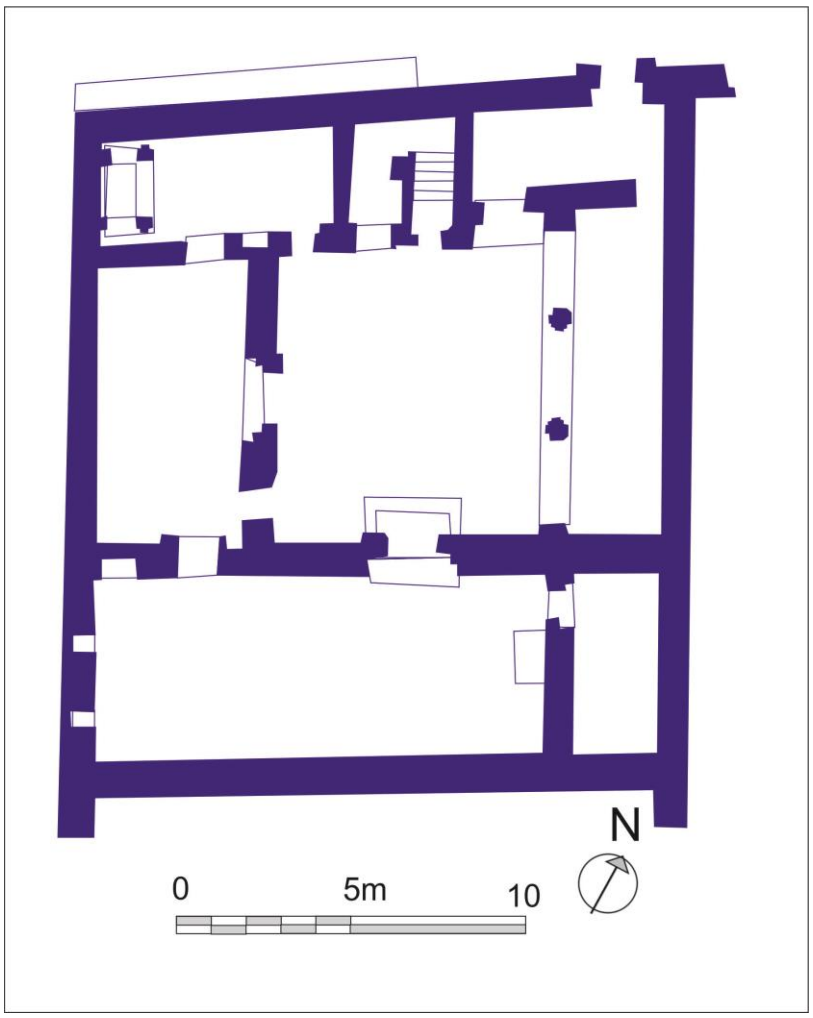

Fig. 1: Doura Europos, plant

The excavations in Galilee in the last decades have shown that the *domus* of the first communities no would suffer radical changes in the planimetry even after being used as places of worship, as happened for the so-called "Peter's house" in Capernaum[3].
When during the period between the pontificate of Pope Victor (190-199) and the beginning of the third century, as a result of a strong proselytizing and required by the standardized form that the liturgy was increasingly taking, the Christians began to design buildings of worship *ex novo*, the type, now supported by the practice of worship, remained essentially unchanged, with a broader articulation of interior space according to the needs of worship.
Several archaeological evidence show that, in the middle of the third century, began the decisive process of resolution formal and structural of the "place" of Christian worship, which ended in architectural types made by Constantine onwards[4].
Even in Rome, numerous archaeological traces found in the churches "owners" suggest to the order primitive of these buildings, later overturned by the creation of a housing of Christian worship, in which however are recognizable obvious influences deriving precisely the type of *domus*.
There is one point, in any case, I want to make clear regarding the fact that, when we talk about Roman dwelling, it refers to a complex and fluid, subject to change obviously related not only to the type of society, but also by geographic area as well as by evolution in time and space. T
he evaluation of the first Christian buildings of the City is much debated, but valuable, in a vision compared with the contemporary traces of similar construction found in Syria, to shed light on the early stages of definition of future churches.
The buildings found beneath the Basilica of Saints John and Paul, the old *Titulus Byzantis*, suggest that, in the third century, under the church there would be a single building, made from the fusion of previous environments[5].
The Christianization of the house would take place only at the beginning of the fourth century, after phase homogeneous building -between third and fourth- had turned it in a stately home.

The creation of a large room, used as a meeting place for the local Christian community, opens a window interesting on transition from private residence to a place of worship, allowing you to capture those elements that characterize destined to survive into the next basilica, in the first place the importance of *quadratum populi*, around which develops the assembly hall. In the case then of the structure in question, under the floor of the assembly hall was built a *confessio*, as a prelude to subsequent crypts[6].

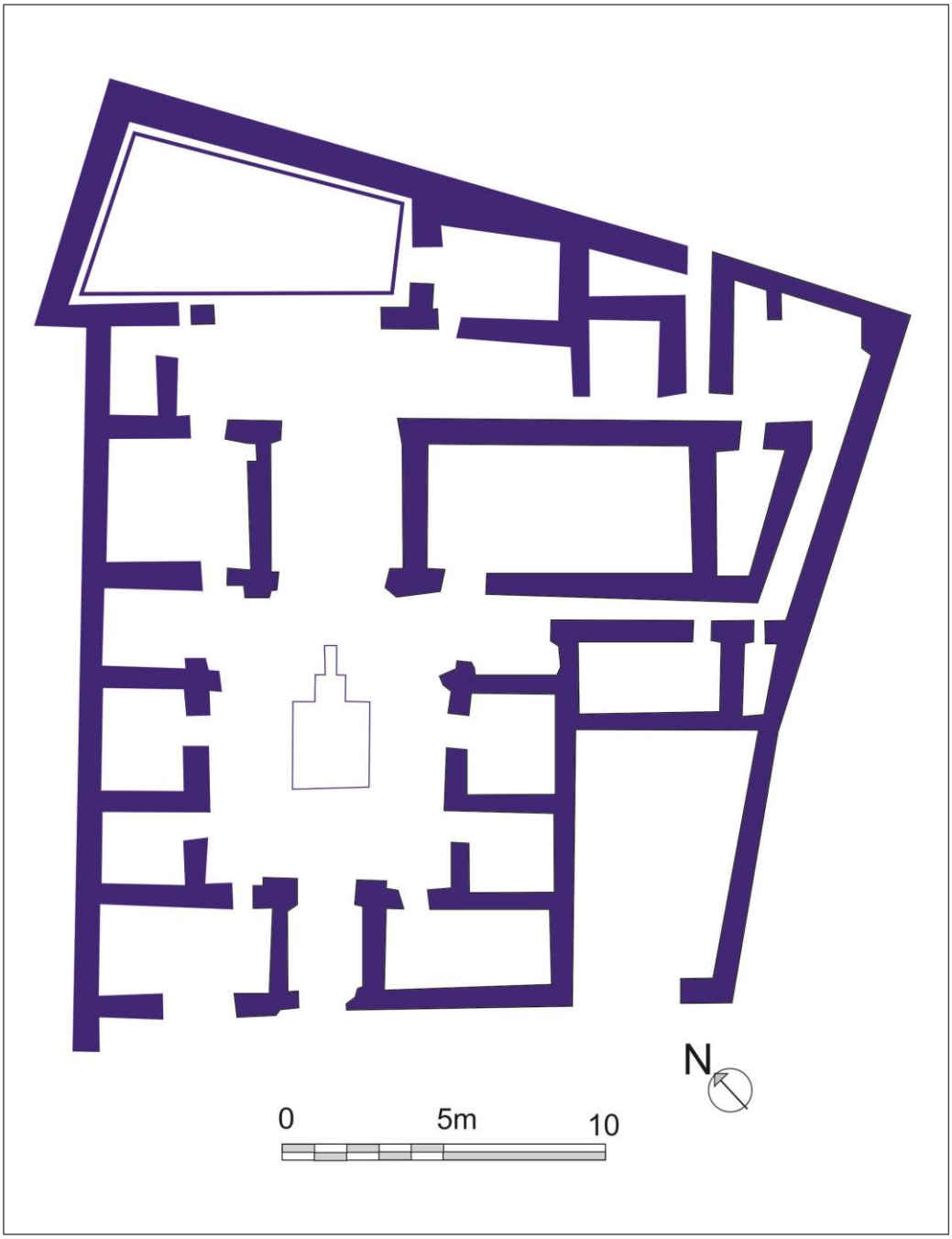

Fig. 2: Pompei, Surgeon's House, plant

1.2 Some examples of Domus: Faun's House in Pompeii

Given this premise, there is no doubt that the image-type of the *domus* can be detected in both examples, Surgeon's House and Faun's House, both in Pompeii, emblematic of the evolution of the type, the more simple the first (IV century) more complex and more late the other.

Especially in the latter, many elements seem predict the development of a basilica, with the particular subdivision into groups of environments with distinct functions and the hierarchical scan specifically between the scope public of the house (the sector to the receipt of the *clientes*, focused on

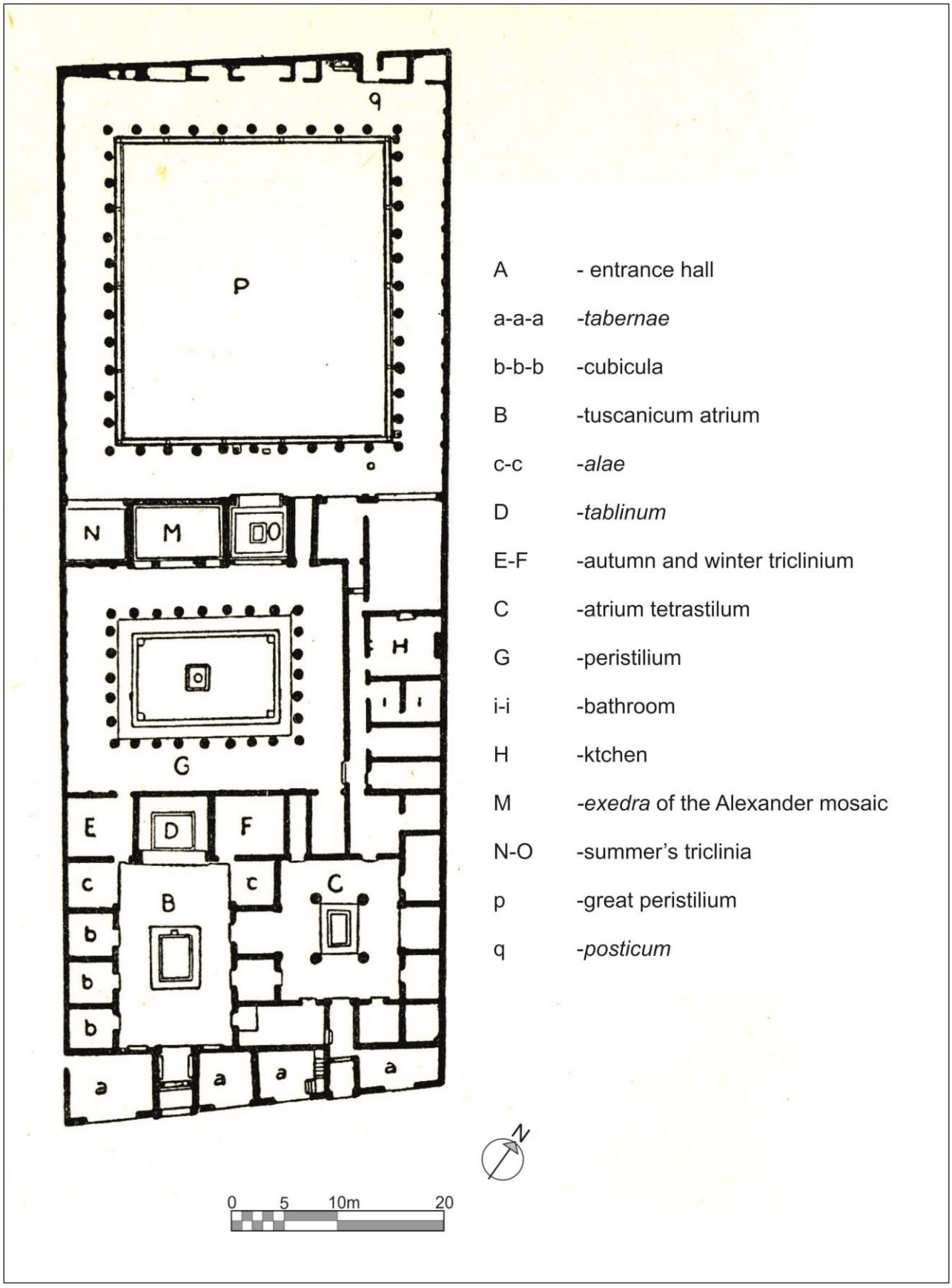

Fig. 3: Pompei, Faun's House, plant

tuscanicum atrium), a part used to welcome the guests and friends of the *dominus* (the two colonnades with their appurtenances) and a group of rooms, located in the immediate vicinity of the tetrastyle *atrium*, conceived as a private place reserved for the *familia*. Very interesting the articulation and total meaning of the ideological-decorative set of the *tuscanicum atrium*, where the two littles temples symmetrics of the *fauces* introduce to the *domini sanctitas*. They are real *lararia* of the public nature of the entire *domus*, which amplify the sacred character with reference to the Dionysian iconography of the whole[7].

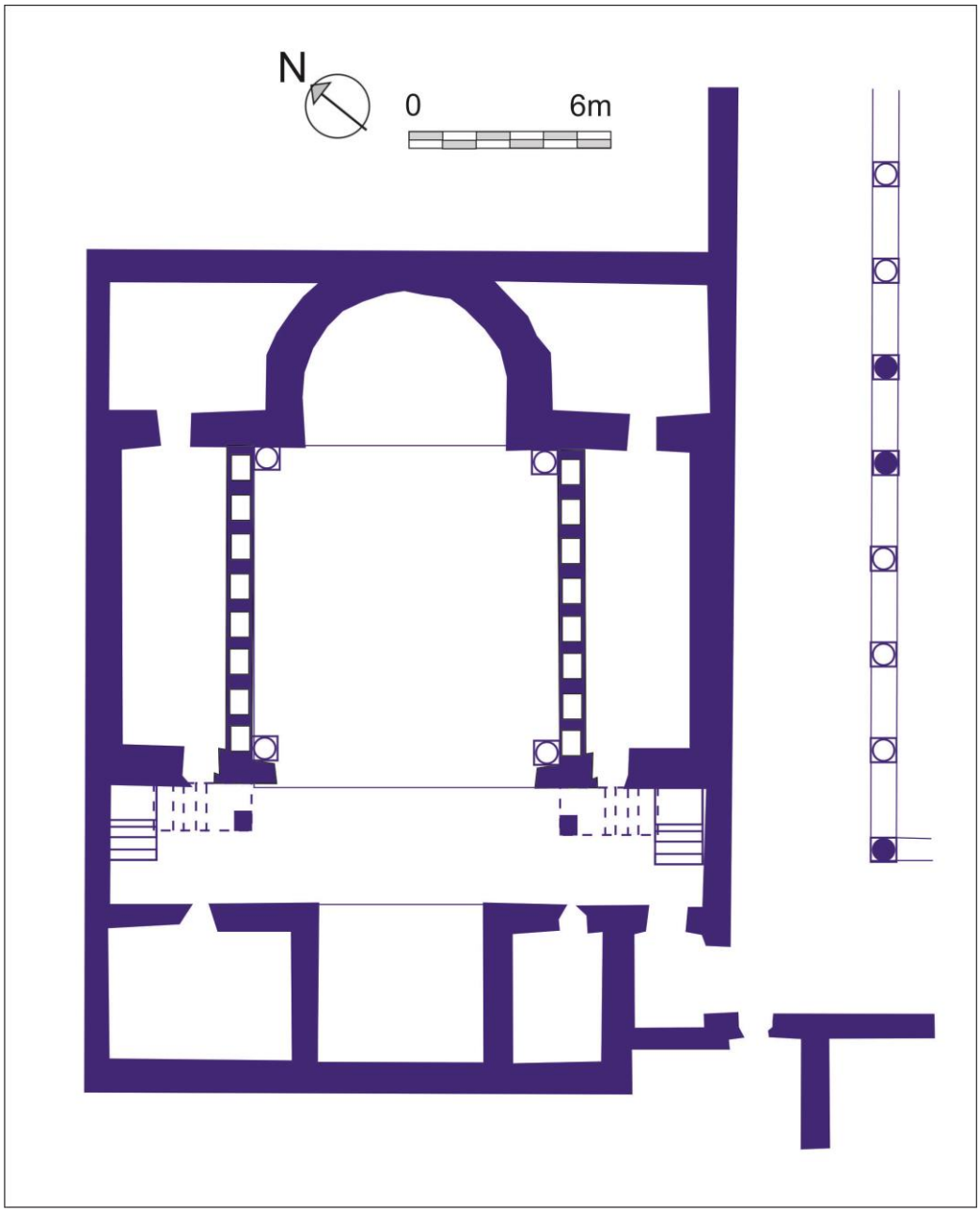

Fig. 4: Haidra, basilica *à auges*, plant

Since the *fauces* you established a relationship with the gods, but the real point of convergence of the constituent elements of the exaltation of the *dominus* was *tablinum*, in which the process of deification of the landlord touched its peak, with the raising of the floor pavement and decoration in *opus sectile*. Continuing and exasperating some peculiarities of the archaic *domus*, the houses of the historical age, just as the greater part of the buildings of the Paleochristian age, have their characteristic not only in the *atrium*, but also in plan's organization, that in fact is based on development of axes, one vertical (*fauces, atrium, tablinum*) another, in the *alae*, perpendicular.
Equally relevant for the purposes of this contribution is the set of *domus* with apse, whose reference model can be found in the development of the suburban villa in Imperial age.

Beyond the individual examples, it matters to emphasize the functional scanning of the environment, the strong emphasis of the *atrium*, culminating in the peristyle, the separation of the private areas, the presence of apses, located, for example in the case of *villae*, in the so-called *pars urbana*.

1.3 The Christian basilica

Analyzing the Christian religious buildings built since the fourth century, one can easily identify a common element: they all feature the same division in *atrium*, nave and sanctuary raised. In essence, this simple system of basic repeats that of the greek-Roman *domus*, with one entrance from the street, quadrangular *atrium* with fountain, from which it passes to a vast pillared hall and finally the *lararium*, which is more restricted. To confirm the dependence on the *domus*, is the fact that, in the face of an insistence on shared Christological symbolism related to the plan of the basilica with a transept, many of the first churches (St. Sabina and St. Maria Antiqua in Rome, House-Church of Joseph in Nazareth, Damous el-Karita in Carthage, St. John Studios in Constantinople, Constantine basilica in Jerusalem, Nativity Church etc…) were devoid of the transverse element.

Even more significant is the role that the *atrium* plays also in buildings with a central plan, as the church of Saint Lorenzo in Milan, legacy of a functional differentiation that has its roots in the buildings of the imperial era. The outdoor area of the *paradisus* inherits the "social" function of the *atrium*, in front of the nave, destined to the faithful, and the altar, where there is Divinity.

Very important to understand the structure of the pre-constantinians buildings and the legacy of the *domus*, is the eulogy for the cathedral of Tyre, crucial for reconstructing the spatial organization of the site, now destroyed: «A vestibule huge and very high rises on the side of the rays of the rising sun [...] leave a space as large as possible between the aisles and the first entry, which surrounded and decorated with four arcades, forming a quadrangular body, supported on all sides by columns. The spaces between them are closed by wooden barriers that rise up to a height appropriate, while he has left blank the middle part of the atrium [...] There he has placed symbols of sacred purifications, setting up in front of the facade the church with abundant fountains of living water flow» (*Historia ecclesiastica* 10, 4, 38-45). From the description it emerges the picture of a well-ordered house, whose walls separating pagans and unbelievers, in which the hall is reserved for catechumens, the aisles to advanced in faith, the presbytery to the priests, with a hierarchy of increasing *atrium* spaces apse, which is reminiscent of the Pompeiana *domus*.

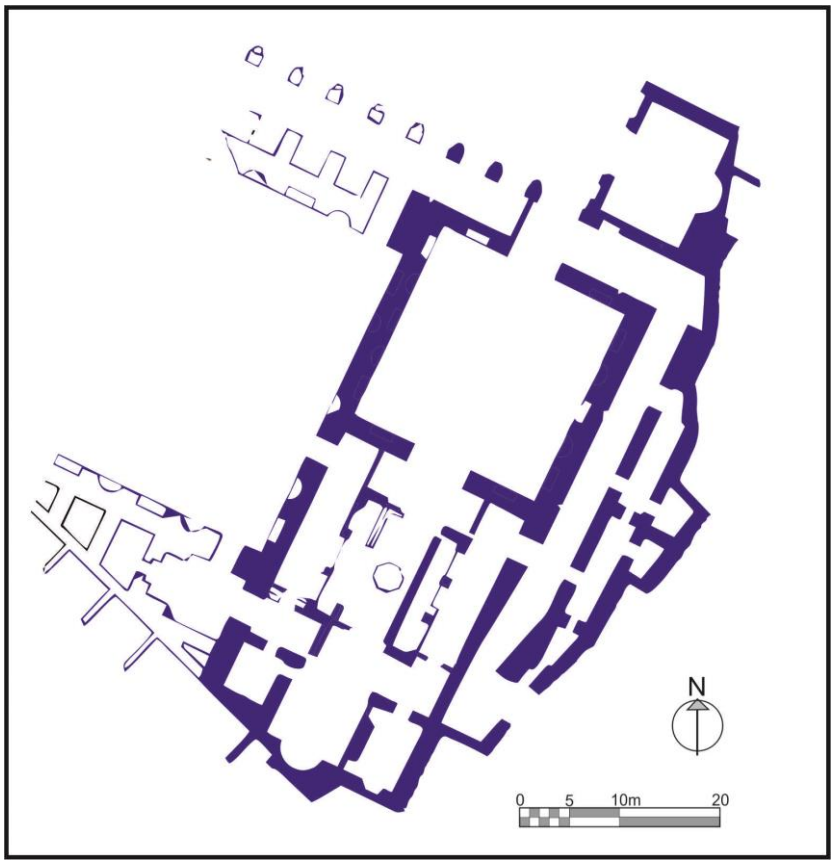

Fig. 5: Rome, St. Maria Antiqua, plant

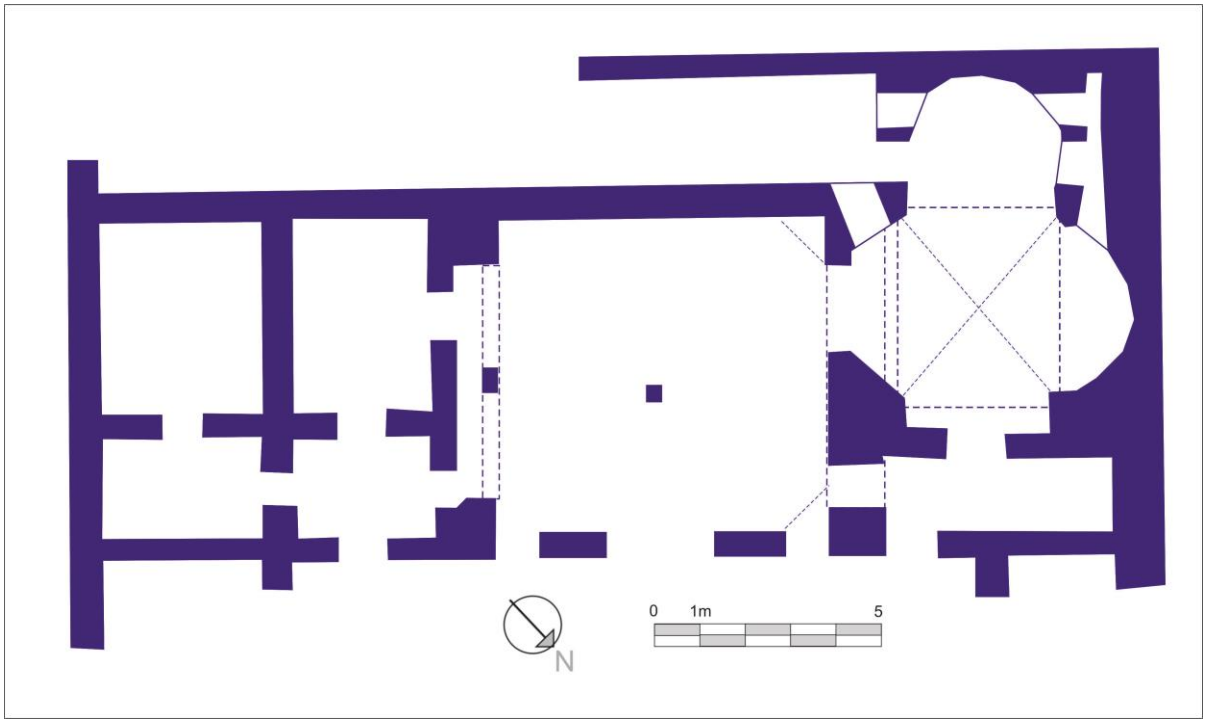

Fig. 6: Thugga, Trifolium's house, plant

An analysis of the first churches in the areas gravitating around the Mediterranean, which waives the pretence to choose as a vantage point in Rome and asks instead to consider all parts of the empire, can't but take into account the incredible development that the type basilica know in the current Maghreb and, in particular, in Tunisia. Here, as noted by a number of studies, especially in the site of ancient Carthage, as early as the fourth century, we find a rich harvest of churches, surprising for quantity and size[8]. The number of aisles of Damous-el-karita, (nine, eleven o'clock, but cross), Dermech I (five), Dermech II (three, but the wide central measuring 9m. X 80)-even taking into account later additions and alterations suffered by these structures-leads to reconsider the problem of the genesis and development of the church, especially in view of the evolution of local plans.
The development of the first buildings around an *atrium* or an *peristilium* (this in Africa) with the scanning of numerous annexes around this, often with the central ship positioned at a lower level than the side, as in Santa Maria Antiqua in Rome (and as in the Africans *domus* "to *peristilium*")[9], constitutes in itself an indication of paramount importance. This church looks like a rectangular hall divided into three naves, in the thickness of the which wall back was built the apsis and on two small chapels. An entrance hall leads to the nave made from a *impluvium* (dating back to the first century a.C.) in a lower level to the two side-aisles, revealing her to be a significant example of the adaptation of an pre-existing pagan building.
Beyond, however, of a mere comparison planimetric, seem relevant the elements of early Christian basilicas, in reference to their function and use. The presence of the *trychora* for the relics in the apse in a long series of buildings reminiscent the use of such environments is made in the context of private building of Imperial age (villa of Piazza Armerina, Diocletian's palace in Split, Palace of Bosra, building of Mshatta).
The large series attested, numerically significant especially for the African area, more than useful to clarify individual cases, it may shed light on a general criterion of reference. The fact that the *trychora* was used mainly in the apse is linked to the original function of this architectural element, attested both in the *termae* and in the *triclinium* of *domus* of many areas particularly in the East.
While the very presence of triconch has urged the series of precise comparisons between the private building of the Italian area and the North African, notably as regards the so-called "peristyle houses"[10], its function invites further reflection. If in fact the trilobate *ductus* appears in direct relation with the relics of martyrs and *martyria*[11], it also seems related to the *trychora triclinia* of the mansions of imperial age, especially prevalent in the western part of the Roman Empire.
Precisely this kind of choir is an important topic in support of the bond with the domus: as in *triclinia*, in the presbytery, with the exception of some North African churches- there is the altar, the holy table, or under which with which they were the relics of the martyrs.

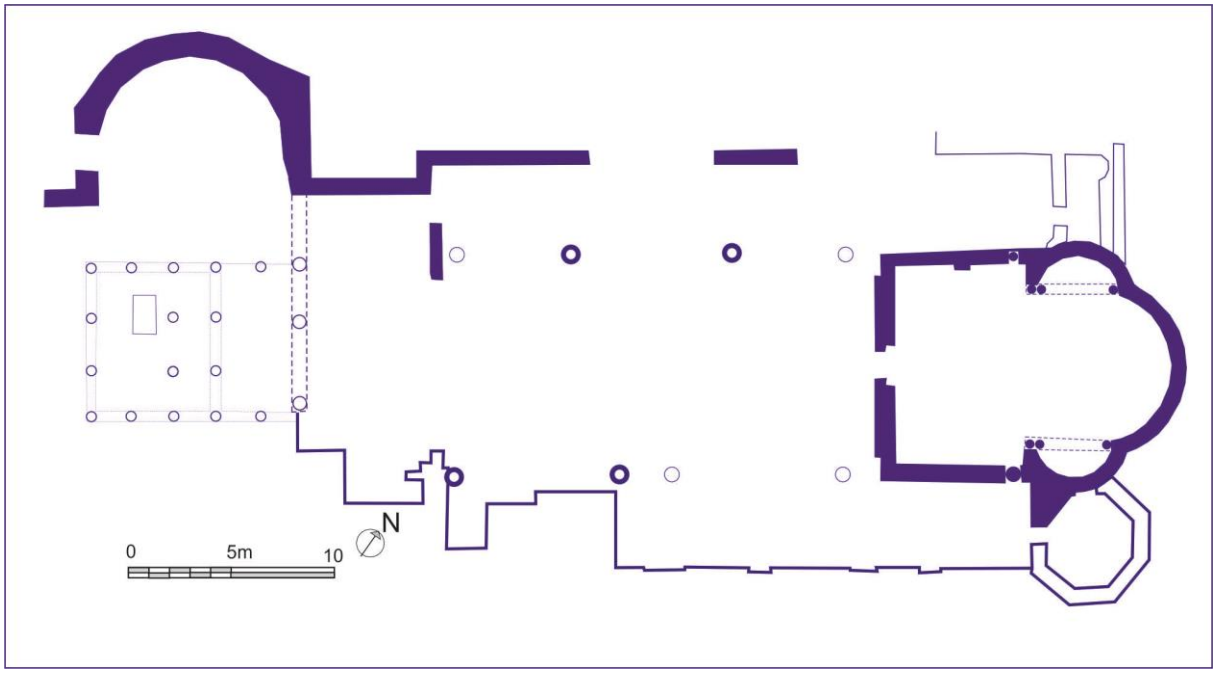

Fig. 7: Cimitile, Basilica nova, plant

Not surprisingly, in many instances of advanced altar in the nave, was the same ara to take shape triconca, as for the altar of the *basilica nova* in Cimitile, of which we know the form based on the description of saint Paulinus bishop of Nola[12].
This type of building had played a major role in the civil late antiquity, adopted for the construction of sumptuous dining rooms and then transferred to sacred architecture, reserved to the chancel area, where celebrated the Eucharist, understood as "memory" of Last Supper, the more so, at least from the end of the fourth century, it is consistently associated with martyr's cult. In the most ancient examples, like the churches of Cimitile (Nola), Knossos, Concordia, Bétika, Deir el Abjad, the Roman influences are too significant to be passed over in silence, as evidenced by the lack of the transept and the *ductus* outside, corresponding to the inner, intended to be changed at a later date. It is particularly significant that the Christian altar derives from the table household and not from *ara* used for pagan sacrifices, *sub divo* in the *temenos* of the temple, particular this confirmed, especially in the East, by the name of τράπεζα, which normally indicated that part of the church.
Equally significant are, in the construction of the first centuries, elements ostensibly difficult to explain, such as the presence, attested in the fifth century in all the sacred buildings of Cyrenaica and other North African (Basilica of the prophets, apostles and martyrs of Jerash), and Aegean, of two rooms on either side of the entrance, almost a equivalent of the sacristies flanking the apse.
These spaces, whose function was unknown so far, can only be understood in relation to the *fauces* of the Roman *domus* and with their derivation from the domestic environments. Still in Cyrenaica they are associated with certain characteristics (chorus closed by gates, nave's isolation through another system's gates) that are reminiscent of the clear separation of the environment of the house and the central closure outside of the room private.
Finally, only keeping in mind the model of the private residence, is possible explain some types purely Africans, attested both in phase early Christian age and in Byzantine era, as the basilicas *à auges*[13], in which the church is flanked by crushers and mills grinding of grain (in sometimes, as in Palestine, located internally next to the apse) while the intercolumns of the nave are closed by feeding or food containers.

Conclusions

The building of worship for excellence in Christian had to be realized with reference of more models, not least that of the private residence, from which the church itself took the moves. A reflection on the initial places of worship, especially in the East and in North Africa, leads us to reconsider the link between private residences and places of worship.



Fig. 8: Cimitile, St. John, trychora

The reference to the civil basilica remains a valid model to explain certain features, but must necessarily be supplemented or even excluded in some areas -as current Maghreb and Near East- in wich the private *domus* was the prevailing model of reference.
The issue is complex, also due to the fact that the type of the *domus* presents significant geographical and typological varieties and therefore should be analyzed the simultaneous evolution of building's two types.
More generally, it should be noted that, since the first imperial age, is adopted a kind of architecture common to residential mansions and imperial useful to the ruling classes to express their aspirations and political and *status*.
It is possible to detect not only a model, but a development of contemporary architectural models that used the same code to express similar meanings in terms of the ideology of power.

Note
The text is preview of a larger study on the relationship between religious and private building in the Late Antiquity in course of publication.
Graphic reworks by Saverio Carillo.

Bibliographical References

[1] LANCEL, Serge. PICARD, Gilbert-Charles. DUVAL, Noël. «Carthage». *Encyclopédie Berbère*, 12 (1993), p. 1780-1811. ZANINI, Enrico. DUVAL, Noël. ZUCCA, Raimondo. SPANU, Pier Giorgio. ARTIZZU, Danila. STASOLLA, Francesca Romana. CELLINI, Giuseppina Alessandra. CARRA BONACASA, Rosa Maria. «L'Africa settentrionale tra il IV e il VII secolo». *Il mondo dell'Archeologia* (2005).

[2] LERICHE, Pierre. AL MAHMOUD, A'sad. «Doura-Europos. Bilan des campagnes 1988-1990». *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*. 69/1-2 (1992), pp. 3-28; LERICHE, Pierre. AL MAHMOUD, A'sad. «Doura-Europos. Bilan des recherché récentes».

Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres. 138/2 (1994), p. 395-420.

[3] CORBO, Virgilio Canio. *The House of St. Peter at Capharnaum. A Preliminary Report of the First Two Campaigns of Excavations*. Jerusalem: Franciscan Printing Press, 1969. 71p. *Studium Biblicum Franciscanum : Collectio Minor. 5*. ID.*Cafarnao. I. Gli edifici della città*. Jerusalem: Franciscan Print. Press, 1975. *Studium Biblicum Franciscanum, 19*. 224p.

[4] LICCARDO, Giovanni. *Architettura e liturgia nella chiesa antica*. Milano: Skira, 2005. 216p. ISBN: 978-8876243448.

[5] BRENK, Beat. *Le costruzioni sotto la chiesa dei SS. Giovanni e Paolo*, in *Aurea Roma. Dalla città pagana alla città cristiana*. Catalogo della mostra (Roma, 22 dicembre 2000-20 aprile 2001) Edited by Ensoli, Serena, La Rocca, Eugenio. Roma: L'Erma di Bretscneider, 2000, p. 156-158. 711p. ISBN: 8882651266, 9788882651268.

[6] *Ibidem*. BRENK, Beat. «Microstoria sotto la Chiesa dei SS. Giovanni e Paolo: la cristianizzazione di una casa privata». *Rivista dell'Istituto Nazionale d'Archeologia e Storia dell'Arte*. 3/18 (1995), p. 169-205.

[7] De ALBENTIIS, Emidio. «La tipologia delle abitazioni romane: una visione diacronica». *AnMurcia*. 23-24 (2007-2008), p. 13-74.

[8] DUVAL, Noël. «Études d'architecture chrétienne nord-africaine». *Mélanges de l'Ecole française de Rome. Antiquité* 84/2 (1972). pp. 1071-1172. DOLENZ, Heimo. *Damous-el-Karita : die österreichisch-tunesischen Ausgrabungen der Jahre 1996 und 1997 im Saalbau und der Memoria des Pilgerheiligtumes Damous-el-Karita in Karthago*. Vienne: éd. Institut archéologique autrichien, 2001. ISBN 978-3-900305-32-1. DOLENZ, Heimo. «Two annex buildings to the Basilica Damous-el-Karita in Carthage. A summary of the excavations in 1996 and 1997», *Antiquités africaines*, XXXVI (2002) p. 147-160.

[9] REBUFFAT, René. «Maisons à péristyle d'Afrique du Nord. Répertoire de plans publiés (I)». *Mélanges de l'Ecole française de Rome. Antiquité*. 81/2 (1969), p. 659-724.

[10] REBUFFAT, René. «Maisons à péristyle d'Afrique du Nord. Répertoire de plans publiés (II)». *Mélanges de l'Ecole française de Rome. Antiquité*. 86/1 (1974), p. 445-499.

[11] DUVAL, Noël. «VII: Forme et identification: questions de méthode [Àpropos des «monuments à auges» et des triconques en Afrique du Nord]». *Mélanges de l'Ecole française de Rome. Antiquité*. 91/2 (1979). pp. 1015-1022. VARALIS, Yannis. Deux églises à choeur tréflé de l'Illyricum oriental Observations sur leur type architectural. *Bulletin de correspondance hellénique*. 123/1 (1999). pp. 195-225; JACAZZI, Danila. *La nascita del linguaggio del sacro tra Oriente e Occidente: l'architettura cristiana del complesso basilicale di Cimitil*e. In JACAZZI, Danila. CARILLO, Saverio. *Materia Cimitile Percorsi Didattici e Ricerca*. Atti della XXI e XXII Settimana della Cultura Scientifica e Tecnologica del MIUR (Cimitile, 17-23 ottobre 2011; 15-21 ottobre 2012) Napoli: La scuola di Pitagora. 2013. *Fabbrica della conoscenza, 41* p. 109-120. ISBN: 978-88-6542-311-0.

[12] PAUL.NOL. *ep*. 32, 20-21. On the correct interpretation of the piece: CAMPONE, Maria Carolina. Morfologie degli spazi liturgici antichi. Radici mediterranee nel battistero paoliniano di Cimitile. In JACAZZI, Danila. CARILLO, Saverio. *Materia Cimitile. Percorsi didattici e ricerca*. Atti della XXI e XXII Settimana della Cultura Scientifica e Tecnologica del MIUR (Cimitile, 17-23 ottobre 2011; 15-21 ottobre 2012) Napoli: La scuola di Pitagora. 2013. *Fabbrica della conoscenza, 41* p. 11-22. ISBN: 978-88-6542-311-0.

[13] DUVAL, Noël. DUVAL, Yvette. «Fausses basiliques (et faux martyrs) : quelques "bâtiments à auges" d'Afrique». *Mélanges de l'Ecole française de Rome. Antiquité*, 84/1 (1972), p. 675-719.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

POMPEI URBAN CENTER : knowledge, regeneration, management

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The scientific interest and design for the urban affairs of Pompei moves from the singular nature of this city, today strongly characterized by the presence of the Ruins and the Sanctuary as well as a strategic location in the territorial framework. Proposals for redevelopment of the tourist-cultural-urban Pompei are, therefore, designed to interact with the two main poles, the ruins and the Sanctuary, making the city a *port* of cultural tourism in Campania. The objectives of a strategy for strengthening and redevelopment are numerous: - redistribution of tourism flows of access to cultural heritage and landscape; - increase of the attendance interested in cultural tourism related to the production and distribution of art and craft products; - energy saving derived from the rationalization of traffic and increase of energy production through the use of photovoltaic systems. All this through the construction of a true Urban Center that will produce information-communication-participation by activating a program of events designed to raise awareness of projects and scenarios of the transformation of this area; a cultural center to disseminate the new languages of the contemporary city; speaker and promoter of best practices aimed at increasing the awareness of the citizens and through the support to the institutions a useful tool for the construction of urban policies shared.

Keywords: heritage, regeneration, development

1. Regenerate and Preserve Pompei: strategies, methodologies and tools

"Our artistic heritage is a universal language of humanity because it is an expression of our nature, our history, and our living relationship with others.
For this reason it can be the unifying factor around which we can strengthen respect for civil and social values ,as well as economic and territorial development and the inclusion of our citizens.
The way to inform a responsible citizenry must be through education" F. Profumo

Pompei is "the representation" of our cultural heritage, and has been a UNESCO site since 1996. It is the largest archaeological site in the world. Its 66 hectares, of which 45 have been excavated and 33 are open to the public, include all of the ancient city divided into 9 regiones (districts), subdivided into 112 insulae (blocks) and 1500 domus (houses). It possesses a rich and varied artistic heritage consisting of mosaics, decorated surfaces and decorative architectural elements that are all important components of the Pompeian identity and which attracts 2,300,000 visitors each year.

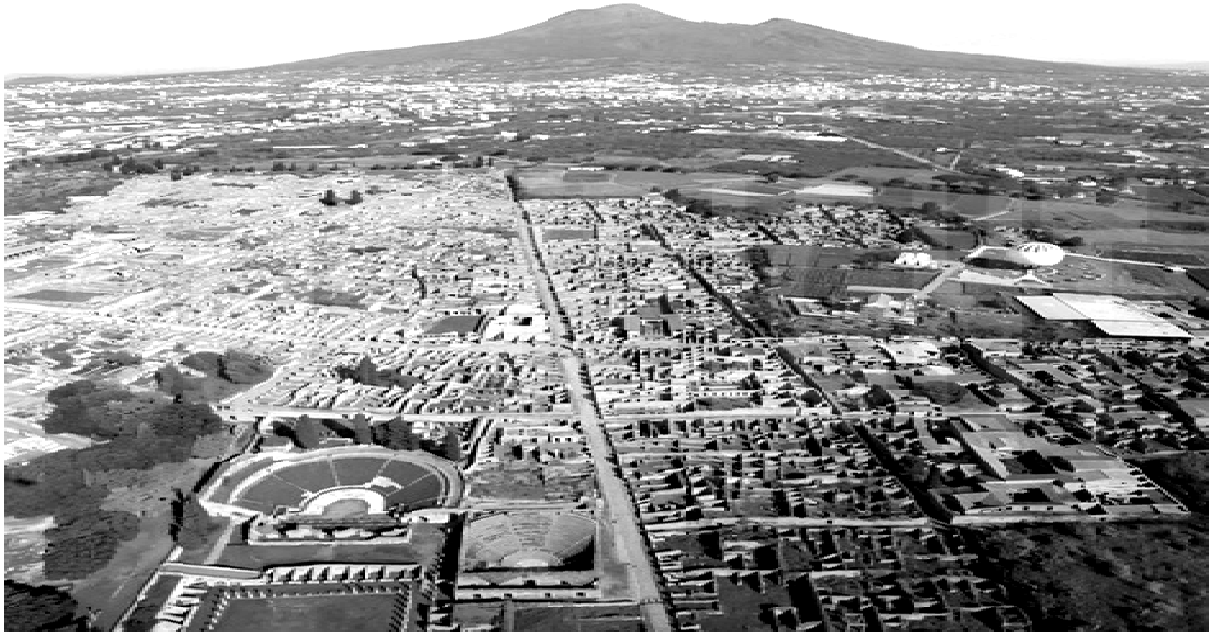

Fig. 1: View from the south of Pompei. In the right foreground, the theater and the Odeon. In the center, street Stabbiana, which runs through the ancient city from north to south. In the background, Mount Vesuvius.

In terms of tangible and intangible activities, the awareness that this heritage contributes to European cohesion and plays a strategic role in its development means that all forces and all attention converge on Pompei; for these reasons, protecting Pompei means that all stakeholders must assume their responsibilities.The search strategies, methodologies and innovative tools is necessary for the preservation of Pompei. Also against the continuous decay concerted action is necessary to identify, on the basis of sound scientific evidence conjugated to the prompt action for the safety of the whole area. The scientific interest and design to the vicissitudes of urban Pompei moves from the singular nature of this city, (fairly recent re-establishment after the interruption of the ancient Roman glories), today strongly characterized by the presence of the Ruins and the Sanctuary as well as a strategic location in the territorial framework. Clamped between the Vesuvius, the mouth of the Sarno and the hill chain that joins the peninsula of Sorrento, Pompei seems to claim the upgrading of urban infrastructure nodes, and answers to broad and good landscape sensitivity, to redevelop the rail-highway-parking system channel-campaign-tourist sites.
It is known that the Ruins of Pompei are one of the most visited sites (over 2 and a half million people a year according to the Superintendent), as well as the Shrine of Pompei is, for many visitors, one of the most important Marian shrines in Europe. These two sources of cultural tourism are as important as different and autonomous: ancient Pompei few visitors go to visit the new one with its Sanctuary and vice versa. So for the proposed redevelopment of the tourist-cultural-urban Pompei are primarily intended to integrate the two main poles, the Ruins and the Sanctuary (the old and the new) making the city a Port of cultural tourism in Campania region, decided to explore the main cultural tourist routes of the region (Vesuvian Area, Naples-Campi Flegrei, Sorrento Peninsula).

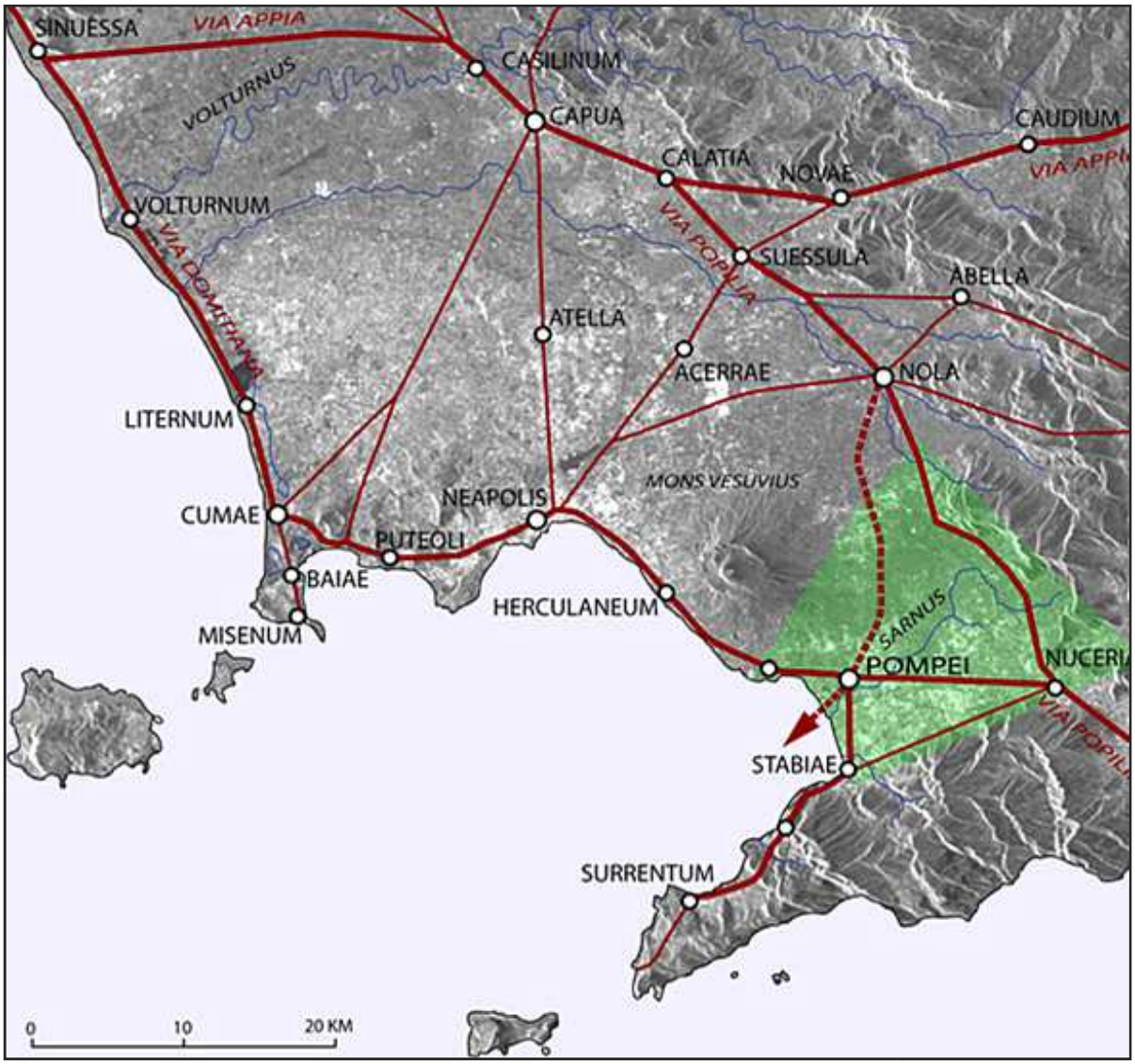

Fig. 2: Network of the main connections between Pompeii and the cities of Campania

1.2 Intervention's strategies

Radically affect the structural and preservation, protection and enhancement of an archaeological and historical and cultural heritage character of uniqueness and absolute relief leads to strategic interventions through the principle of enhanced cooperation and implements that address with reference three essential features that characterize it as a prototype:

- THE SAFEGUARD OF A CULTURAL HERITAGE OFWORLD SIGNIFICANCE AS A DRIVER OF TERRITORIAL DEVELOPMENT IN A COMPLEX AREA

Strengthening territorial competitiveness, including tourism, by means of a unified system of functionally interdependent interventions that offers prospects for growth and socioeconomic development, leading directly to the reinforcement of national and local identities.

The innovative drive of the methodologies adopted will in turn generate opportunities for the growth and development of professional skills, of businesses in this sector, and of research, by creating a workshop structure; upgrading the video surveillance system; promoting and guaranteeing conditions of transparency, participation, and control by the citizens (URBAN CENTER)

- 100% SECURITY AND LEGALITY : THE ABSOLUTE PROTECTION OF THE REQUIREMENTS OF SECURITY AND LEGALITY, INCLUDING COOPERATION WITH THE MINISTRY OF THE INTERIOR

Dealing at the urban scale with all key aspects that relate to minimising hydro-geological risks, implementing structural reinforcements for embankments not yet unearthed and the insulae; consolidating and restoring masonry and decorated surfaces; protecting buildings from the elements; and upgrading the video surveillance system.

Monitoring of the works throughout, from the analysis of the tender documents to the implementation of the works by those carrying them out; monitoring the relevant funding streams in respect of the principle of traceability in accordance with art. 3 of Law no. 136, 13 August 2010. carrying out on-site health and safety checks; checking that the rights of workers are respected.
- STRENGTHENED COOPERATION
The interests of all ministerial departments are made to converge within the implementation model: consistency of the project with EU rules on development policy; the high technical and scientific profile of the initiative; its ability to continue working towards territorial development objectives during its period of implementation; the involvement of the whole competent institutional sector at the territorial level; appropriate and efficient conditions and procedures for implementation.

2. New cultures, New languages for the city of Pompei

In recent years, new forms of architectural and urban of the contemporary city have been experienced in the valuation of the historic city, in the recovery of some structures of the suburbs and into a consolidated view of the landscaped open areas. I believe that today it is essential to deal with a critical and purposeful that part of the city, more extensive, which includes the suburbs of large cities, the urban sprawl, the infinite city, a group that can be called the city continues to the urban character that pervades. It an urban character that characterizes the ways of life of the inhabitants which does not correspond to an urban character of the spatial organization and morphology.
In this city are found new potential sites, a different conception of collective space, new types of systems that replace mixité fragmentation functionalist. In this town you can organize a new community vision based on dynamic relations and the opening of the crossing flows metropolitan and territorial conception of the project as proposed open space and time, a vision of a sustainable city that goes beyond the sum of the sustainable neighborhoods.
The languages of this city are produced in the relationships that are established through the use of the morphologies space and their interpretation.
Knowing them and encourage the design experiments I believe it is now one of the tasks of the Urban Center.

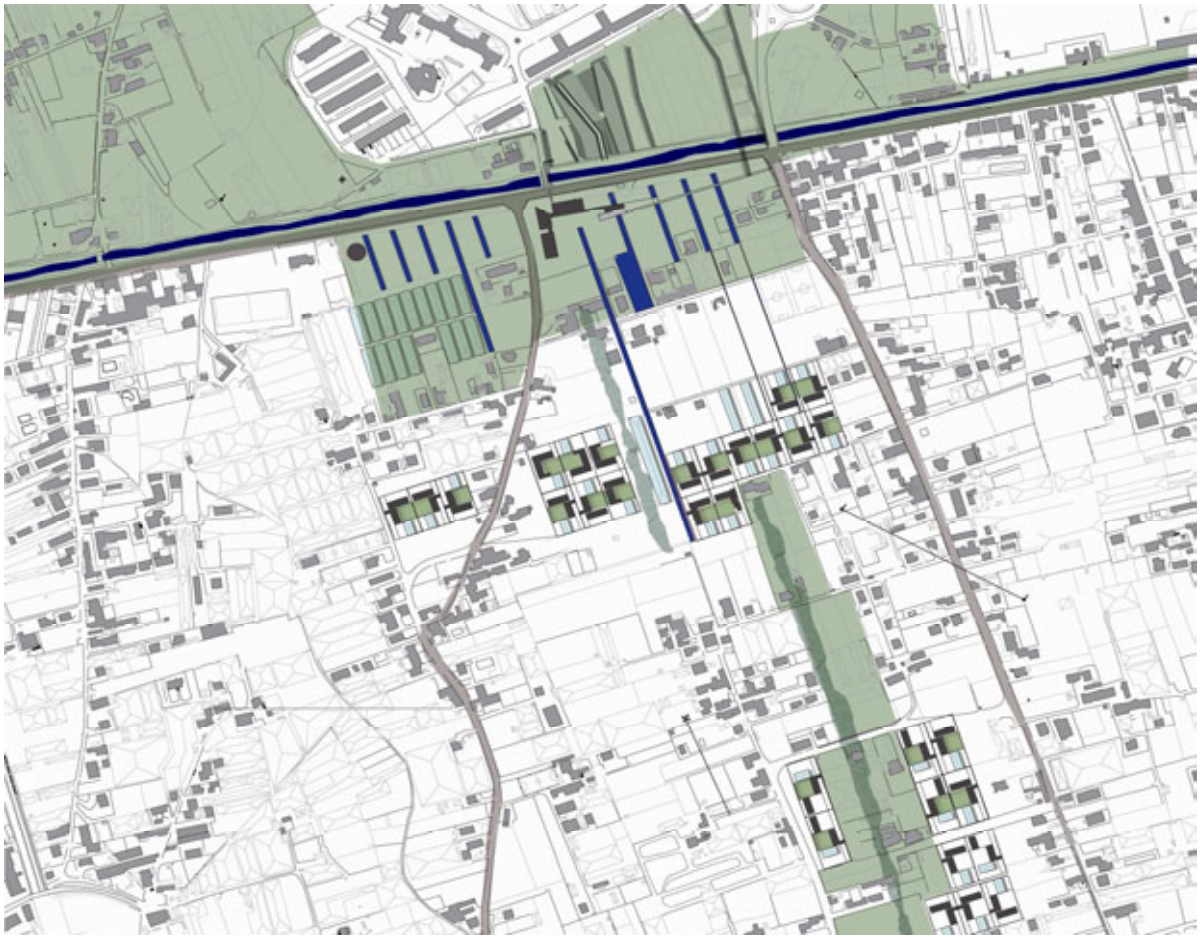

Fig. 3: Design in the built, Pompei

3. The concept of Urban Center and its applications

The obvious targets of this strategy of strengthening, upgrading and safeguarding the environment are manifold.

- Redistribution of tourist access to cultural heritage and landscape;
- Increase in attendance interested in cultural tourism linked to the production and distribution of art and craft products and a better link with the various productions of the territory;
- Energy savings derived from the rationalization of traffic and increase energy production, through new uses of photovoltaic systems and so on.

All this through the construction of a true Urban Center that will produce information-communication-participation by activating a program of events designed to raise awareness of projects and scenarios of the transformation of that territory; a cultural act to disseminate the new languages of the contemporary city; speaker and promoter of best practices aimed at increasing the awareness of citizens and institutions through support to be a useful tool for the construction of urban policies shared.

The phenomenon of the Urban Center is closely related to the metamorphosis of the subjects architects scenarios transformation of the city. The new generation, if we may so call it, of strategies for the promotion, development and commercialization in the field of urban modernity seems to favor a more sensitive approach to the figure of the complexity of the actors, with the maturation by administrations to pilot and manage increasing security mode , times, reports of dialogue between the interests and finds space.

Now passed, in fact, the traditional, monolithic model of dialectical opposition public / private due to the proliferation on the urban scene of a surprising number of actors – both quantity and characterization – the result of a partnership between consolidated entities (local governments, businesses, consortia of private banking groups, STU and joint ventures) and "emerging players" (special purpose company, promoters theme, management groups, authorities, institutions of communication and image enhancement, interest groups spread), new stakeholders that in pursuing specific missions are holders of innovative approaches both in the process of formation and stabilization of the design patterns, as in the architecture of support to the paths of realization and management of interventions.

The Urban Center can play the role of "cultural center" not only as an expression of reality brought some local perspective but also as a "node coagulation territorial", a bridge between the government of the transformations settlements and citizens, between the environment depositary of an technical knowledge and regulatory apparatus on one side and all the people and groups who live, make use of local resources and will grow opportunities.

The "territorial projects" that the Urban Center can facilitate and accompany binding appear both in the metropolitan conurbations, both agglomeration and unions of municipalities contained, for which the sine qua non for the promotion of local resources is represented by a threshold of significant critical mass that would justify and encourage virtuous forms and concrete planning.

Ultimately, the Urban centers can play a role identity to the civic community, in which the needs and intentions fragmented and geographically dispersed, forced within administrative boundaries that often have nothing to do with the different physical-spatial relations environmental, social, economic, can be put in the system and a shared strategic vision.

3.2 American Urban Center

There are three main commitments of American Urban Center: the issue of transparency and access to information; the issue of direct production of studies, research and other documents regarding the citizen development and related problems; the promotion of architectural activities directed primarily in participatory planning, in competitions' s ideas, debates about current projects.

In Europe, you perform the same tasks, although with less attention to the aspects of participatory planning and consulting. What changes the results obtained, it is the same role that the Urban Center takes in the urban context: no more third place of moderation between the parties involved as an expression of the public will. The following American cases, although arising in a social context, administrative and planning is completely different from that of Europe and, in particular, from the Italian, allow to understand the evolution, the management procedures adopted and forms of financing obtained.

These models have the general characteristics that can be taken from any Urban Center in the world, although in different conditions. Ultimately the features common to the Urban Center analyzed will be the foundation for the construction of an Urban Center in the area of Pompei.

The birth of the Urban Center in America dates back to the 70s. In this period, in fact, it happens a new phenomenon in the way urban towns typical of American cities: it begins a process of abandonment of the city center is by the population, both by capital and productive activities. This leads to two main consequences:

- remain huge brownfield sites in the city center for further evaluation reuse;

- starts a continuous and uncontrollable horizontal development towards the outside of the city, not integrated with overall planning and long-term.
In this context, forming associations of citizens who want to take action on the issues. So the union of several associations, generally financed by foundations and universities, leading to the birth of the first Urban Center: tanks of ideas in which citizenship can participate in the urban redevelopment of brownfield sites. In such structures, seeking a compromise between a number of stakeholders to bring proposals strongly directed towards a better quality of life of the city and towards greater social cohesion to internal districts themselves.

3.2.1 The SPUR: San Francisco Planning and Urban Research Association

"A community that does not plan and build the structures necessary for the life of all
days remain perpetually backward; The buildings may also be towers towards the sky but their current social elevation will remain below that of an almost decent country "
Lewis Mumford - the cardinal principle of the Spur San Francisco

The oldest Urban Center is probably the one in San Francisco. It was founded at the beginning of the 900 at a particular time catastrophic for the city, the management of the post- earthquake of 1906 that destroyed the home to more than 300,000 people (out of a total of 400,000). In this situation, the social and urban, some citizens and city leaders decided to create this forum for the discussion with two primary targets: to improve the quality of housing in new buildings and to limit as much as possible post-earthquake building speculation. This first structure is a forerunner of the real Urban Center citizen (the SPUR San Francisco). Have been proposed to citizenship meetings, debates, seminars to be administrators, planners, representatives of associations have shown development projects, research, projects of buildings and redevelopment of areas. This behave a number of advantages: encourage the participation of a large number of people, prevent the request for reimbursement by the speakers in front of the brevity of the interventions, increase the ability to organize a large number of encounters though of lower dimension. In summary, the main purpose of this Urban Center is to increase the participation and information between stakeholders in order to create guidelines and policies to suggest the local administration as a result of the debate, first within the association itself , and then the public.

3.2.2 CFA: Philadelphia Center for Architecture Foundation

Different interpretation than San Francisco is the "Urban Center in Philadelphia. It was founded in 1968 and underwent a final set in 1980. Philadelphia is the city that contains the largest number historical buildings of the city, the place where was signed the declaration of independence, the first capital of the United States. This context helps us to understand the specific address taken from Urban Center. A specific project, which has been the most successful in the various editions, is aimed at nurseries and schools with objective to know the younger importance of environment and the buildings that surround them with deep historical significance through interactive features and games. A similar target is pursued towards an adult audience through an extensive activity of guided tours to the places and routes the most important of the American metropolis.
The promotion activities then pass through the drafting of city guide and a magazine that in addition to release information on the activities that the center conducts, develops the debate on topical issues in the city. Always include the major players in the process and also to exit from the local area are organized competitions for ideas and set premiums so as to involve international players, but above all to attract attention towards the heart. All these issues are, however, discussed in forums, seminars and discussions organized periodically by the property is for a public purpose expert, who for the most widely interested and for which you have to use a totally different language. The structure’s staff is not particularly slim, twelve are the people working under him; the board is made up of thirty people from various backgrounds (architects, bankers, lawyers, real estate developers, brokers, representatives of the groups and local committees, experts in specific disciplines).
All the activities of the Urban Center in Philadelphia, however, revolve around the principle of importance of safeguarding the cultural and architectural history of the city is very rich.

3.2.3 CAF: Chicago Architecture Foundation

In Chicago, the situation is very similar to that of Philadelphia. The city, famous for its architectural brilliance, saw the birth of his own Urban Center with the target of increasing and spreading the architectural culture of the city, promoting it in the population, in administration and throughout the world. The town house is designed to encourage the promotion and enhancement of the architectural culture of the town and through outreach activities and discussion and through events that promote awareness and citizen participation in urban transformation. The foundation is operated as a charity that deals with the dissemination of the culture of urban design.

The public events they see a confrontation between academics, practitioners and all other stakeholders and thus to promote discussion and the creation of ideas. As in most of the cases so far seen, the main donor are the foundations as well as to the Depaul University. Like most of the UC analyzed born at the end of the 60s with a specific target: to save from demolition an architecture of Richardson very important to the city's culture. In the following years they began the training of citizenship, conscious that a greater awareness of all precious architectural heritage against the citizen would have at least the most protected in the choices of future administration. All the activities of the foundation are based on the performance of 600 volunteers who make it possible to manage the structure with a relatively low budget.
The activities of retail sales, primarily related to the bookshop, allow good economic gains.The individual accessions insignificant compared to the total revenue, as public funding. On the contrary, the development of targeted projects on commission allows additional income.

3.3 European Urban Center
The arrival of the Urban Center takes place in Europe with more than fifteen years of lagging behind the United States of America. Only in the late 80s, early 90s, they begin to arise in major European capitals of structures called Urban Center or Architecture Center, Light House, Open House, and more. These structures arise in a context of deep critical for Europe's urban areas. On the one hand there are the first brownfield sites, to regenerate completely, from there is more to the chronic lack of infrastructure, a characteristic of European cities. The growing cultural well-being, in addition, can only encourage the desire and need of citizens to understand and express their opinion about the urban change in progress.
In addition to England and France, where many Urban Center proliferate in most large cities, which create a very similar pattern linked to the spread of architectural culture as well as the facilitation of the exchange of information among its architects themselves, are two interesting Urban Center were born, in the mid-80s in the two capitals of the northern Europe known for the vibrancy of its architectural urban transformations: Copenhagen and Amsterdam. These two centers are if you want the best example of how the Urban Center will play a key role as a place for discussion and dissemination of architectural processes, leading to an effective architectural brilliance and a widespread awareness of the architectural tradition of their country . The forms of control of the two centers are different: the former is supported by private funding, the second to the government funding.

3.3.1 ARCAM - Amsterdam
With nearly ten years ahead of its main competitors in Europe, Amsterdam was equipped with an Urban Center already around in the second half of the 80s. The structure was built to interior of a building specially designed by one of the most famous Dutch architects, built right in the city center, you can count on a facade of three layers of steel and glass. The activities are aimed primarily at the general public: for adults and tourists, through exhibitions, debates, lectures, meetings with designers aimed primarily to help people understand the inspiration and the study of urban works in progress, but always trying to create an awareness and protection on Dutch architecture; training programs to young people with very accurate that you can even insert inside of their syllabus for many college courses.

3.3.2 DAC - Copenhagen
Copenhagen, like Amsterdam, is a forerunner in the role that Europe can take an Urban Center for the urban future, and not just the city. In 1986, in the central area of the port, was in fact created the Danish Architecture Center - DAC-with the aim of bringing designers and manufacturers to facilitate the building of a new city and especially to promote the techniques and culture of the growing phenomenon of environmental quality for which its Copenhagen, in later years, it will become popular in the rest of Europe.
Lots of activities specifically aimed at training the younger, with targeted activities for teachers, children, youth and college students. The DAC organizes temporary exhibitions mainly related to sustainable construction. For all these initiatives often receive government funding to internal programs that the danish government has set up with the intention of becoming the nation most avant-garde in Europe in the field of architecture. You want to access all the citizens and visitors of tests, projects, experiments about concepts that can produce novelty in the field of quality housing. All these exhibitions are created with the greatest number of possible partnerships, both to increase the funding available, both for the use of human resources in the most competent individual sectors, but especially to enhance cooperation and exchange of information among the various stakeholders . The Urban Center Danish want to make the bearer of a culture innovative architectural paying particular attention to danish and international architects, promoting meetings, workshops and discussions reserved for them, with the intention of stimulating ideas, gain knowledge from the most interesting experiences of the world. Through these operations, the future classes of architects and designers will have a greater

awareness of the danish architectural culture, but above all the basics to be able to quickly renew the capital, creating the world center of Architecture and Design addressed to sustainability and a better quality of life.

3.4 Italian Urban Center

To see the first Urban Center in Italy, you must wait ten years behind the rest of Europe. The debate began in the late 80s when INU (National Institute for Urban Planning), designed for various public administrations creation of the Urban Center to accompany the processes of development of their cities, inspired by the U.S. model. Although, as already seen for the rest of the world, there is a real model of the Urban Center, in Italy there are two strands: the Urban Center started out as "windows of the city," public spaces in which to present, communicate , inform, represent the changes in the city according to the plans of the junta; the Urban Center births according to the preparation of master plans in which you search for the debate, the participation of citizens in order to achieve a common result.

3.4.1 Urban Center Metropolitan – Torino

The Urban Center in Turin remains an isolated case in Italy, both by type of management, and its ability to finance itself and the activities it carries out. The path that led Metropolitan Urban Center as it is today was very long. It starts twelve years ago with the creation of a project "Urban Center virtual" face to collect and disseminate information on the policies proposed urban transformation among citizens.

The innovative factor associated with the Metropolitan Urban Center n derives from the role it assumes in the processes of transformation going on in town: no longer confined to inform and involve the city users interested through the classic activities (exhibitions, publications, debates etc.) seen in other, more Urban Center, but rather deals with the constant monitoring of the projects that are entrusted to him on several occasions by municipal government or by individuals also Italian in order to obtain the best mediation between all parties involved in the operation. This innovative role is crucial as it provides precisely to bring together all stakeholders (clients of works, designers, directors and committees, but often also citizens) around a table where everyone is free to bring his case to internal comparison. In these tables are then explained the objectives and proposals of the various actors and Metropolitan Urban Center has the role of moderator and the bearer of a goal: that of urban quality. In this context it is not always arrive at a final common position, but the comparison still need to get at least part of the compromise, however, and to show clearly what are the target of individual stakeholders at the table. The Metropolitan Urban Center has acquired considerable experience in this regard in dozens of projects, who accompanied officially, relating especially to the huge areas of post-industrial transformation.



Fig. 4: Urban Center Metropolitan, Torino

3.4.2 Milano Urban Center

The place and space are a dedicated element of success for the Urban Center in Milan: it is inside of Vittorio Emanuele Gallery, with an exhibition space of 160m2 associated, upstairs, in offices, services, and another small space devoted to breakfast, meetings or initiatives of various kinds.
Inside the exhibition space there is a permanent exhibition that tells the future transformations of Milan, its future skyscrapers, the areas of development, all through easily upgradeable and replaceable panels that cover the walls of the room. The activities organized but are not limited to major exhibitions: there are numerous conferences, debates and workshops organized in their own room equipped of 'Urban center that can hold up to 200 people.

4. Conclusions

With the analysis of various Italian and international cases, it is seen as every urban center has its own meaning, its own type of management, funding tied to the local community.
What should be then those features for the Urban Center of Pompei? And most importantly, because an Urban Center in Pompei? What should make up for deficiencies? What targets ask?
From what emerges from research conducted in recent years, such structures may have different features and characteristics, and consequently also differ from each other significantly. In fact, next to a core activities, informational and communicative, the urban center often accompanied by events, which vary according to the culture of "doing the town" and those relating to the legal model of the order of the countries in which they are established.
Incubators of knowledge, rather than reservoirs of creativity; places of participatory democracy rather than deliberative, represent the extremes of a dichotomous schema "pendulum of interpretation" useful representation for utilizing multiple forms that urban centers are taking to coagulate the interactions between civitas and urbs, namely between brought social and cultural expressed by the community at large and the physical city.
The choices regarding the objectives must start by considering that the urban context of Pompei has experienced a remarkable liveliness in last decade. There have been many projects that have changed and marked the city and many are the ones under construction, design or even earlier discussion. Many projects, little knowledge: the public opinion today is to discuss issues and projects of which he knows very little.
In all these contexts, given the experiences of other Urban Center, which could be the role of a Pompeian Urban Center? The exhibition space could and should be devoted to the dissemination of their data and projects for the main processes of urban change. Expose projects, detailed renderings, models for larger systems will help to fuel a serious debate with all stakeholders who have a good knowledge of what will happen, costs, effects and prospects. The Urban Center can then become a place of exposure, but also a place for debate. Might have the designers of the works, the competent assessors in redevelopment projects and mobility on stage to explain to citizens, in detail, what are the interventions, such as projects, such as the measures financed, listening to the views of all.
The assessor and or the designer himself could explain, during a guided tour, the stages of progress of the construction and how it was conceived and designed his project.
The issues to think about from the outset, to define even in broad outline the characteristics of UCB are:
• broad objectives;
• how to organize and how to handle it, it will very much depend on the choices of 'municipal administration, which is the main promoter;
• on which events and which initiatives to push inner space;
• what initiatives on which to work and what's the initiatives that can attract more funding and sponsorship;
• what subjects involved;
• if you have a fixed venue (like the majority of the Urban Center) or prefer a web communication with touring events in village halls;
• communal space which allocate and what are the characteristics that a space must have to be used (which are a function of "objective that you assign);
• such as opening times and how to structure operatively adopt this service;
• that the budget be made available

Bibliographical References

[1] FALQUI E., BARTOLACCIO A., PAVONI P. *Zeppelin. Progetto per un Urban Center nell'area metropolitana fiorentina*. Libreria Alfani Ed., Firenze

[2] FARERI, P. *Urban Center. L'esperienza statunitense*. Camera di Commercio di Milano, Istituto per la Ricerca Sociale, Milano

[3] GAMBARDELLA, Carmine. *Atlante di Pompei*. Napoli La scuola di Pitagora, 2012, ISBN 978-8865421710

[4] MONARDO, B. *Urban Center. Una casa di vetro per le politiche urbane*. Officina Edizioni Roma, 2007

[5] Referring Web Pages Web: www.comune.pompei.na.it

[6] Referring Web Pages Web: http://consortile.asmez.it/

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The Atmosphere of Industrial Architecture: Experience and Production

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Abstract
During the last decades a cultural grafting of former industrial areas in the Danish city centres has been unfolding: Former industrial buildings with distinct architectural atmospheres have been transformed into cultural centres - milieus of experiences in prime examples of conservation of architectural heritage. In this integration of city and industry the houses of the industrial economy have become houses of the experience economy!
However, concurrently a conflicting tendency is unfolding at the same cities' outskirts: The construction of contemporary industrial architecture in segregation with the cities. Which qualities separate the transformed industrial architecture of the past from the industrial architecture of the present?
Could contemporary industry again contribute to the city? And which capacities are to be embraced in order to meet the demands of both industrial economy and experience economy?
This paper seeks to investigate how to create an integrated and resilient approach to contemporary industrial architecture where development and improvement is facilitated by the knowledge of the transformed industrial architecture; how to utilise the lessons learned from the conservation and management of cultural and architectural heritage; and how in the link of past and present to move beyond mere retrospective and stringent rational approaches to industrial architecture by focusing on the connection between architectural atmospheres and the creation of experiences.

Keywords: Industrial architecture, experience economy, atmosphere, peripheral perception

Two contemporary tracks of industrial architecture [1]
The current state of industrial architecture is the theme of the article *Industriarkitektur efter industrialismen 1960-80 (Industrial architecture after the industrialisation 1960-80)* by the associate Professor at Aarhus School of Architecture Boris Brorman Jensen. He states that with the transformation from industrial economy to experience economy the role of industry in the city has shifted. In this process Brorman Jensen points towards two tendencies: The establishment of new industrial buildings at the outskirts of the cities and the reintegration of former industrial buildings into the city by applying new programmes. These roles are reflected in the economic development of Danish society: Contemporary society has both elements of production connected to industrial economy and elements connected to experience economy. In this development are two tendencies – the segregation of the industrial architecture of the present and the city, and at the same time the integration of the industrial architecture of the past and the city.
With these opposite developments it seems necessary to ask: Which qualities separate the industrial architecture of the past from the industrial architecture of the present?

Brorman Jensen gives a harsh description of the state of contemporary industrial architecture as he describes the production facilities at the outskirt of cities as an ocean of anonymity consisting of introvert, concrete monoliths with lack of illusions. A focus on consumerism and minimised production

costs has according to Brorman Jensen neglected industrial buildings as an architectural area: The buildings are minimised to vapid boxes assembled by standard concrete elements with a large frame where the factory sign can be changed to match the company currently housed in the building. Brorman Jensen further states that not only the buildings are in a poor state – also the industrial areas are left to large pieces of patchwork consisting of squares of disjointed land with a cover of asphalt and grass, included a few trees and bushes in a forest of signs.
Brorman Jensen states that the dullness clearly is larger than the construction costs. As a consequence of this construction cost, low prices on land and connections to infrastructure have become the most important parameters for industrial architecture – and they are all found at the outskirts of the cities and near the highway. This tedious tendency is questioned by Brorman Jensen as he asks: "*Why must it be that boundless bleak*?"
The answer is perhaps that it does not necessarily need to be that boundless bleak; industrial architecture has since the mid-1800s played different roles in the societal development. These roles have been the focus of the Danish architect Jørgen Sestoft's investigation of the history of industrial architecture in his book *Arbejdets bygninger (The Buildings of Work).* Together with the article *Fabrikken som arkitektur i Nordeuropa (The Factory as architecture in Northern Europe)* by the historian Caspar Jørgensen an answer to Brorman Jensen's question is approached.
Sestoft describes the history of industrial architecture through a tripartition of the industrial periods: The first industrial period from middle of the nineteenth century, the second industrial period around 1910-40 and the last period from the 1950s and onwards. These three periods also represent three different views on industrial architecture, respectively: The image of progress, the image of functional beauty and the image of pollution.
The description by Brorman Jensen is inscribed in the latter period from the 1950s and onwards with industrial architecture as an image of pollution – and focus is therefore aimed at this period to elaborate of the state of contemporary industrial architecture.

Segregation and integration within industrial architecture [2] [3] [4]
Jørgensen states that the huge construction boom after the end of World War II and a focus on getting the economy kick-started created an enhanced focus on the functional principles and mass production where function dominated and the architecture became a by-product. Through these processes the architect lost his role in the building process of industry as it evolved to the consistence of large flexible boxes of production.
These foci and the exponential use of the car and explosive development of infrastructure fostered separation and large industrial areas were therefore planned and isolated from residential areas in the rural areas with cheaper rents and lower wages. The industrial typologies became - in the words of Sestoft - a picture of pollution.
The latest period of industrial architecture can therefore be characterised as an engineer-oriented industry where optimisation and production are the key notions: Industrial buildings as an industrial product isolated from interaction with the city to optimise cost; and cooperation between architect and engineer are minimised.

To unfold alternatives to the current state of industrial architecture that Brorman Jensen vividly describes focus is aimed at the other roles of industrial architecture through history: Industrial architecture has not always been ousted to outskirts of the city - the role of industrial architecture has shifted drastically during the years since the industrial revolution.

With the breakthrough of industrialism from the mid-1800s the industry was established as building typologies dedicated to a specific function of the given industrial production. These industrial buildings were often placed without regard to overall planning, as they were located at a site where the surroundings could be utilised in the production. New settlements were often located around or in immediate vicinity of the major industries to have the workers proximity. The first period described by Sestoft has thus a high degree of integration between industry and city.
The development created new urban areas with industry at the centres: Where the cities previously had been built around the church they were now centred around the industrial buildings.
According to Jørgensen the industries created a pressure on the hierarchical architectural subdivision and the architectural profession designed several private industries.
In the end of this period the industries started to focus on optimising of production and process methods and the engineer became more and more important to the industrial buildings.
In this first period the industrial architecture was regarded as a sign of progress and the buildings of this period are characterised by integration with the cities, connection to the architectural mode of expression at the time and a change of hierarchy within architecture where production facilities climbed in prestige. The design of industrial architecture was in the domain of the architectural profession – however as Jørgensen states this changed.

In the period of 1910 to 1940 the optimisation of production developed the industrial architecture into process plants which challenged the historical rules in relation to scale and proportions: These buildings no longer contained individual workers with isolated individual machines, but greater procedural machinery, where the flow and relationship between the individual machines were crucial to the production. These buildings changed the view on industrial buildings from carriers of symbols in the historic architecture to functional buildings that intrinsic had a beauty in the emphasis of function. The functional focus facilitated a higher emphasis on engineering in the design of the building. The stringent simplicity of function and technology became part of the architectural vocabulary – architectural and engineerical consideration went together as cooperation in a modernistic future-oriented perspective.
The collaboration between architects and engineers and the increasing focus on the industrial fabrication and production methods resulted in a focus on the fast-growing technology. The industry had become the flagship of the development of modern society; the building became a symbol of the future and the machine itself.
This focus on functionality and rationality simultaneously resulted in a segregation of industrial areas and residential areas – and functionally divided cities therefore arose as a result of this approach.

Where the first period of industrial architecture was dominated by the segregation of professional competency with an architectural dominance and an integration of city and industrial buildings, the second period of industrial architecture was dominated by the integration of architectural and engineerical competencies, but also by the modernistic segregation of city and industrial buildings. The domains of segregation and integration can therefore be said to have exchanged places in the two periods.

The third period described by Brorman Jensen can with this in mind be described as an adoption of the aspect of segregation of the two first periods: The industrial architecture of the third period are dominated by the segregation of professional competencies with an engineerical dominance and the segregation of city and industrial buildings.
When Brorman-Jensen ask: "*Why must it be that boundless bleak*?" – perhaps the solution is rooted in the embracement of integration instead of segregation: What if the industry again became an integration of professional competencies and became integrated in the city?
Could this change of focus point towards a fourth period of industrial architecture where industrial architecture again claims the domain as societal co-generator of the urban scene?

As Brorman Jensen described two tendencies already exist in the state of contemporary industrial architecture: Segregation of industrial architecture of the present and the city and the integration of the industrial architecture of the past and the city.
The renewed interest to the central location of the derelict industrial buildings and their attractive potential for future development of cities can be ascribed as the transformation from industrial economy to experience economy. The latter development described by Brorman Jensen indicates that the transformed industrial architecture has capacities suited for the unfolding of the experience economy – capacities similar to those contemporary industrial architecture needs to embrace in order to contribute to the contemporary urban development. In continuation of this consideration: Which capacities of the transformed industrial architecture are important and useable in a re-integration of industry into the cities built on the experience economy's requirements for architecture?

Lessons from the transformation of industrial architecture [5]
The capacities of transformed industrial architecture are investigated in the research project *"The Experience City".* The research project investigates this cultural grafting of former industrial areas in the Danish cities that has been unfolding during recent years: New cultural centres deliberately linking cultural institutions, information centres and milieus of experience in act of transformation.
The Experience City focuses on the connection between the cultural centres of the experience economy with different programmes – commercial and free of charge. The motivation for the link of different cultural programmes is often of financial character as the cultural programmes alone has not been able to fund the projects. Links between educations, productions of knowledge and experience have arisen as a consequence of this in the larger provincial towns of Denmark. The research project mentions these as hybrid cultural projects and stresses the potential of these projects for more than mere entertainment and for the inclusion of diverse groups of the society.
The architecture of these hybrid projects is described as *"experience-architecture"* which reuses and reinterprets heritage of industrial architecture and lend scale and typological diversity in the transformation to facilitate the cultural programme. As Brorman Jensen the research project emphasises the importance of the central placement of the former industrial areas as they re-enter the

cities, and in addition to this the research project emphasises that the large volumes of industrial architecture also are subjects of interest for the experience economy as they are carrier of historical references. The buildings are of high spatial quality and consist of a typological diversity of labyrinthine structures that makes them a perfect match for cultural use founded in experience.
The Experience City refers to Tate Modern as an exemplary transformation with these capacities: The former power plant at the south bank of the River Thames have by Herzog & de Meuron been transformed with a prospective approach where a prosaic reuse of the industrial architecture is combined in interplay with constructive and aesthetic additions – the contrast of the melanised concrete to the elements of glass, steel and wood strengthen the narrative of the transformation where the key concept in the transformation is the preservation of the vast space of the Turbine Hall of the power plant.

In continuation of these descriptions of *The Experience City* it seems that intrinsic in industrial architecture are potentials of experience and identity that reach beyond values of production.
To unfold these potentials it seems necessary to address the challenges of the adaption by industrial architecture to the agenda of experience economy. The values of production, cost optimisation and logistical connections are essential for a production rooted in an industrial economy, but they cannot stand-alone if these buildings are to contribute to the contemporary urban scene.
To elaborate on how industrial architecture is to develop focus is therefore turned away from the demands of the industrial economy to the demands of the experience economy – keeping in mind that industrial architecture also have to meet the essential demands of production, cost optimisation and logistical connections. The element of optimisation of production will always be a key design parameter for the industrial architecture – but the further investigation of this section will not focus on means of further optimisation, but on how the industry can embrace the experience economy.
In the same way the key design parameter of integration - between both professional competencies and also between city and industry – will not be exhaustively addressed as the focus will be on which capacities contemporary industrial architecture needs to contain to contribute to urban development.
To approach this focus the demands of the experience economy are addressed. Aiming attention at the foundation for the experience economy does this: The creation of experiences – and the role of architecture herein.

The design principles of experience economy [6]
The two American economists B. Joseph Pine and James H. Gilmore introduced the term of experience economy at the end of the twentieth century: The term describes an economy based on experiences as the latest successor in a row of agrarian economy, industrial economy and - most recent - service economy.
The approach of Pine and Gilmore has a commercial focus and as the maximisation of profit is the main focus not all of the considerations are transferrable to architecture. However the core of this economy is – obviously - the importance of experience and this aspect can according to *The Experience City* be utilised to shed light on the role of industrial architecture in contemporary society and to unfold the phenomenon of experience.
Pine and Gilmore operates with four experiential realms and five design principles to create experiences; the four experiential realms of the experience economy are: Entertainment, educational, escapist and esthetic. The realms are characterised by two key dimensions: The level of participation and environmental relationship; and it is in the coupling of these dimensions that the four experiential realms arise.

The experience of entertainment is characterised by passive participation and absorption as environmental relationship. Absorption is described by Pine and Gilmore as *"occupying a person's attention by bringing the experience into mind"* as opposed to a physical involvement which is characterised as immersion. Entertainment is thus a passive absorption of the experience through the senses: The participant is an observer.
The educational experience is also a mental experience – however it is an act of active participation: The mind is actively engaged and absorption of the unfolding events occurs as the participant is actively engaging.
The escapist experience is a physical experience in contrast to entertainment and education and this means that immersion occurs instead of absorption. The result is the completely immersion of the participant in the experience as an actively involved participant – the participant is able to affect the actual performance. A level of escapism thus occurs as the participant immerse in the act of participation.
The esthetic experience is as the escapist experience rooted in a physical immersion, but is of a passive nature. The participants have no or little effect on the event or environment.
Pine and Gilmore state that the most important factor for entertainment experience is to sense, to

learn for the educational experience, to do for the escapist experience and to be for the esthetic experience.

Pine and Gilmore stress that experiences can be enhanced by blurring the lines between the four realms, and that the richest experiences include aspects of all four realms: The design of a rich, compelling and engaging experience encompass the experiences of entertainment, educational, escapist and esthetic – not necessarily at once, but emphasised differently during the process of the overall experience. Only when the interplay of the four realms is unfolded within the same experience is it possible to create *"a distinctive place"* – in contrast to what Pine and Gilmore describes at plain space. Staged experiences that unfold over a period of time need the sense of place to keep participants in the experience; the goal is according to Pine and Gilmore to create mnemonic places: Places that produce memories which will invite the participant to return to the experience again.
To design distinctive, mnemonic places which embrace all four realms of experience Pine and Gilmore list five design principles: Theme the experience, harmonise impressions with positive cues, eliminating negative cues, memorabilia and engage the five senses. Theming the experience, harmonising impressions with positive cues and eliminating negative cues can altogether be described as the creation of a consistent universe of experience – or as Pine and Gilmore state: A mnemonic place.
The element of memorabilia which is to provide a tangible artefact seems difficult to apply to architecture, but the latter principle - engagement of all five senses - continues the focus on memory: The degree of which an experience includes all senses determines how memorable the experience will be for the participant. Cues can strengthen an experience through a single sense, but also detract value from an experience if not matching the overall narrative. Pine and Gilmore stress that architectural and technical skills are needed to ad sensory phenomena to experience in the creation of *"experience with senses that make sense"*.
The parameters of the creation of experiences can therefore be said to consist of the creation of mnemonic places in the inclusion of the four realms of entertainment, educational, esthetic and escapist experience and the engagement of the five senses.
With these overall aims of the experience economy it however seems necessary to ask how these parameters can be approached - which elements in the creation of experience is contemporary industrial architecture to aim at to embrace the potentials of the experience economy?
To answer these questions and to transfer the principles of Pine and Gilmore to a spatial context focus is aimed at the Danish/Icelandic artist Olafur Eliasson who has conducted in-depth investigations of the relation between the utilisation of all senses and the creation of experiences in works of spatial character.

From observer to participant [7]
Olafur Eliasson has through his work addressed the aspect of multisensory awareness within the experience economy and in the 2004 interview book *At se sig selv sanse (To see yourself sense)* he states that the commercial part of the experience industry is one of the only places of contemporary society where the individual sensory perception is the centre of focus. In continuation of the focus on sensory perception Eliasson ascribes the understanding of subjectivity as one of the main areas of his work.
Eliasson states that he approaches the mechanisms of experience by trying to dematerialise and de-objectify the work of art; the focus is a transgression from the creation of "the right experience" for the spectator through the object to allowing the subject to become constituent for the work of art: The decisive element for Eliasson is the dissolution of the clear boundary of object and subject in a process where the spectator becomes participant.
Eliasson hereby suggests that experiences arise from the dissolution of the boundary between subject and object and the change of the role as mere observing subject to an engaged participant as a consequence of the dissolution. This transgression between body and setting lies in continuation of the consistent all-embracing universe of mnemonic place described by Pine and Gilmore. This approach of Eliasson thus emphasises the active participation over passive participation in the four realms of Pine and Gilmore – meaning that the educational and escapist realms are emphasised over the entertainment and esthetic realms in the creation of powerful experiences rooted in the dissolution of opposition of subject and object.
Eliasson has focussed on this relation between subject and object in numerous projects among this The Weather Project at Tate Modern in London where the spacious understanding of the large turbine hall of the former power plant was changed by placing a large, bright, artificial sun at one end and a large reflecting mirror on the ceiling. These interventions changed the space from a cool, cold and hard entry hall of dimensions of a cathedral to a place where people grouped themselves and lay down on the concrete as the sun and the mirror created a sense of intimacy and intermission – a place to linger.

Eliasson states that in the process of the dissolution of the border between subject and object the vision is only one sense among others to contribute to the creation of the experience: Perception is connected to all areas of the body and consciousness - and that the role of spectator is only connected to vision. He states that the approach of focusing on isolated vision therefore is stridently limiting in the creation of experiences.
The call of Pine and Gilmore for engagement of all senses is by Eliasson not only emphasised, but also further extended: Eliasson seeks to create what he describes as *inertia* and thereby enhance the intellectual potential of motoric skills. Eliasson states that a reduced ability to hear, touch, see, and smell; the absence of memory or anticipation; a reduced balance etc. is highly influent on an experience. Eliasson thereby suggests that the sensory apparatus is extended beyond the classical five senses of sight, hearing, taste, smell and touch – balance, distance, sense of time and dimensionality are equally important.
Eliasson stresses that this multisensory awareness is cornered in the western world where man is regarded as a rational being and as a consequence of this the consciousness of sentiments has been placed at the very end of the course of cognition: The sentiment of the situation is understood as something successive of the process of engaging in a situation and forming an opinion of the situation. In this line of thought a sentiment of the situation is reached afterwards. The goal of Eliasson is to turn this process upside down so the sentiment comes first and the rational conclusions follow thereafter. By doing this Eliasson strives to let sentiments constitute the surroundings instead of being products of them.
Eliasson states that by reversing the approach of the rational natural science where the senses are mere receptors for the environment it is thereby possible to see the senses as producers of the environment. He states that the senses constitute the environment and through this dialog with the environment they also constitute us – a sort of double dialogue thus exists. The senses are completely relative to the situation – a new position forms a new situation and a new perspective.
The perception of experiences is thus according to Eliasson founded in the dissolution of the opposition of subject and object where the change from spectator to participant is at the centre of focus. The realms of the educational and escapist experience are thereby emphasised. The importance connected by Pine and Gilmore to the five senses is extended and in continuation of this the emphasis on sentiments in the beginning of cognition is accentuated.
As the mnemonic place, four realms and the five senses are linked through experience it seems that the accentuations of Eliasson are related to an undefined element connected to the interaction of subject and object sensed by all senses as a sentiment.
Keeping the architectural capacities of the transformed industrial buildings such as Tate Modern in mind: What is this element that also seems to be intrinsic in industrial architecture according to conclusions of *The Experience City*? And how can it be further approached in an architectural discourse?
To transfer the conceptual consideration of the creation of experience by Pine and Gilmore and the spatial consideration of the creation of experience by Eliasson into an architectural context the philosophy of Gernot Böhme, professor of philosophy at the Technical University of Darmstadt, will be utilised.

Atmosphere as a space of bodily presence [8] [9] [10]
The relation between architecture and the interaction of subject and object has been the theme for investigation of Gernot Böhme: The vaguely defined element that Eliasson addresses in his work is by Böhme clearly defined as atmosphere: In the essay *Atmosphere as an aesthetic concept* Böhme bluntly states that atmosphere is something between the subject and object.
The notion of atmosphere is by Böhme problematized as it is of a colloquial character – it is highly ambiguous and is connected to vastly diverse thing. Böhme however stress that atmosphere always concerns a spatial sense of ambience, and he therefore describes atmosphere as a prototypical "between"-phenomenon: *"Atmospheres fill spaces; they emanate from things, constellations of things, and persons. The individual as recipient can happen upon them, be assailed by them; we experience them, in other words, as something quasi-objective, whose existence we can also communicate with others. Yet they cannot be defined independently from the persons emotionally affected by them; they are subjective facts*." Böhme continues by stressing that atmospheres are characteristic manifestations of the co-presence of subject and object.
Böhme emphasises that the character of atmospheres make them an aesthetic concept – where focus is changed from the prevalent aesthetic emphasis on what is perceived to how it is perceived; it is not about what something represents, but how it is present. This establishes a focus on sensory perception – as opposed to judgement - and Böhme thereby continues the emphasis on sentiments by Eliasson.
Böhme states that atmospheres address aesthetic as its original meaning - as the theory of

perception: *"In order to perceive something, that something must be there, it must be present; the subject, too, must be present, physically extant. From the perspective of the object, therefore, the atmosphere is the sphere of its perceptible presence. Only from the perspective of the subject is atmosphere perceived as the emotional response to the presence of something or someone. Aesthetics thus becomes the study of the relations between ambient qualities and states of mind, and its particular object consists in spaces and spatiality"*.
The concept of atmospheres thus changes aesthetics from something passively beheld into something that creates a spatial sense - objects are something that changes the room by their presence. Atmosphere is first and foremost something that recreates spatiality - it focuses on a physical presence and a sensory perception.
Böhme states that the goal of the aesthetic of atmospheres is that which lies between – the space! The role of the architect is according to Böhme to shape space from consideration to confinement and expanse, direction, lightness and heaviness. In connection to this three notions are especially important: Radiance, impressions and suggestions of motion.
In an interview with the Danish architectural journal *Arkitekten* (*The Architect)* Böhme describes the rehabilitation of the senses and a rediscovery of the human body as general tendency in contemporary society as a consequence of the experience economy - the popularity of physical therapies such as yoga and t'ai chi or more physical forms as cross fit and parkour are examples of the change of viewing the body as mere object to experiencing it from within.
This tendency within the experience economy is for Böhme an evident opportunity to aim focus at a greater sensibility to the atmospheric qualities of spaces: The emphasis on experiences calls for a focus on how the human is situated in spaces and an emphasis of senses over intellect.
Böhme describes atmosphere as the core concept in the way man perceives and finds him in a room – where atmosphere is grasped by a bodily presence. Böhme therefore sees atmosphere as an obvious concept in future focus in the experience economy with the prominent focus on the user experience quality. By going from a society based on production economy to a society based on experience economy – focus has shifted from basic needs to the desire of rediscovering body and learning how it works and reacts.

Böhme continues Eliasson's critique of western tradition of cognition and elaborates on the link between a multi-sensing participant and the emphasis on sentiments in the beginning of cognition in the creation of atmospheres by architectural means. The sense of space created by atmosphere is at the centre of attention and the bodily presence is according to Böhme decisive.
Böhme states that the description of a room on the basis of an atmosphere departs from a subject's subjective description: A subject that has been placed in the enclosure and perceived the tangible presence, proportions and given elements placements in the space. By describing space in such a manner the concept of space can be described as a space of bodily presence.
As an example of this Tate Modern's Turbine Hall cannot be described by mere dimensions or the relation to the human body – the same space can be experienced in very different way even though the dimensions of space and man do not change: Where the Turbine Hall was experienced as a space of intimacy during exhibition of the Weather Project by Eliasson, the same space of the Turbine Hall radiated a sense of distance during exhibition of Sunflower Seeds by Ai Weiwei in 2010, where millions of unique porcelain sunflower seeds covered the floor of the space.

The space of bodily presence is the space which is experienced due to the spatial presence and the space which therefore is sensed with our body – it therefore has an anisotropic character as it is centred around and defined by an absolute: Where the body is.
This suggests that the characterisation of a space is determined not only by where, but also by how the subject is present in space. This experience of how the subject is present is the decisive factor for the characterisation of the space – and Böhme stresses that this can be described as atmosphere.

Böhme states that as a consequence of this architecture is classified as an art of space – and not as a visual art as it is often described: The true means of creating experiences for architecture is to create bodily awareness of the situated space.
Böhme is thus eye to eye with Eliasson as he ascribes the senses of the body decisive importance: The spatiality of atmosphere is registered by all the senses of the body as a space of bodily presence – and atmosphere and multisensory awareness is thus closely related.
The change from spectator to participant via the dissolution of the opposition of subject and object can therefore be related to the creation of space as bodily presence – and the creation of experiences within architecture is therefore closely connected to the creation of atmospheres.
Even with the connection between experiences, participation, space as bodily presence established through the term of atmosphere - the term is still at an abstract level: How are architects to approach atmospheres and sensory perception in the creation of experiences within industrial architecture? To

approach an answer focus is aimed at a protagonist of sensory awareness within architectural theory.

Atmosphere and peripheral perception [11] [12]
The Finish architect and theoretician Juhanni Pallasmaa has during the past two decades been an proponent for a higher degree of multisensory awareness in architecture – and has in his latest phenomenological writings also addressed the theme of atmosphere: Pallasmaa describes the human capacity of grasping the essence of atmospheres as an instantaneous and all-encompassing capacity moving from the wholeness of complex and comprehensive images towards the single elements of the images.
In the 2010 essay *On Atmosphere – Peripheral Perception and Existential Experiences* Pallasmaa suggests a definition for what he denotes as experiential atmosphere: *"Atmosphere is the overarching perceptual, sensory and emotive impression of a setting or a social situation. It provides the unifying coherence and character for a room, space, place, and landscape, or human encounter. Atmosphere is "the common denominator", "the coloring", or "the feel" of the experiential situation. Atmosphere is a mental background, an experiential property or characteristic, that is suspended between the perceived object and the subject"*.
Pallasmaa states that man is cable of grasping the essence of a place before understanding it intellectually by identifying the details – and even though one is perhaps not able to speak of the characteristic of a situation a firm sense, emotive attitude and recall of the situation are still created. A greater importance is thereby attached to the immediate understanding than to the conscious analysis – and Pallasmaa is thereby in accordance with very similar consideration of sentiments by Eliasson and sensory perception by Böhme. To elaborate on how this immediate understanding is at work Pallasmaa aims focus at the multisensory awareness: Pallasmaa stress that the environmental characters are not of mere visual perceptual quality, but of multisensory qualities: An environment is grasped immediately as an overall atmosphere, feeling, mood or ambience rising from a complex fusion of countless factors. Pallasmaa emphasises in concordance with Eliasson that these factors are understood by use of more than the five Aristotelian senses as orientation, gravity, balance, stability, motion, duration, continuity, scale and illumination are involved in the immediate reading of environments. All of these elements are perceived in a peripheral manner and not as conscious observation. Pallasmaa emphasises that every significant experience of architecture is multisensory; he accentuates this by quoting Merleau-Ponty: *"My perception is [therefore] not a sum of visual, tactile, and audible givens: I perceive in a total way with my whole being: I grasp a unique structure of the thing, a unique way of being, which speaks to all my senses at once".* Pallasmaa remarks that this description is also a perfect characterisation of the atmospheric perception.

The terms of *atmospheric perception* or *peripheral perception* is according to Pallasmaa essential for the all-encompassing and instantaneous perception of atmospheres - *peripheral perception* is unconscious, unfocused and encloses and enfolds in an embrace of atmospheric space. Opposed to this perception is the focused, analytical vision connected to perspectival spaces which leave us passive and separated from the sensed: *"Focused vision makes us mere outside observers, whereas peripheral perception transforms retinal images into a spatial and bodily involvement and gives rise to the sense of an engaging atmosphere and personal participation. Peripheral perception is the perception mode through which we grasp atmospheres"* .
The term of *peripheral perception* adds a nuance to the preceding writings of Pallasmaa: In his extended essay *The Eyes of the Skin: Architecture and the Senses* from 1995 Pallasmaa advocates for an emphasis on multisensory aspects within architecture as he states that the bias towards vision has become increasingly concerning. Pallasmaa states that this ocular bias never has been as apparent as during the past decades – architecture has aimed at creating striking and memorable visual images and has therefore become image products far from existential depth and sincerity: *"Instead of experiencing our being in the world, we behold it from outside as spectators of images projected on the surface of the retina*". Pallasmaa continues: *"As buildings lose their plasticity, and their connection with the language and wisdom of the body, they become isolated in the cool and distant realm of vision. With the loss of tactility, measures and details crafted for the human body – and particularly for the hand – architectural structures become repulsively flat, sharp-edged, immaterial and unreal"*.
In his writings on atmosphere fifteen years after the publication of *The Eyes of the Skin* Pallasmaa elaborates on the consequences of the hegemony of the visual perception for architecture: *"Our culture of control and speed has favoured the architecture of the eye, with its instantaneous imagery and distanced impact, whereas a haptic and an atmospheric architecture promotes slowness and intimacy, appreciated and comprehended gradually as images of the body and the skin. The architecture of the eye detaches and controls, whereas haptic architecture engages and unites. Tactile sensibility replaces distancing visual imagery through enhanced materiality, nearness, and intimacy"*.
The importance of the multisensory is thus evident according to Pallasmaa - however latent in the

latter statement of Pallasmaa seems to be a contradiction as Pallasmaa connects the focused vision to “instantaneous imagery” but also connects the *peripheral perception* to the ability to grasp an atmosphere instantaneously. Two instantaneously understandings thus exist – and it is therefore important to stress the difference of the instant focused visual understanding of architecture and the instant unfocused bodily understanding of architecture: Architecture as picture and architecture as atmosphere – the first creating distance and the latter creating experiences within architecture.
In addition to this it seems that a paradox exists in the line of thought connected to atmosphere: Atmosphere is both related to an instantaneously understanding, but at the same connected to a gradually appreciation and comprehension of architecture resulting in slowness and intimacy. It therefore seems that intrinsic in the term of atmosphere and therefore also - according to Pallasmaa - in haptic and atmospheric architecture is two paces of perception: One that allows the human body to instantaneously and with all senses to grasp the identity of a space, place or situation as an atmosphere; and another of an inexhaustible character that cannot be grasped, but engages and unites.
Pallasmaa elaborates on this as he states that strong and overpowering atmospheres are of haptic nature – and almost have material presence as if they are embracing. In continuation of this line of thought a focus on atmosphere can be seen as the point of departure for a dismantlement of distance and segregation in contemporary industrial architecture and the creation of multi-sensory experiences within industrial architecture through atmospheres.

Conclusion

In order for industrial architecture again to contribute to urban development of cities in the experience economy the creation of experiences is a pivotal element and in this creation the terms of atmosphere and *peripheral perception* stand as the key notions for industrial architecture.
The emphasis of the sensory awareness is a consistent element by both Pine and Gilmore, Eliasson, Böhme and Pallasmaa in the creation of experiences: Pine and Gilmore advocate the inclusion of all five senses, Eliasson connects a multisensory beyond the five senses to sentiment; Böhme emphasises sensory perception in favour of judgement in the understanding of space as bodily presence; and Pallasmaa connects the extended sensory apparatus to *peripheral perception*.
The latter term stands as a designation of the way atmospheres are sensed: An inseparable relation exists between the *peripheral perception* and atmospheres which are closely linked to the dissolution of the opposition between subject and object in the creation of participation.
The creation of experiences can therefore be concluded to be closely linked to the creation of atmosphere within architecture – and the task of contemporary industrial architecture can therefore be defined as not only production and integration between city and industry - but also the creation of frames for atmosphere. These three parameters stand as the key aspects that contemporary industrial architecture need to embrace in order to again claim the domain as societal co-generator of the urban scene.
With the importance of participation introduced by Eliasson this means for industrial architecture that the realms of educational and escapist experiences come to play a key role: Where the transformation industrial buildings of the past embraces aspects of authenticity, identity and transparency the industrial architecture of contemporary society could facilitate experiences by introducing aspects of learning and recreation.
In the connection to the two participatory realms of experience the industrial architecture has the possibility to utilise the intrinsic capacities of an industrial production: The transparency of construction and process can be linked to the realm of learning in a manner where the public is not precluded from the industry, but integrated to a degree where both production and communication of production are possible in urban areas.
The inclusion of the public has in addition to the educational capacity also the possibility to create an escapist experience as the accessibility of the production can supplement the absorption of learning – to use the term of Pine and Gilmore: As the visitor moves around between the elements of production a level immersion can be created - and visitor can become participant.
These means towards the creation of experiences are bound together by the architectural means of atmosphere in the creation of a coherent contemporary industrial architecture emphasising production, transparency of production, integration with context, multisensory awareness and atmosphere in the creation of experiences within the cities.

Bibliographical References

[1] BRORMAN JENSEN, Boris. Industriarkitektur efter industrialismen. In BIRKET-SMITH, Thomas. *Industri* . 1st ed. Copenhagen: Fonden til udgivelse af arkitekturtidsskrift, 2010. p.114, 128

[2] Ibid. p. 114, 128

[3] SESTOFT, Jørgen. *Danmarks arkitektur – Arbejdets bygninger.* 1st ed. Copenhagen: Nordiske Forlag A/S, 1985. p.17, 74-75, 92-93, 127,160-162

[4] JØRGENSEN, Caspar. Fabrikken som arkitektur i Nordeuropa. In BIRKET-SMITH, Thomas. *Industri* . 2nd ed. Copenhagen: Fonden til udgivelse af arkitekturtidsskrift, 2010 p. 69-75, 86, 92, 96, 98

[5] MARLING, Gitte, KIIB, Hans. & JENSEN. Ole. B. *Experience City.dk*. 1st ed. Aalborg: Aalborg Universitets Forlag, 2009. p. 11-13, 15, 83, 89, 91

[6] PINE, Joseph and GILMORE, James. *The Experience Economy*. 1st ed. Boston: Harvard Business School Press. 1999. p. 6-12, 30-35, 38-39, 42-43, 46-61

[7] PEDERSEN, A. E. & MEYHOFF, K. W. *At se sig selv sanse: Samtaler med Olafur Eliasson*, 1sted. Copenhagen: Informations Forlag, 2004. p.47-49, 57-59, 61-62, 136

[8] BOHME, Gernot. *Atmosphere as an aesthetic concept*. In Daidalos nr. 68. Berlin: Daidalos ,1998. p. 112-115

[9] BISGAARD, Ulrik & FRIBERG, Carsten. *Atmosfære: Interview med Gernot Böhme.* In Arkitekten 2006, årg. 108, nr. 13. Copenhagen: Arkitektens Forlag, 2006. p.11-12

[10] BÖHME, Gernot. *Atmosfære: Den kropslige tilstedeværelses rum og rummet som fremstillingsmedium + Atmosfærer: Forbindelsen mellem musik og arkitektur hinsides fysikken*. 1st ed. Copenhagen: Kunstakademiets Arkitektskole Institut 1, 2007. p. 30-34

[11] PALLASMAA, Juhani. *Encounters 2 – architectural essays*, 1sted. Finland: Rakannustieto Publishing, 2012. p. 18, 238-240, 248-250

[12] PALLASMAA, Juhani. *The eyes of the skin*, 1sted. England: John Wiley & Sons Ltd, 2005. p. 9-10, 30-31

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Conservation of cultural heritage
Risk analysis for protection and management

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Abstract
The cultural heritage, in line with directives of sustainability's European principles, should be protected to preserve memory and cultures; in this way others people could enjoy it, for a long time.
To explain exactly cultural heritage, we refer to the definition introduced with L. n.310/1964 by *Franceschini* commission: "Everything that is testimony, having value of civilization"; so a definition that extends conservation concept from punctual heritage to diffused one.
However, even today, when we think about conservation of cultural heritage, we refer erroneously only to heritage that we could found in archaeological sites, historic cities or museums; while conservation of cultural heritage should be extended to whole cities or landscapes.
Within this general framework, it's clear that conservation of cultural heritage, local and diffused, can't exist without the knowledge of sites that must be protected. For this reason, we propose to make an operative instrument for knowledge, protection, conservation and prevention.
This instrument is the *Risk Map*, it will be an informative system of cultural heritage, just like a particular type of data base, that will support scientific and administrative decisions of government, local authorities or research areas, responsible for conservation.
In this way, the Risk Map, just as an urban planning, could help to make a documentation of cultural heritage and a conservation planning.

Keywords: Risk, planning conservation, cultural heritage

1. Introduction to the method

To preserve architectural, historic and cultural heritage of a small city or a whole country, to plan and organize a series of action to safeguard and hand down it, and to make sure that future populations could enjoy it in many ways, is not only a duty, but a sign of regard, just like a caress to beauty.
The Risk Map of cultural heritage is a project of the ISCR (Superior Institute for Conservation and Repair).
The basic idea is a logical consequence of a theoretical - practical research that starts from Cesare Brandi's preventive repair concept, and go on through Giovanni Urbani's elaborations on planning conservation.
The force that is the base of the Risk Map is to protect architectural heritage and, therefore, to perform an action of cataloging.
Assuming that you can't protect what you do not know, the Risk Map focuses on a coherent set of operations such registering, inventorying , surveying and creating a database, followed by an historical and aesthetic analysis. A program of indexing and cataloging, therefore, is closely connected to principles of architectural and cultural heritage's protection.
Also, the Risk Map identifies systems and methods that allow us to program the maintenance and restoration of cultural, architectural, archaeological and historical - artistic heritage, according to their state of preservation and the aggressiveness of their environment, and why not, using a new valuation's element: a *value judgment* with specific and concrete criteria.

In this case, saying to program it's just like saying obtaining useful information to predict, and so to decide in time, which interventions we should begin urgently, in terms of response time and realization costs too; always trying to avoid losses and damages.
This behavior arises as requirement, but it becomes a necessity if we think of importance of some Italian historical cities, or if we consider the great consistency of Italian cultural heritage, the paucity of financial investments to its conservation and our duty to take advantage of all resources, in the best way, going over all kind of emergencies.
At the end of this project will be available to Ministry and Superintendents, new tools of knowledge and new analysis procedures to facilitate the supervision and monitoring of conservation's state of cultural heritage, in this way will be simple directing and optimizing conservation interventions.
The Risk Map adopts a simple schematic division of heritage in different categories (for example, palaces and villas, towers and steeples, churches etc.), to which corresponds a color belonging to a specific gradation, according to the its risk class, that is also classified in range: high, good, medium, low, very low.
The construction of the Map, and its way of representing territory's point of importance, will be further explained below.

1.2 Analysis and application of the method

The project was born, as already said, from a Giovanni Urbani's idea, based on contents methodology developed for the first time in his "The Pilot Plan for the planning Conservation of Umbria's cultural heritage" (1975). It was the first experiment of global rating, in which he extended the degradation factors's analysis to whole territory.
The importance of this type of study was dramatically confirmed by devastating earthquakes that happened in Friuli (1976) and Irpinia (1980).
That Pilot Plan was based on the registration, the georeferencing and the compilation of a technical file on the seismic vulnerability of architectural heritage at risk, in the area.



Fig. 1: Two photos that show earthquakes's effects: Aquila 2009 and Haiti 2010.

During the night of 5 to 6 April 2009 on Aquila, an unexpected earthquake destroyed almost all of the historical city, in just six seconds.
The 13th of January 2010 on Haiti, thousands of people died under rubble, because of earthquake of magnitude seven, that destroyed Haiti. Among the buildings collapsed there were the presidential palace, some hospitals and public offices. Death were estimated around five hundred thousand.
After Italian disaster, mass media echo was huge, but up still now, don't exist a real project of protection, still there are questions about combination of seismic risk and cultural heritage, although Superior Institute for Conservation and Repair have indicated the Risk Map as the best prevention instrument.
After tragedies like these, we remain with the memory of the splendor of a city, together with rubble and some pictures that we will not forget easily. We remain with a feeling of inadequacy and helplessness, with anger for senseless tragedies, that perhaps we could avoid in time, using rules and common sense.
In Italy, the earthquake on Abruzzo showed the precarious state of hausing, in general, and of historical – artistic one in particular, of the whole national heritage.

Technicians of Ministry of Heritage and Cultural Activities, intersecting area seismicity's values with cultural density of a place, estimated that about two hundred fifty thousand buildings, on a total of half a million, are located in a seismic area, and only a little part of them can show off a risk assessment.
The need to draw up a risk map for architectural heritage of the most important historical cities of our country is stronger if we think that Italy is a country with a high seismic risk, which is one of the most delicate and important sectors of Civil Protection assistance.

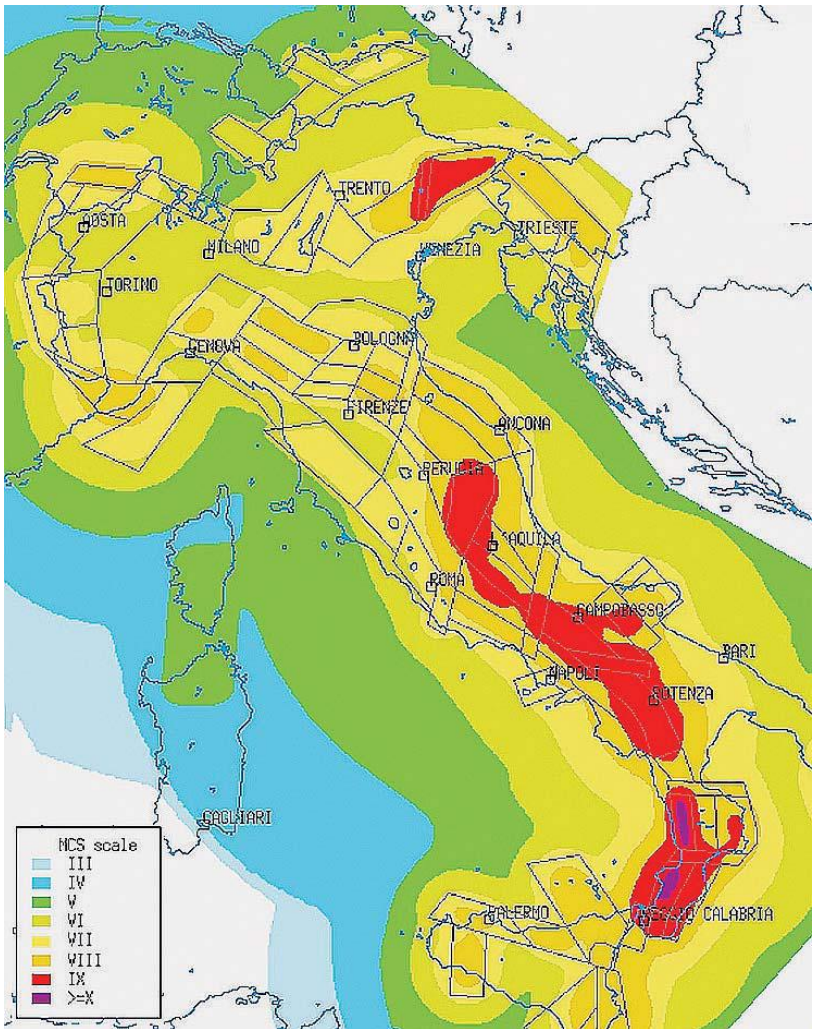

Fig. 2: Italian seismic hazard map.

The Risk Map project is very ambitious, in fact, it wants to create an information network, such as completion of work done by Superior Institute for Conservation and Repair; in this way all institutions, state and local governments responsible for heritage preservation, will have a support instrument for their scientific and administrative activities.
The concreteness of the project is the realization of a risk model, for which construction was adopted a statistical approach: the individual assets are valued as "unit" of a "statistical population" of which we want to assess the overall risk.
To build the risk model, we have identified two investigation areas, that through vector layers's overlap allow us to build two separate matrices:
- Value matrix
- Danger matrix.

Overlaying two matrices, we get the Risk Map, that will contain information about vulnerability, hazard and the proper value of each emergency diffused on territory.
The software that allowed us to operate in this way is GIS; the acronym means Geographic Information System. Thanks to this tool, we can collect, file, recover and transform spatial and no spatial data.

Essentially, GIS is a decision support system, which allows us to increase our basic knowledge of a given territory.
To make clear the operative process, we summarize the process in simple executive phases of realization; we consider three main phases:
PHASE 1: Value matrix
At this step, we collect and analyze all information about importance and value of each property. This matrix will consist of the following thematic maps:
- summary dating
- architectural quality buildings
- cultural value
- finishes building
- location of buildings and relationship with urban context.

PHASE 2: Danger matrix
At this step, we collect and analyze all information about aggressiveness and vulnerability of the environment against heritage. This matrix will consist of the following thematic maps:
- risk landslides
- risk hydraulic
- grade of crowding
- condition of efficiency and health
- static condition of buildings
- maintenance status
- deterioration status.

PHASE 3: Risk Map
At the last stage, we summarize, on a single file, all the information collected thanks to the implementation of previous matrices.
In order to make clear the process explained before, we show results obtained working on realization of Rossano's Risk Map (Calabria, Italy). We have developed the project on the basis of the three phases previously explained, considering only the historical part of the city.
First, we constructed Value matrix:

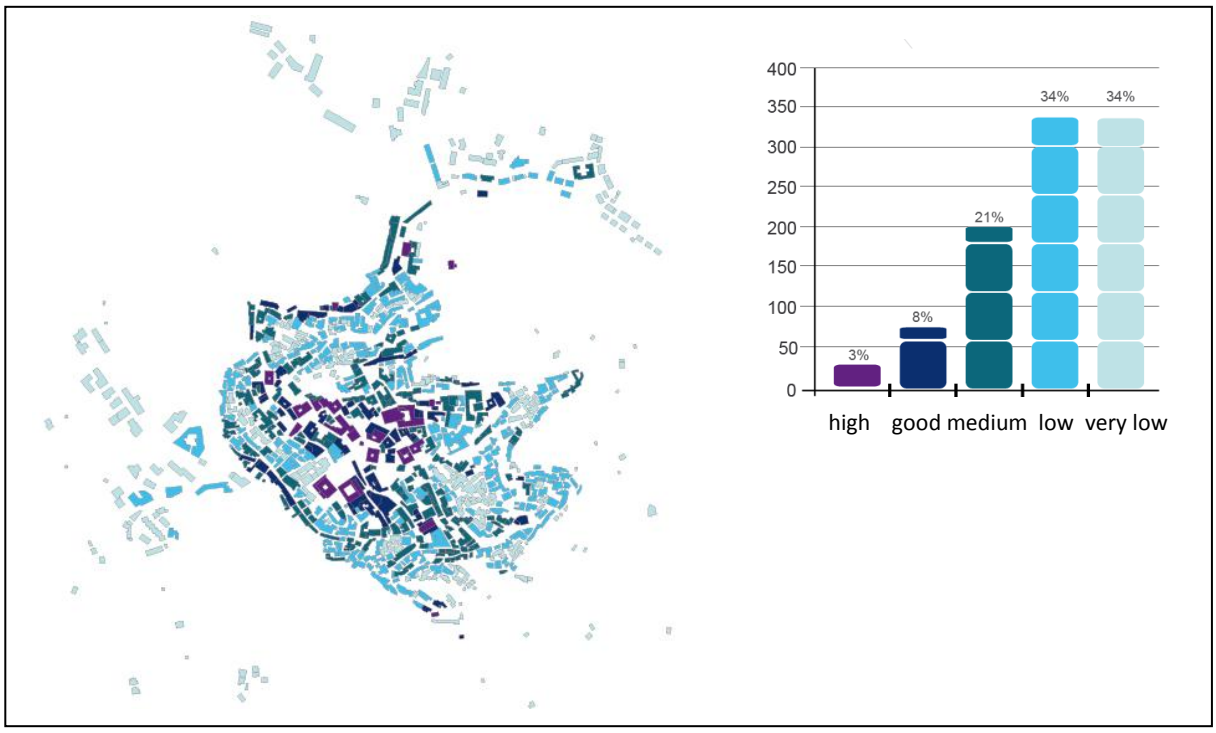

Fig. 3: Rossano (old city) Value matrix.

The matrix clearly shows that the center has a worthy state of value (cultural, architectural, etc...). Out of a total of about a thousand buildings located and analyzed, a large part of heritage, of residential category, belongs to low and very low ranges, covering approximately 32% (based on total).
In the next step, we constructed Danger matrix:

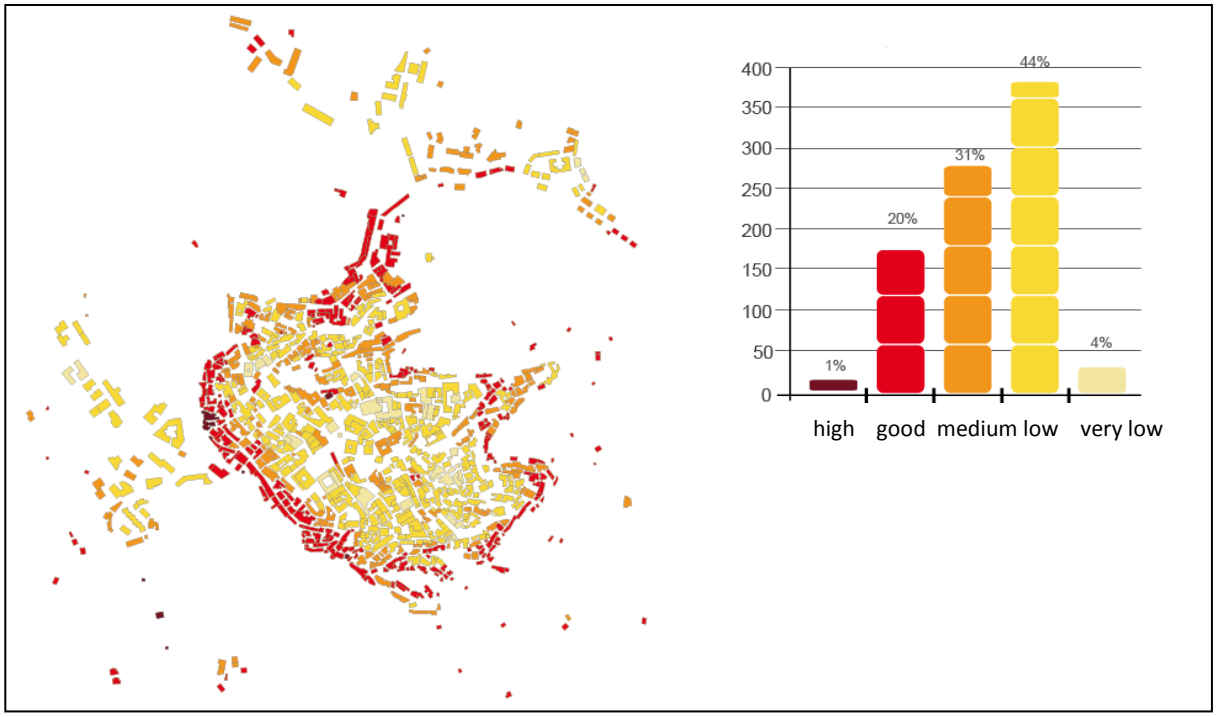

Fig. 4: Rossano (old city) Danger matrix.

The matrix clearly shows that the old city has a grade of danger (risk landslides, hydraulic etc...) mostly medium, or not very worrying. Out of a total of about a thousand buildings located and analyzed, a large part of the assets is in the low range, while the actual danger found covers approximately 21% (based on total); this percentage is still to be kept under control because it refers to many historical buildings.
At the end, we got Rossano's Risk Map:

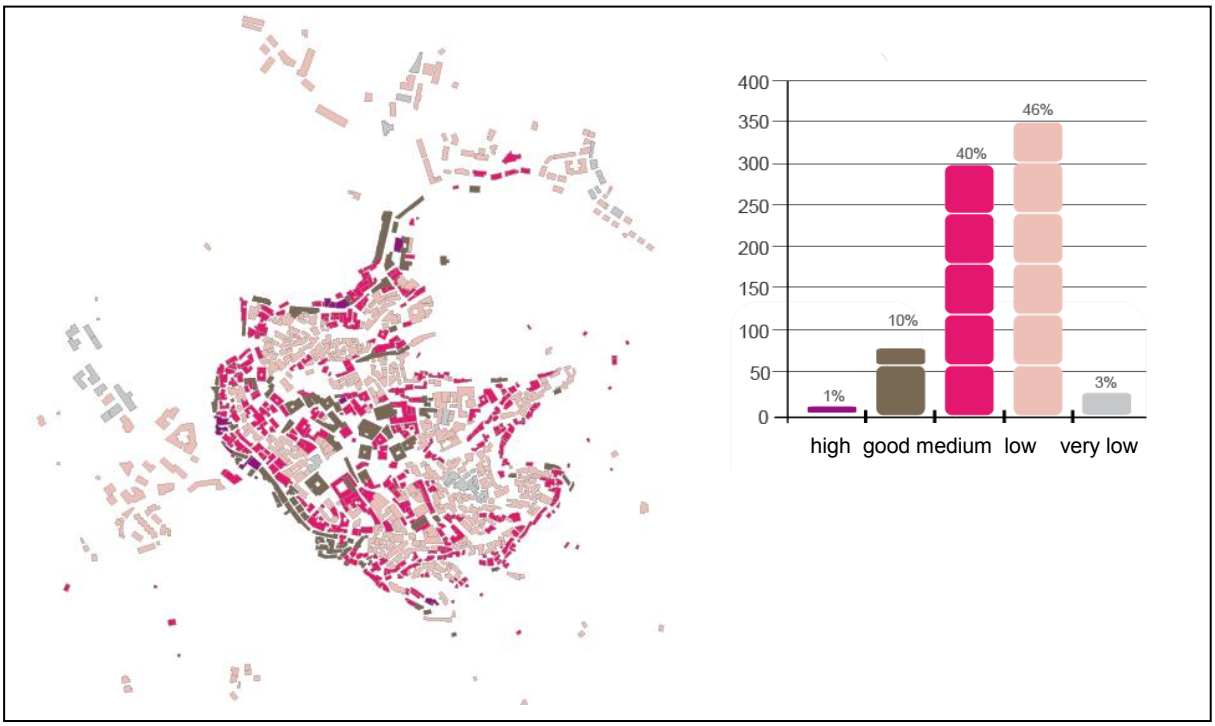

Fig. 5: Rossano (old city) Risk Map.

The Risk Map, as already said, comes out overlapping two previous matrices.
The Risk Map, through the use of different colors, clearly shows that the old city has a medium level of risk, approximately 46%.
However, the Map doesn't exclude the need to focus attention on potential risk issues that could occur.
In fact, out of a total of about thousand buildings located and analyzed, the high risk covers approximately 12%, which added to medium range is more than half of housing and heritage, and so it's a result that we could not underestimate.
At the end of presentation, it's clear that the Risk Map is an operative instrument, logical consequence of a progressive rationalization of many factors, thoroughly investigated.
Certainly It is a kind of support for all possible actions aimed to protect cultural heritage.

Bibliographical References

[1] LOMBARDIA, Regione. *Polo regionale della carta del rischio del patrimonio culturale: dalla catalogazione alla conservazione programmata.* 1ª ed. Roma: Istituto Centrale per il Restauro Editore, 2000.

[2] DE CARLO, Giancarlo. *Urbino, la storia di una città e il piano della sua evoluzione urbanistica.* 1ª ed. Padova: Marsilio Editori, 1966.

[3] BIGNAMI, Daniele F. *Protezione civile e riduzione del rischio disastri.* 1ª ed. Milano: Maggioli Editore, 2010.

[4] CELANI, Gabrio. *Da Assisi a Melzo passando per Urbino e Bologna.* 1ª ed. Padova: Monteleone Editore, 2004.

[5] ZEVI, Luca. *Il manuale del Restauro Architettonico.* 2ª ed. Roma: Mancosu Editore, 2002.

[6] ANDALORO, Maria. *La teoria del restauro nel Novecento da Riegl a Brandi.* 1ª ed. Firenze: Nardini Editore, 2008.

[7] DI STEFANO, Roberto. *Il recupero dei valori. Centri storici e monumenti. Limiti della conservazione e del restauro.* 1ª ed. Napoli: Edizioni Scientifiche Italiane, 1975.

[8] BRANDI, Cesare. *Teoria del restauro.* 1ª ed. Roma: Storia e letteratura Editore, 1963.

[9] CORBOZ, Andrè. *Ordine sparso. Saggi sull'arte, il metodo, la città, il territorio.* 1ª ed. Milano: Franco Angeli Editore, 1998.

[10] ROMANO, Marco. *Costruire le città.* 1ª ed. Milano: Skira Editore, 2004.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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TYPOLOGICAL ASPECTS OF CASERIO, A TRADITIONAL BASQUE RURAL BUILDING

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Abstract
The folk architecture is undoubtedly one of the essences of Basque cultural identity. It is a simple architecture, holder of architectural, ethnographic and historical, unique values; perfectly integrated with the landscape and the climate and made of simple elements and natural materials [1]. This immense heritage unifies physically and culturally the various areas of the Basque Country. The identity role of architecture is shown by the Basques' perception of the traditional house, not only as a place to live and work, but also as "perpetual being", that allows Basque man himself to perceive the historical continuity of his family, tracing the origin of house builder's last name, the founder of the lineage. Indeed houses were usually called after their builder.
The most typical expression of the above architecture is the Caserìo, the characteristic farmhouse, made of simple structures surrounded by large tracts of land intended for cultivation, grazing and collection of firewood. Utility, functionalism, rationality and simplicity prevail in these sturdy, large buildings.
Caserìos have been key elements in the construction of Basque rural landscape, and they are now an integral part of it. This is due to the usage of local/natural materials and the colonization of only the strictly necessary territory. The original type has been built during more than 500 years with only few variations, and the abundance of specimens still lived-in and well conserved, make the caserìo a true archetype of rural architecture.
The aim of this paper is to highlight, through a careful typological analysis of a ten of caserìos, the invariant features - landscape, technological and functional – of this building type. It is believed that this work can be useful for a proper preservation of this archetype of Basque traditional architecture.

Keywords: building technologies, typology, Basque architecture

1. Historical notes
The Caserìo is the most typical expression of the Basque Country's folk architecture, in particular in the Vizkaya district a vast heritage of caserìos is nowadays preserved. It is a simple building that represents one of the essences of Basque cultural identity, holding architectural, ethnographic and historical values. His perfect integration with the landscape joined with his own name and specific function, make the caserìo a "perpetual being" that allows Basque men to trace house origin [2]. All caserìos in fact, have an own name coming from topographic, vegetal and geological references about the site where the house was built, well known to the authorities and neighbours and unchanging over time.
The modern caserìo, as known today, appeared in the Basque Country at the end of XV century, as an evolution of the previous medieval huts, accordingly to the new social and economical conditions.

The demographic growth, that required the conquest of new spaces, and the suppression of the usual seasonal transhumance, that forced in creating big areas for animals housing within farms, can be considered as some of the most important factors that led to the caserìo birth [3].
It's possible to find out three major historical steps in the caserìo typological evolution: an early Gothic-Renaissance period, from the last decade of the XV century until the middle of the XVI century; a peak Baroque period, from the second half of the XVII century to the last years of the XVIII century, and a final phase, with decline symptoms, matching with the XIX-century neoclassicism [4].
The XVI was undoubtedly the most brilliant step in the caserìos life, full of experimentation and variety of shapes and materials. The Gothic-Renaissance caserìos were very sober, without almost any furniture, and with a few rooms for family use, in a context where concepts like shame, intimacy and comfort had very little importance for lower classes. Less than a quarter of the inner surface had a residential function as the major part was reserved to stables, warehouses and agricultural machinery (such as presses). The caserìo was above all a work-tool.
Between the XVII and XVIII centuries, caserìos began to be built with timbering technique: a good facade design and the careful selection of materials was a symbol of owners social prestige. Baroque caserìos were built with a modern approach, functions were well-defined and interior spaces were large and rationally distributed. Furthermore, during this period, because of a pressing demand for homes, many existing caserìos were cut into two or more shelters to be inhabited by several families of tenants.
Caserìos built during the last neoclassical period had small dimensions and humble appearance, often simple huts precariously turned into homes. In addition to these new edifications, in the XIX century the renovation of the existing caserìos started. Therefore lot of them were abandoned as well, especially the most recent ones that did not offer the minimum conditions of life and production, but that had been occupied by farmers for lack of better options [5, 6]. The Caserìo architecture is a simple architecture that beautifully converses with the landscape and the climate and it is made of simple elements and natural materials. It has inspired, to the beginnings of the Twentieth Century, a new architecture Basque, that, with modern forms and different uses, develops a new local language that uses the many potentialities of the local materials and emphasizes the architecture of this typical European frontline region [7, 8, 9, 10, 11].
Currently tens of caserìos are restored every year, even thanks to public funds, but there is still no clear understanding about the true architectural values to be preserved, or about methods needed to comprehend them.

2. Typological aspects

From the typological point of view, it is possible to define some main characteristics recurring in almost all the specimens, regardless the geographic position and the historical age, that give the possibility to outline a very archetype of the rural Basque architecture. These features can be summarized as follows:

1. It's shaped in a rectangular, compact and independent block. It is a large house, without courts, patios or other outbuildings. A single unit but with specialized sections: stable, granary, mill, barn, cellar, workshop, hayloft, etc..
2. The eastward orientation of the main facade determines the position of the patio that, used for outdoor works, needed the best exposure to capture the maximum of solar light, especially in the early morning.
3. The inner disposition of rooms is unambiguously defined by the ezkaratza a large, central room that establishes the position of the others without any hallway.
4. There are no floors below the ground level, so no caserìos has cellar.
5. Walls, generally plastered, are stone made, assembled with coarse mortar. Corners and window frames are sometimes reinforced by freestone while timbering are made up with a massive use of wood from nearby forests.
6. The framework was traditionally made up of short and relatively small vertical timbers, which were placed in such way as to form rectangular panels, with no crosspieces or diagonal struts.
7. Roof is preferably low sloped (24 ° - 28 °), resting on strong beams and with unfixed tiles.
8. The main door is often located on the bottom of an atrium. Sometimes there are external stairs and / or wooden balconies at the first floor.
9. The complex relationships between neighboring caserìos don't require physical proximity, clearly rejecting any possibility of sharing a partition wall or of waiving sunshine benefits. For this, houses never form squares, streets or urban groups: they are usually organized in "open swarms", formed by from seven to twenty units, designing the typical Basque country landscape [6].

Hereinafter it are examined three typical kind of caserios.

2.1 Caserìos Oar Erdikoa, Oar Ganekoa and Oar Azpikoa in Garay (Vizkaya)

This group of tree houses, built more than 200 years ago, is located in the most depressed part of Garay. All the three buildings keep their original name, respectively Oar Erdikoa, Oar Ganekoa and Oar Azpikoa
The first one, Oar Erdikoa (fig. 1) recently renovated, holds a "neovernacular" style and it is currently inhabited.



Fig. 1: Caserìos Oar Erdikoa, Oar Ganekoa and Oar Azpikoa

The second building (fig. 2) looks well-conserved and the presence of some tools in the porch rather than the inner wallpaper, made possible to state that it has been abandoned from no more than 50 years.

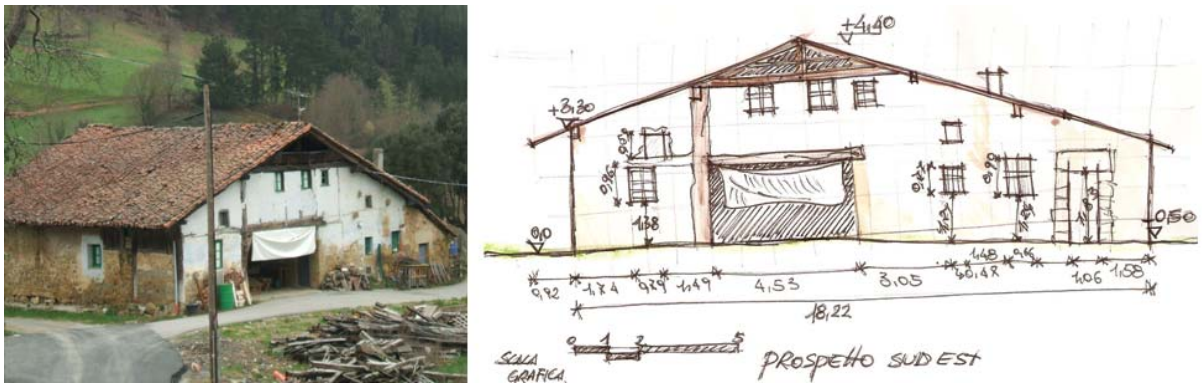

Fig. 2: Side view and front dimensioned sketch – caserìo Oar Ganekoa

It's also clear that it has been undergone renovation works, like the painting and replacement of some fixtures. Furthermore a room has been added on the right side, determining the main façade asymmetry, even if the previous symmetry is very remarkable from the cracks in the plaster and wood beams peeking out. Except for the entrance, the whole building was closed, so it's only possible to make assumptions about this addition, evidently dictated by the need of additional space for storage of equipment and food or housing for workers.

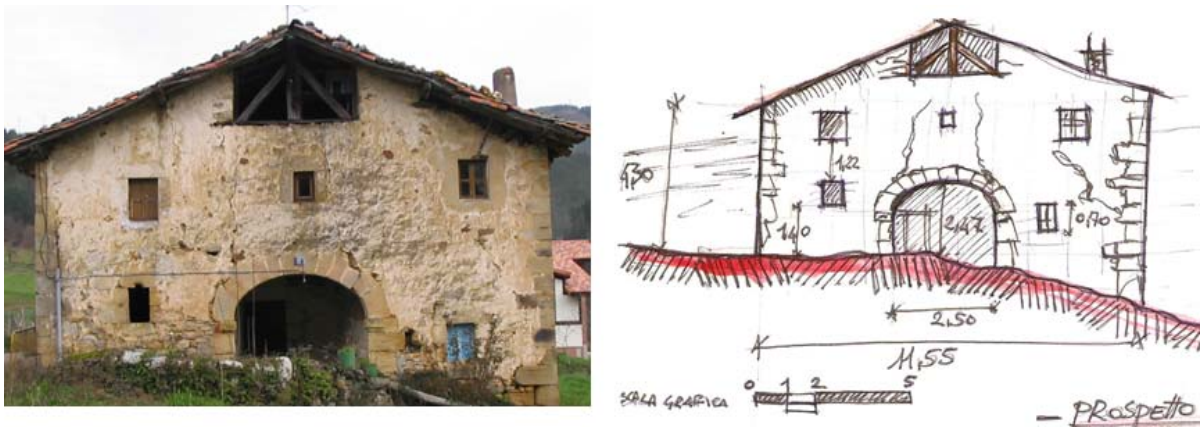

Fig. 3: Front view and dimensioned sketch – caserìo Oar Azpikoa

The last specimen of the trio (fig. 3), perhaps the most interesting, has been abandoned in not-so-very recent times, so it has not undergone any change over time, neither external nor internal. The back side (fig. 4) has two large overlapped openings: the ground floor one was for animals entrance while the first floor one for supplies storage. The choice of a masonry segmental arch (fig. 4) was perhaps dictated by economic reasons. This technique in fact is the less demanding and expensive one, even if its flattened shape and the irregularity of ashlars create a significant pushing force, that affects negatively the mechanical strength.
Regarding this, the arch has some evident longitudinal lesions that, starting from frames, spread to the rest of the structure. These lesions can be also reported to the physico-chemical deterioration of the mortar joints or to eventual dissymmetrical overload.
The plan of this caserìo (fig. 5) is almost square and subdivided in four parts. A large portico entrance allows access to the home itself but also to two other independent rooms.



Fig 4: Side view, internal vertical connection and arched entrance – Oar Azpikoa

For the ground floor a direct metric survey has been carried out while for the first one, because of the precarious condition of the floor, the limited accessibility and the very poor visibility, only an indirect survey has been possible. Space on the first floor is reasonably supposed to be reserved to the sleeping area, the conservation of supplies and storage of hay and grain.

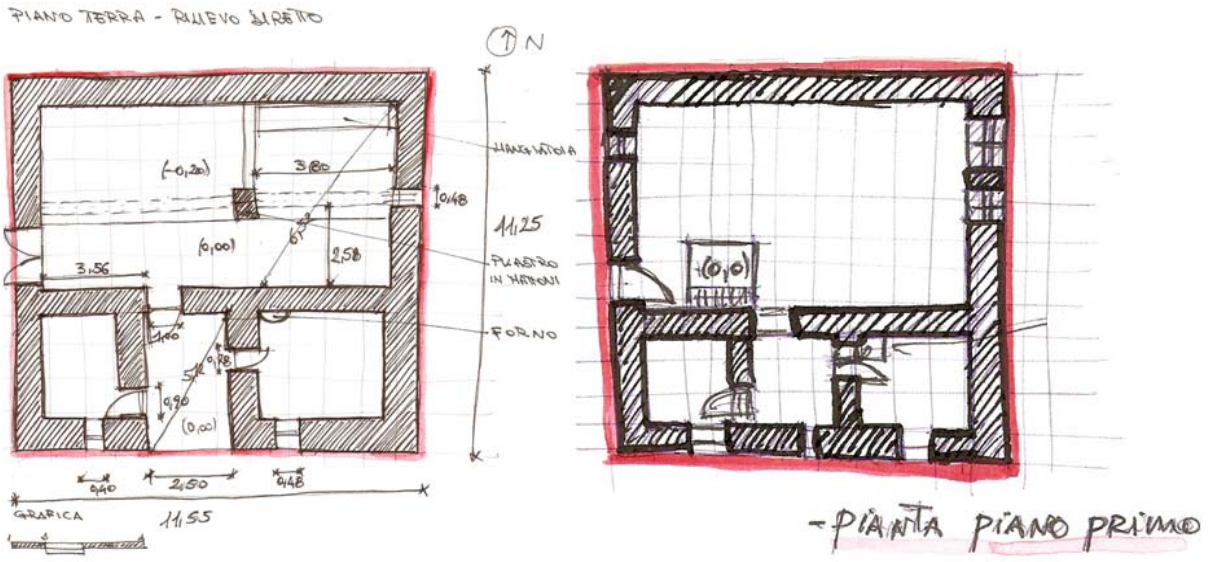

Fig 5: Metric plan of ground floor and first floor – caserìo Oar Azpikoa

2.2 Caserìos Ugarka and Zulaibar Beasko in Zeanuri (Vizcaya)

Last living fossil among the oldest specimens of regional architecture is the Caserìo Ugarka (fig. 6), which maintains its oak wood structure and, miraculously, even the original interior layout, but some masonry reinforcement have been set up where necessary.
The kitchen, like all caserìos belonging to the Gothic-Renaissance style, has a fireplace in the center of the room and vertical closures made by bulkheads. The caserìo, located on a slope, has two inde-

pendent openings, one each level, ensuring a clear and hygienic separation between people and animals.
Not far from Caserìo Ugarka, in the *Zulaibar Beasko barrio*, there are two very well-conserved caserìos, rotated relative to one another by 90°. This rotation, jointly with the difference in the materials used, let suppose they have not been built in the same time.



Fig. 6: Front and side view – caserìo Ugarka



Fig. 7: Front and side view – Zulaibar Beasko Barrio, caserìo 1

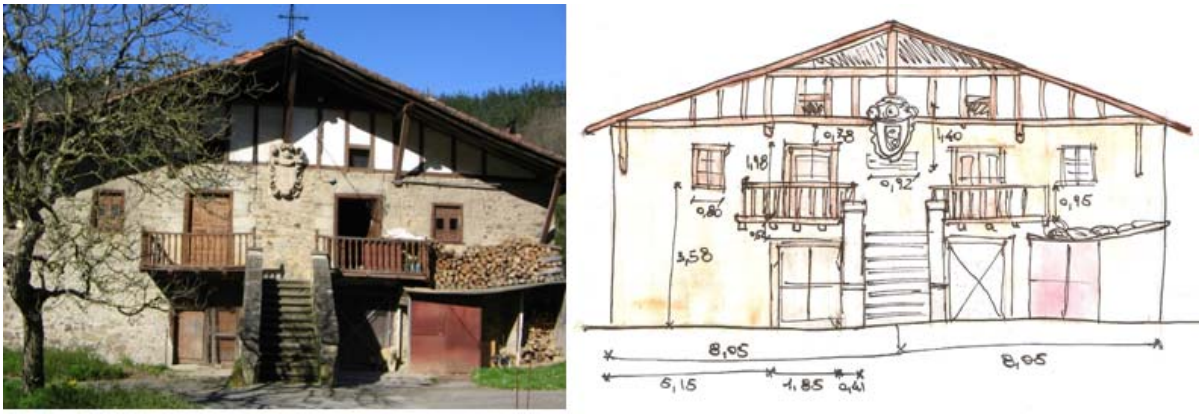

Fig. 8: Front view and dimensioned sketch – Zulaibar Beasko Barrio, caserìo 2

The arched entrance of the first caserìo (fig. 7) is common to other specimens that date back to the late XVIII century, although in this case the arch is only a disengagement and not a porch.
The second caserìo (fig. 8) is divided into two nearly symmetrical homes, probably as result of a later split into two parts of the original single unit. The reason of this partition may be sought in the pressing demand for land and homes by settlers, occurred in the XVIII century.

Another hypothesis is that the building has been originally designed to house two families: in this case it would be a rare example of duplex caserìo.

2.3 Caserìo Etxebarri in the Goitiz Auzoa Barrio, Mundaka (Vizcaya)

This caserìo (fig. 9), of more than 300 years, has apparently not undergone significant renovations over time. Also in this specimen the two levels have two separate entrances to ensure the distinction, absent until the Baroque period, between spaces for humans and those reserved to animals.

The porch-room, like in the Oar Azpikoa caserìo, allows to enter three independents rooms with different functions, probably stable, barn and kitchen (fig. 10).



Fig. 9: Front view and dimensioned sketch – caserìo Etxebarri



Fig. 10: Caserìo Etxebarri – porch

Bibliographical References:

[1] MOLLO, L.; TAGLIAVENTI, G.; MATURO, N. – L'invenzione dell'architettura regionale: l'avventura dei paesi baschi da cambo a fuenterrabia, in *Intervenire sul patrimonio edilizio: cultura e tecnica* Celid, Torino, 2006

[2] BAESCHLIN, A. – *La arquitectura del caserìo vasco*, Villar, Bilbao,1980.

[3] DE YRIZAR, J. – *Las casas vascas*, Villar, Bilbao, 1965.

[4] SANTANA, A. ; LARRAÑAGA, J.A. ; LOINAZ, J.L. ; ZULUETA, A. – *Euskal Herriko baserriaren arkitektura: Baserriak*, Eusko Jaurlaritza. Vitoria-Gasteiz. 2001.

[5] LÓPEZ, C.F. – *La arquitectura popular Española*, Vol. 1/2, Aguilar, Madrid, 1973.

[6] DUVERT, M. (Lauburu Association) – *Etxea ou la maison basque*, Lauburu, Saint-Jean-de-Luz, 1980.

[7] GODBARGE H., *Arts basques anciens et modernes. Origines, evolution*, Chabas, Hossegor 1931.

[8] CULOT M., *Le Pays Basque. Architecture des années 20 et 30*, Institut Français d'Architecture-Norma, Paris 1993.

[9] VIGATO J. C., *L'Architecture Regionaliste. France 1890-1950*, Institut Français d'Architecture-Norma, Paris 1994.

[10] MESURETTE G., *Architecture de la Còte Basque*, Mardaga Editeur, Liege, 1994.

[11] TAGLIAVENTI G. MOLLO L, *Architecture in the age of globalization*, ALinea, Firenze, 2003.

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POMPEI: from Town to *City*

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In 1997 an UNESCO delegation, consisting of two hundred experts from fourty five countries around the world, stated that the archaeological site of Pompei is a world heritage site. Additional guarantee for any international financing, aimed at recovering both the rich existing that the submerged archaeological heritage, to bring to light (one third) through new excavations. Pompei is a town in the center of world attention because of the presence, in its territory, of rich and complex cultural-historical heritage represented by archeological site and of the Sanctuary dedicated to the Virgin of the Rosary. So in 2002 the Municipal Government represented by the Extraordinary Commission, (experience conducted personally as a Higher-level Prefectural Executive of the Municipality of Pompei nominated by the Prefect of Naples by decree of 21/09/2001 Sector n.13903/Gab.VI) has focused on technical and administrative issues related to socio-cultural aspects that characterize the Institution, to gain a correct and consonant aegis requiring the recognition of the title of "City" for Pompei. Therefore, through a study developed from historical, social and cultural point of view aiming to highlight the possession of the requirements established by the law for the acquisition of the aforementioned title, Pompeii get the title of "City" with DPR 01/09/2004.

Keywords: City, Municipality, heritage

1. Development of cultural heritage of religious interest

The Constitution of the Italian Republic in recognition of the value of religious culture, with Art. 9: "The Republic promotes the development of culture and all the historical and artistic heritage of the nation." In addition, the agreement for the revision of the Concordat between the Republic and the Holy See, in Article 9, paragraph 2, reads: "The Italian Republic recognizes the value of religious culture and that takes into account the principles of Catholicism are part of the heritage of the Italian people". So it is with the state to enshrine these fundamental tools, the Constitution and the Concordat, the relevance to the national community of the historical and artistic heritage of ecclesiastical nature, section breaks in a more general importance is attached to the cultural heritage, seen as an essential element for national identity.


Fig. 1: Areas of worship: Pompei


Fig. 2: Areas of worship: Roma

The patrimony of the Church not only have a font size to the museum, the key issue is that of their religious and worship; in the ecclesiastical cultural heritage coexist multiple dimensions and multiple elements of characterization, artistic appearance, the pier religious and spiritual significance for the local community identity that makes them the object of worship.
Therefore, the enhancement of cultural and ecclesiastical Ie policy for places of worship take on all aspects of the original than is the case for cultural heritage in general and Ie areas with a strong tourist attraction. The heritage represented by cultural heritage of ecclesiastical nature entails a great responsibility not only for the Italian parishes but also for the state and for the common people.
The ecclesiastical cultural heritage existing in our country do not end in the great cathedrals, in large convents or abbeys in history, but also in that immense heritage in a capillary spread inside of the whole national territory, in the North as in the South, in large urban areas and small towns, in the areas of hills and mountains, as in the large and small islands.
The Bishops Conference has in recent years given rise to regional councils, with expert groups suggest that the Ecclesiastical Authority measures and initiatives for the conservation and enhancement of cultural heritage, religious. At the national level, the Italian Bishops Conference has established its consultation, which, among other things, the task of creating Ie rules for the management and protection of cultural church; In addition to the Holy See, has developed a number of significant initiatives for the promotion of cultural heritage worldwide, constituting the Pontifical Commission for the Conservation of historic and artistic heritage and setting up a course for the training of experts at the Gregorian University.
Finally it should be noted that the bulk of the contributions that the State pays for the restoration work, and aimed at ecclesiastical heritage, although the amount of financial resources available in this field has gone dangerously thinning, after years of linear cuts that have indiscriminate characterized the public spending during these years. At this point, we must make a general remark.
Today we are faced with a new concept that differentiates the protection, conservation as true, by the measurement, reading them as complementary aspects. We can not disregard the enhancement of any, specific cultural property; because it is a historical, a clear expression of cultural identity and territorial cohesion, which is essential for the education and training of every future generation. Therefore, the protection, the conservation of cultural property, ecclesiastical or otherwise, can not be limited in the protection of the good as such, in its defense against the ravages of time or the pressures of the environment, preservation of cultural heritage leads to its enhancement and returning to the theme of the conference, highlighting a well of a religious nature means use it in liturgical practice, make it an object of worship.
Finally, a particular relevance in the issue of promotion of cultural heritage of religious interest, it should be to take on the issue of restoration and reuse of assets no longer in use or abandoned. You can not drop to the degradation of the desecrated churches, abbeys no longer monks, convents of friars free now, these are also important cultural signs of art, testimony, history and spirituality, it is not possible to neglect further. It is estimated at 100,000 Ie existing churches in the Italian territory, but data are lacking on the opening worship and the amount of hours that are usable by the faithful. Cultural property unplayable cultural property devalued, and even less when ecclesiastical nature and must fulfill a social function and spiritual at the same time.



Fig. 3: Church of San Francesco: Napoli



Fig. 4: Church of San Domenico Maggiore: Napoli

A church and monument, and architectural heritage, houses objects of historical-artistic (statues, ornaments, vestments, etc.) as well as having a value of religious and spiritual. The protection and enhancement of cultural heritage ecclesiastical requires care, passion, perseverance and knowledge

to fulfill a real mission, to keep intact and strengthen the descriptive characters and the cultural and religious identity of a community and of a territory .

2. Religious tourism as a factor of territorial development

Cultural tourism related supply of goods or to the use of religious places of worship is a significant factor of tourist attraction and is an essential resource for the sustainable development of the territory concerned. The attraction that exercise in general shrines and places of worship, involves a great interest in the works of art contained in it and at the same time is a real opportunity to know the area inside of which they are inserted, its cities, its cultural resources, economic landscape.
The attraction that exercise places of worship, be they large or small, is significant and very significant Ie increasing opportunities for knowledge, to use in a conscious and sustainable leisure, attracting tourism flows coitus and quality, not tied to particular events or placed in specific seasons. These tourist flows, these capabilities of attraction does not seasonal or episodic, can represent a great opportunity for the promotion of the local environment in which the places of worship are located and which are expressions, may constitute an important element of regional marketing, supply of territory , putting in all the system resources in a given area, enhancing the quality and making the most of the potential, even those existing in an embryonic state.
Many of the strategies for territorial competitiveness, retain a significant space to the attraction and promotion of places of worship and religious heritage of all inside of the various instruments of the tourist. In many cases, local development policies draw cultural - religious routes to promote tourism products are highly competitive and made specific improvement actions for development of regional infrastructure, political reception and accommodation facilities, policies for the protection and enjoyment, even immaterial, the cultural and environmental heritage. Also, always within the local development policies for places of worship, a specific space and increasing the relevance is taking the issue of sustainability of mass religious tourism, to prevent and / or mitigate pressures in the environment and factors alteration of church property as such. In this case, investment planning, orientation of tourist flows, time schedule of the cash flow, qualification and modernization of infrastructure, range of accommodation and dining, are all decisive factors in the action of Subjects in charge of the government of the interested public.
Also in this case, stands as a strategic consultation and cooperation among States, regions, local authorities, ecclesiastical authorities, social partners and local expression of the territory concerned. Finally, at the conclusion of this paper, a reflection of a general nature about the role and opportunities that globalization and the network can offer in the pursuit of policies for the development of local systems aimed at the enhancement of the places of worship.

3. Historic and Urban characters character Pompei' s City

Located at the foot of Mount Vesuvius, on the south side at 14 m height above sea level, Pompei is a religious center and tourist attractions worldwide to the simultaneous presence of a vast archaeological heritage unique in the world and the Sanctuary of the Blessed Virgin of the Rosary, the one reached by millions of visitors charmed by the buried city, the other, the destination of many pilgrimages. The ancient city, founded by the Oschi in the seventh century b.c., and so named in honor of Hercules (Pompei) was an important commercial hub, initially greek, then etruscan, roman and later sunni. The eruption of '79 b.c. destroyed and only in the eighteenth century began the first excavations to be able to then visit the ancient ruins.
The territory of Pompei, bordering the neighboring town of Boscoreale, Scafati, Torre Annunziata, Castellammare di Stabia, and Santa Maria La Carità, covers an area of about 1192 hectares. D'Aragona.

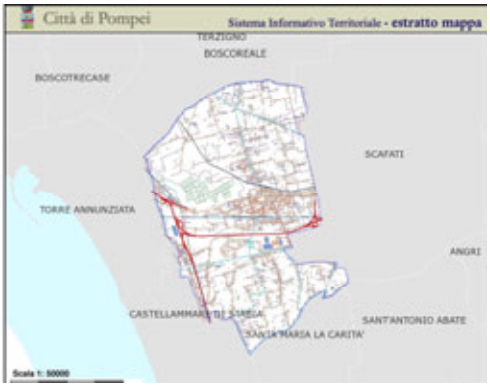

Fig. 5: Territorial Framework Pompei



Fig. 6: Square Bartolo Longo, Pompei

The current center, built around the Shrine, traces its origins to a parish community built in the early eleventh century, around the church of the ss. Salvatore, called "Field Pompeianus." Subsequently, the name of Valle di Casale, had a castle, before the feud of Luigi Caracciolo and then Ferdinando In 1593 it became the property of Alfonso Piccolomini, but for the overflowing of the river Sarno was abandoned and later became an unhealthy area and infested by brigands. And here get there in 1872, the Lawyer Bartolo Longo, a native of Naples and Puglia Latimer who contributed initially to gather the few inhabitants scattered around the church dedicated to the Virgin of the Rosary, built the first Benefactor - Founder, beatified today and in waiting for canonization.
From that moment he became the key man for the construction of the immense charity work and childcare, in particular, that make Pompei famous all over the world and an aggregator of numerous charitable initiatives. Bartolo Longo, who has been erected a monument dedicated to him in the great Piazza, Pompei is a true bastion of faith, hope and temperance in which to believe and which to draw lessons for an authentic Christian vocation. In 1878 began the first work of the Sanctuary consecrated then, in 1891 and expanded by five times in 1938. In 1925, we project the majestic bell tower height of 80 m from the top of which you can admire the beautiful landscape of the Sarno Valley that cuts through the Pompeian territory from east to west, resulting in a few hundred yards from the Gulf of Naples.
Pompei plays a pivotal role cultural and social differences between the provinces of Naples and Salerno, and is an aggregation point between the countries of the Vesuvian area became an independent town March 29, 1928 with a population of about 7000 people, in 1930 obtained the concession Coat of arms of the civic and the Municipal Banner, with special RR. DD With the last census conducted in 2001, today the city of Pompei has a resident population of 25844 inhabitants. Since 1952, seat of the Autonomous Care Hospitality and Tourism and the Archaeological Superintendence independent, boasts two interesting museums: the Archaeological set in the Excavations, its come from artifacts including the bust of a statue of Apollo and Diana , exposed in the National Museum of Naples and Vesuvius that, set in the rooms of the Shrine near the Cottage which was the home of Bartolo Longo, founder of the Shrine of Pompei and related works, where there are exposed eruptive material, old prints, reproductions of artifacts archaeological and a plaster cast for a journey back through the centuries, the various phases of the eruption of Vesuvius. In it there are also ornaments and coins found during the excavations of the ancient city and the reproduction of the column with the famous cryptogram of the Pater Noster that, for some, testifies to the successful spread of Christianity in the pagan Pompei, already in the first century. Pompei has two great days that attract thousands of pilgrims in fervent prayer at the feet of the B. V. of the Rosary: the May 8th and the first sunday in October, both dedicated to the recitation of the "Supplication".
The Sanctuary, also home of the Pontifical Delegation, is a promoter of important initiatives socio - cultural including the Religious Craft Show, at the annual theme, held at the Institute Bartolo Longo, which takes place in the autumn and the Young Meeting scheduled to May 1 of each year, which takes place in the room meeting, adjacent to the archaeological site of Roman-Greek Amphitheater .
The Pilgrim’s House, located opposite the Basilica in the great square and recently renovated, is equipped with large rooms equipped for the reception of pilgrims and to facilitate the consummation bag. In addition, it is equipped with a modern living intended to conventions for n. 134 seats and room for a modern audio-visual projections; while, next to this big building, there is a modern Young Hostel with 50 beds and a theater, the "Di Costanzo-Mattiello", with 500 seats available, always committed to the artistic cast of big fame.



Fig. 7: The Pilgrim’s House, Pompei



Fig. 7: Theater Di Costanzo – Mattiello, Pompei

The Archaeological Survey is also a promoter of good events and initiatives, including conferences, theatrical and musical performances that take place annually at the Amphitheater and Great Theater, adjacent to the Gymnasium of Gladiators. The Eagle's Cottage, located inside of the excavations but more recently built, is also home to study meetings and exhibitions on display.
On September 26 last year, was kicked off with great success to an important cultural initiative: an archaeological multimedia night time visit to the ruins, created with unique combination of sound, light and images, in order to make the most charming and exciting route to visit. In 1997 a UNESCO delegation, consisting of 200 experts from 45 countries around the world, said the archaeological site of Pompei, property of humanity. Additional security for any international funding, aimed at recovering both the rich archaeological heritage of both the existing and still submerged, to bring to light (one third) with new digs.
The City hall, in order to intensify the relations between the old city and the Marian city, in collaboration with all the productive forces and associative in the city and in particular of the AACST, helps to improve the reception of the tourist flow, - that the only 2001 recorded a traffic of 2,550,615 visitors - promoting and sponsoring cultural events of a certain prominent intervening with better signage and appropriate plan of roads, as well as facing the illegal building. In full synergy, the local police headquarters, State Police and the Police Station, facing the problems of public safety all over the territory.
A special program agreement made between the mayors of several municipalities, including Pompei, seen in the region of Campania, the actuator of the project about on the landfill of the existing Plant Railway, Railway Station, CIRCUMVESUVIANA (L 142/90, Article 27), located in the center of Pompei, which allows communication between Naples and Sarno, while other station device offers the possibility of easy access to the towns of Naples and nearby Sorrento peninsula.
The station of the state, in addition, a few hundred meters from the Basilica, allows easy connection with all the national territory, mainly due to the obligatory stops carried out by long-distance trains from Sicily and from all over the country and abroad. A bus service S.I. T. A provides additional easy access to Naples, Salerno and the Amalfi Coast, while the same CIRCUMVESUVIANA Company provides bus service to the connection between Scafati and Naples.
The reputation of the place has meant that important public offices were resident in the municipal area of Pompei as, the Courthouse, the Administrative Offices of the Sanitary District - AS.L. Na 5 ensures that the activities of Ambulatory Health Care, Emergency Regional Activities, Activities of Mental Health and the Family Planning. In area of the territory is, moreover, the Presidium of continuity of care night before a holiday, festive and supervision of Medical tourism. In addition, the territorial area is home to the Department of Prevention ASL Na 5 with eight Central Services and other centralized activities of the Department.
In the field of health and social care set out again: Nursing Home "Maria Rosaria" n. 100 beds and 150 authorized an agreement with admissions specialist for 8, the House of Rest "Carmine Borrelli" with about 52 seats for admission and the Pensioner "Marianna De Fusco" of the Pontifical Shrine with about 40 people in hospital.
There are four pharmacies of which: 2 central and 2 peripheral. Among the religious institutes to be counted: the Order of the Sons of Divine Fathers, daughters Dominican Sisters of the Holy Rosary, the Sisters of the Sacred Brisket, the Brothers of the Christian Schools, the Sisters of Mary Immaculate and the Secular Clergy.
The Institute for the reception of the Orphans, also founded by Blessed Bartolo Longo, has become a center of education for underprivileged children.
The Pontifical Shrine operates an elementary school, two middle schools, a vocational school and a Pedagogical High School, and also takes care of the preparation of the report "ROSARY AND NEW POMPEI", with a circulation of 260,000 copies in Italian and in English with 18,000 distribution world.
The presence on the territory of the two companies, the archaeological and the Marian has led to a development of tertiary education, so as to record a capacity of 27 hotels with a total of 1078 beds and 3 campsites; 170 public houses including: restaurants, snack bars and kiosks, and the presence of four Travel Agents.
The thriving business has a three Hypermarket Supermarkets, 554 shops and 44 operators in fixed place of public areas present to the ruins of Piazza Anfiteatro, 24 stalls with shifts in Square B. Longo, 15 kiosks selling souvenirs and newspapers, about 400 craftsmen, 68 itinerant traders and residents, not for the sale of food.
The CARTIERA A.T.I., built in 1950, is a significant other industry, while the canning is fairly represented. In addition, a weekly market is held on Friday with employment of public area by 167 operators and a major wholesale market for floriculture products, among the first in Italy, helps to give a new boost to local business. The development of commercial activities has seen the establishment of six major banking branches, such as the Banco Ambrosiano Veneto, Banca di Roma, Banca Monte dei Paschi di Siena, Banca Popolare dell 'Irpinia, Banco di Napoli and Banco Cooperative Credit

Scafati. There are two Clubs in the area State Educational with 14 central and peripheral plexus, two State Middle Schools with four complexes, a State Scientific high school with two buildings, a legally recognized Language High School, three and five equal Nursery Schools Preschools legally recognized.

3.1 Pompei and title of “City”



Fig. 8: City Hall, Pompei

Municipality represented by the Extraordinary Commission (experiment carried out personally as higher-level Prefectural of the City of Pompei appointed by the Prefect of Naples by decree of 21/09/2001 Sector n.13903/Gab.VI) has taken steps to focus attention on technical and administrative issues relating to certain socio-cultural aspects that characterize the body, so that it could gain a more just and consonant aegis calling for the recognition of the title of "City" for Pompei. Therefore, by resolution N. 244 of December 16, 2002 the Extraordinary Commission of Pompei calls for the granting of the title of City. Through a study on the historical-social-cultural, aiming to highlight the possession of the requirements of the rule for the acquisition of title aforesaid, the President of the Republic grants the country of Pompei the title of "City" with DPR 01/09/2004.

Ratificata con delibera	di ___ n° ___ del ___		Prot. n. ___	
Rettificata con delibera	di ___ n° ___ del ___		Affissa all'Albo Pretorio il ___	
Modif. e/o integr. con del.ra	di ___ n° ___ del ___			
Revocata con delibera	di ___ n° ___ del ___			
Annullata con delibera	di ___ n° ___ del ___			

UFFICIO SEGRETERIA
PROPOSTE DI DELIBERE
PROT. N. 212
DEL 16 DIC. 2002

COMUNE DI POMPEI

Provincia di Napoli

DELIBERAZIONE DELLA COMMISSIONE STRAORDINARIA

N° 244 DEL 16.12.2002

OGGETTO: RICHIESTA PER LA CONCESSIONE DEL TITOLO DI CITTA'.

L'anno duemiladue addì sedici del mese di dicembre alle ore 21,00 nella sala delle adunanze del Comune la Commissione Straordinaria si è riunita con la presenza dei Sigg.:

Cognome e Nome	Presenti	Assenti
Dott. **Giuseppe D'Angelo**	Sì	—
Dott.ssa **Giovanna Cerni**	Sì	—
Dott. **Gianfranco D'Angelo**	Sì	—

Assume la Presidenza il componente più anziano dei presenti nella persona del Dr. GIUSEPPE D'ANGELO
Partecipa il Segretario Generale Dr. Pasquale Foglia.
Il Presidente, constatato il numero legale degli intervenuti, dichiara validamente costituita la seduta, invitando i presenti a deliberare sull'oggetto sopraindicato.

LA COMMISSIONE STRAORDINARIA

Avvalendosi delle attribuzioni di competenza del Consiglio ~~e/o della~~ Giunta Comunale, ai sensi ed in conformità dell'art.42 ~~e/o 48~~ del D.L.gvo n.267/2000;
Vista l'allegata proposta di deliberazione relativa all'argomento segnato in oggetto, corredata dai pareri di cui all'art.49 comma 1° - del D.L.gvo n.267/2000;
Ritenuto di dover approvare la suddetta proposta di deliberazione;
A voti unanimi, espressi nei modi e forme di legge;

DELIBERA

1. Di approvare la proposta di deliberazione, così come formulata, relativa all'argomento indicato in oggetto, che viene allegata al presente atto per formarne parte integrante e sostanziale e come se nel presente dispositivo integralmente trascritta.
2. Di non assoggettare il presente provvedimento al controllo preventivo di legittimità del Co.Re.Co. di Napoli, per effetto dell'approvazione della Legge Cost.le n.3 del 18.10.01, di modifica del Tit. V della parte II della Cost., comportante, tra l'altro, l'abrogazione dell'art.130 della Cost. che prevede il controllo di legittimità dei Co.Re.Co. sugli atti degli EE.LL., giusta delibera n°6085 del 9.11.01 della G.R., inerente la cessazione da parte dei Co.Re.Co. e sue Sez.ni Prov.li ex L.R. n.21/93 dell'attività di controllo anzidetta, il tutto come comunicato con nota prot. 4650/SP del 14.11.01 della G.R.C. – Ass. al Sistema delle Autonomie e Risorse Umane.
3. Di NON comunicare il presente provvedimento, contestualmente all'affissione all'Albo Pretorio Comunale, al Sig. Prefetto di Napoli, ai sensi e per gli effetti di cui all'art.135 del D.L.gvo 267/00, regolante le materie relative ad acquisti, alienazioni, appalti e in generale a contratti nelle modalità e termini di cui all'art.133 del D.L.gvo medesimo.
4. Di incaricare il Dirigente CapoSettore I (PRIMO) [illegible] P.O. Responsabile del Servizio AR. L. DI LUCA & A. G. VANGONE nella persona del Sig. ___ per l'esecuzione della presente e le relative procedure attuative.
5. Dichiarare le presente, con separata ed unanime votazione, immediatamente eseguibile, stante l'urgenza ai sensi dell'art.134 – comma 4° - del D.L.gvo n.267/2000.

Fig. 9: Request granted "City" title



Il Presidente della Repubblica

VISTA la deliberazione n.244 del 16 dicembre 2002 con la quale la commissione straordinaria del comune di Pompei chiede la concessione del titolo di Città;

VISTA la documentazione prodotta a corredo della domanda stessa;

VISTO il parere favorevole espresso dal prefetto di Napoli in data 2 luglio 2003;

VISTO l'art. 18 del decreto legislativo del 18 agosto 2000 n.267, e ritenuto che sussistano le condizioni ivi previste;

Sulla proposta del Ministro dell'Interno

COMUNE DI POMPEI
DATA 30 GEN. 2004
PROT. n. N. 03272

DECRETA

Si concede al comune di Pompei, in provincia di Napoli, il titolo di Città.

Roma Addì -9 GEN. 2004

Per copia conforme
IL COLLABORATORE AMMINISTRATIVO
(Sig.ra Capasso Arcieri Tiziana)

Fig. 10: Title of "City" D.P.R. 01/09/2004

Today Pompei inspired by the recognition of the title of City granted by order dated 09.01.2004 by the President of the Republic, upon the proposal of Inside Minister, wants to aim high and look to the future, promising to exploit the huge potential offered by the territory, urging according to the intuition of the founder, once again the spirit of aggregation citizen around Christian values and civil rights. Revealed that the recalled recognition represents a moment of fundamental importance for the history of Pompei, so it seems appropriate to celebrate that title with the establishment of a special festival that coincides with the moment of relevance as fundamental as the arrival in the Valley of Pompei of the Blessed Bartolo; that the data and information specified in the above premise were the result of a close collaboration given by distinguished scholars and local historians, the City Council by resolution no. 23 of 11/08/2004, resolves to take note of the DPR of 09.01.2004 in which it was granted to Pompei the title of city, pursuant to art. 18 of Legislative Decree no. 267 of 08.18.2000; to celebrate the above title, after establishment of special holidays falling on the second Sunday of the month of October of each year to coincide with the expected date of arrival in the Valley of Pompei of Blessed Bartolo Longo, the feast which is in addition to the already known occurrences in specified narrative characterizing the emergence and development of New Pompei; to give course to the first occurrence of the above holidays falling Sunday, October 10, 2004, at the inauguration "celebration's day of Pompei City" with broad participation of civil and religious authorities at local, regional and national purpose requested; to establish that it is guaranteed a complete organization of the festivities after careful preparation of all documents, the requirements and the necessary steps.

Bibliographical References

[1] DE SPAGNOLIS, Marisa. *Pompei e la valle del Sarno in epoca preromana. La cultura delle tombe a fossa*. L'Erma di Bretschneider Editore, 2001, 188 p, ISBN 978-8882651466

[2] GAMBARDELLA, Carmine. *Atlante di Pompei*. Napoli La scuola di Pitagora, 2012, ISBN 978-8865421710

[3] FASCIA, Flavia. *Sicurezza e Fruibilità dell'Edilizia per il culto*. Atti del Convegno Auditorium Scavi di Pompei, Elpa Editore, 2011, ISBN 978-8890811609

[4] Referring Web Pages Web: www.comune.pompei.na.it

[5] Referring Web Pages Web: http://consortile.asmez.it/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The Walled City of Nicosia Today - The Challenge of Managing Heritage Conservation in a Living Divided City

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Abstract
Nicosia has been the capital of Cyprus for over one thousand years. It reflects the islands rich heritage and concentrates some of the island's finest historic architecture. The 16th century fortifications of Nicosia are an excellent example of the bastion system of fortifications in the eastern Mediterranean of the time.Political events during the last four decades have culminated in the physical partition of Nicosia. A buffer zone, once the most vibrant part of the city, splits the town into two parts that have been developing independently of each other, thus causing a disfunctional urban entity.In 1979, under the auspices of the United Nations Development Program the two communities (Greek-Cypriot and Turkish-Cypriot) initiated a project for a conservation and planning strategy aiming for a unified urban development. Under this objective a bi-communal team of national and international experts was formed. The Nicosia Master Plan team has since produced a common planning and conservation strategy aiming towards a reunified city.This paper presents the NMP objectives and project examples. Also, an ongoing research project, funded by the Republic of Cyprus and the European Regional Development Fund, is presented which aims at establishing a bioclimatically-based approach in the conservation of traditional buildings in the Walled city of Nicosia.

Keywords: Nicosia, bi-communal, heritage, regeneration, bioclimatic

1. Introduction

Continuous habitation of Nicosia since 3,000 B.C. has formulated the multilayered profile of Nicosia affecting present day living patterns in direct or indirect ways. The city is at the center of the island of Cyprus in the eastern Mediterranean and has been the capital for over one thousand years.The historic city's primary feature is the 16th century (1567 A.D.) renaissance fortifications which are characterized by their eleven heart-shaped bastions, three gates and ditch comprising an excellent example of the bastion system of fortifications of the time in the eastern Mediterranean.The three gates of the Nicosia walls namely, Famagusta gate (east), Paphos gate (west) and Kyrenia gate (north) obtained their current names according to the major city they led to when exiting fortified Nicosia.This significant monument, the walls, the three gates and the ditch are the primary landmark for Nicosia constituting an integral part of the city's identity[6]. The city within the walls comprises of a range of built heritage dating from the byzantine era to the early 20th century as well as contemporary structures.

Today, heritage and planning stakeholders, local authorities and the public through structured participation methods are faced with the utmost need to agree on an area scheme and management plan which will bring together all the public and private stakeholders which are involved in the future of the monuments and the city. Metropolitan Nicosia comprises eight municipalities (population about 240,000) and Nicosia Municipality which includes the venetian walls and historic city has a population of about 50,000.The venetian walls and moat together with the historic city inside the walls have been declared as ''Ancient Monument - Schedule B'' under the Antiquities Law since 2004. The objective of this listing was to protect antiquities and monuments however, lacking the appropriate mechanism for

implementation of this objective the listing of the historic city has proven a hindrance both in relation to the protection of heritage as well as regarding the development and regeneration of the walled city. In order to mitigate this hindrance local stakeholders are currently collaborating to develop a common framework in order to proceed with an area scheme, development and management plan for the Venetian walls and moat.The regeneration of the walled city has been a central issue for Nicosia, since 1980 and is primarily realized under the bi-communal Nicosia Master Plan (NMP) project. Having to deal with the devastating division of the city since 1964 and 1974 the NMP project has been a successful tool in implementing and promoting the integrated regeneration of the old city as well as conserving and reusing its heritage within that framework working towards a unified city.

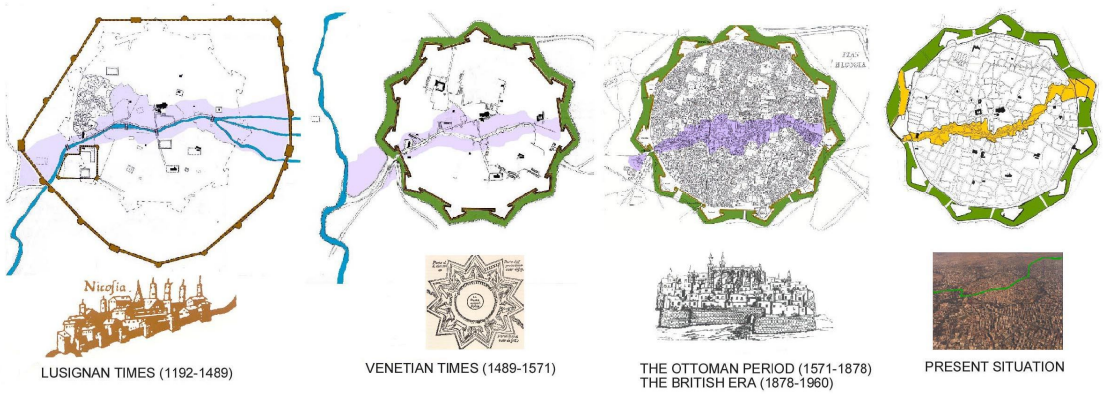

Fig. 1: Historic evolution of Nicosia (NMP archives)

2. The Nicosia Master Plan (NMP)

2.1 The Nicosia Master Plan, the framework

''In 1979, representatives from both the Greek Cypriot and Turkish Cypriot communities of Nicosia came together to assess the future development of the city they shared. Working under the umbrella of the United Nations Development Programme (UNDP), the two communities initiated a dialogue that would stand the test of time, would result in dramatic improvements in the living conditions of all the city's residents, and would introduce one of the most comprehensive planning documents of its time, the Nicosia Master Plan (NMP)''[1]. Through the Nicosia Master Plan Greek and Turkish Cypriots have been working together since 1979 for the conservation and protection of the multi-cultural heritage of Nicosia within the framework of a rational, integrated and sustainable development of the city as well as the regeneration of the historic core[2].The major urban issues that any planning strategy had to deal with at the time were: (a) the division of the town into two separate urban parts following political unrest of 1964 and 1974, (b) the abandonment of the city's core adjoining the buffer zone,(c) the extensive urban sprawl towards the outskirts, (d) the fragmentation of responsibilities for planning issues and the multiple local authorities of the metropolitan city. At the time of the creation of the NMP planning legislation in Cyprus was limited to a law that primarily dealt with building and road design regulations. It was not until 1990 that the Planning Law was passed and put into effect. The Nicosia Master Plan documents therefore, created in the 80's were the core of the Local Plan of Nicosia which is the primary planning legislation for the city dealing with planning and heritage conservation issues.The 2004 project ''The New Vision for the Core of Nicosia'' evaluated the initial Nicosia Master Plan objectives and the effects of implemented projects and policies putting forth recommendations in order to improve and support the regeneration and development processes into the present and future changing circumstances. The primary axis of these recommendations is that cultural heritage is a vital asset of Nicosia and it should be at the heart of the regeneration process of the city.

2.2 The Nicosia Master Plan, implementation

From 1986 onwards, the NMP entered its implementation phase. The NMP team put special emphasis on development projects for the short and medium term, ranging from 5 to 10 years. These projects represented the backbone of the policy aiming at stimulating the physical, functional, economic and cultural rehabilitation of central Nicosia as the key to the overall development of the city. Central to implementing the NMP objectives has been the realization of ten twin priority projects in the walled city on both sides of the dividing buffer zone in order to restore and upgrade infrastructure and historic building stock to be prepared in the event of the re-unification of the city. In the late 1980's brick and mortar projects began with the two major residential rehabilitation projects in the areas of

Chrysaliniotissa and Arabahmet. Interventions during this period focused on the restoration and rehabilitation of important areas of the historic center, the improvement of traffic management and transportation and upgrading of the urban environment and infrastructure. Over one hundred projects are listed as Nicosia Master Plan projects to date. These projects have been funded over the years either by local or international funds or by organizations committed to contributing to the sustainable regeneration of the Nicosia as a whole.



Fig. 2: Map1: Metropolitan Nicosia- urban sprawl. Map2: Implementation of twin priority projects in the walled city (NMP archives).

3. Nicosia Master Plan studies and strategies

Following the first period of implementing priority projects under the NMP provisions and as the improvement of the built environment in the walled city following the NMP interventions was obvious the existence of the buffer zone as a major obstacle to the balanced development of the city continued to be a major impediment. In the meantime, the buffer zone that runs through the walled city comprises some of the most valuable architectural heritage of the historic core. This strip of land was historically the hub of commercial and social activity and posses the greatest ''gluing'' potential for re-uniting Nicosia. Therefore, due to its valuable qualities the NMP implemented the study, ''The survey of the buffer zone of Nicosia'' beginning in 2001. The study surveyed and documented 265 buildings in this access restricted area and produced a comprehensive body of work that includes drawings and photographs of the historic buildings and recommendations for emergency support work in order to protect them until a more complete form of intervention will be made possible.
In 2004 the study ''New vision for the historic core of Nicosia'' was executed. The study included three main objectives, (a) Evaluation of the results of the up-to-date city centre rehabilitation approach, (b) Re-defining of a contemporary integrated planning strategy for the development of the centre, (c) Guidelines for the selection, design and implementation of urban regeneration projects. Through this process a heritage-led regeneration strategy was developed.

4. Nicosia Master Plan Projects

Throughout the years and under the provisions of the above studies and strategies several projects have been implemented in the walled city. The interventions under the NMP provisions have included urban infrastructure, restoration and reuse of a range of architectural heritage in the city, urban upgrading projects, traffic management projects as well as public awareness actions. More clearly, during the past ten years the direction and emphasis of formulating and deciding on new projects has been that of sustainable urban interventions. Issues such as managing heritage conservation together with the rest of the needs of a vibrant contemporary city for new development schemes, pressing public transportation and parking problems together with the environmental impact that energy consumption brings are a daily reality for Nicosia's stakeholders.

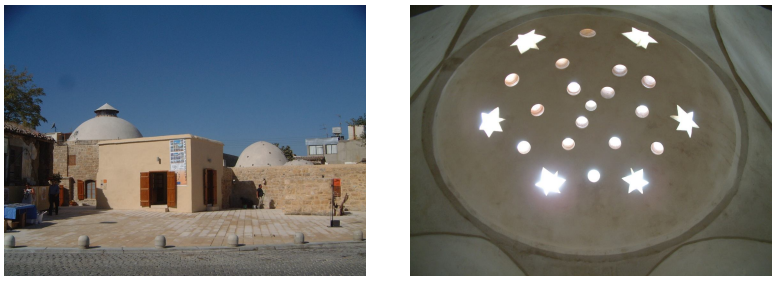

Fig. 3: Restoration of Omeriye Hamam,Europa Nostra 1st Prize 2005,walled city of Nicosia (NMP archives).

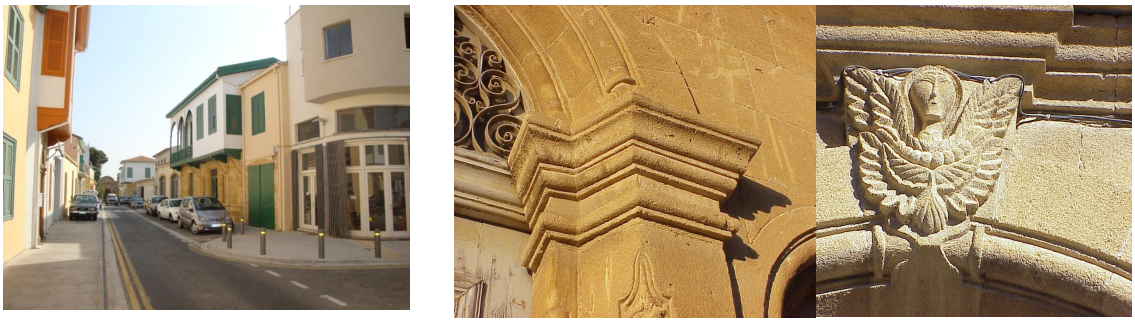

Fig. 4: Restoration of façades and upgrading of infrastructure in the walled city of Nicosia (NMP archives).

The numerous projects implemented in Nicosia have been planned under the framework of the Nicosia Master Plan and Nicosia Local Plan objectives. Since 2001 funding for the various projects has come from local and central Government, USAID through UNDP, European Union pre-accession funds and European Union Structural Funds (European Regional Development Funds-ERDF, programming periods 2004-6 & 2007-13).
The historic core of Nicosia as well as its adjacent historic settlements of Kaimakli and Pallouriotissa have been the recipients of urban upgrading projects since these areas presented severe problems of decay and abandonment due to the division of the city, the feeling of instability and lack of new economic investments in these areas. The walled city is still trying to regain its identity as the central, capital city of the island as opposed to a boarder town along the buffer zone. Areas in the historic city which concentrate urban renewal projects are the Old Town Hall area, the Takt-el-Kale area, West of Ledra street area and the two connection points with the outside the walls city of Solomou Square bus transit station and Eleftheria Square which will connect the old town and the new via a north-south axis.

The urban regeneration projects include the redesign of streets and open public spaces, upgrading of public utilities infrastructure, improving of street furniture and vegetation, signage and inclusion of energy efficient street lighting as well as the restoration of building façades. These types of projects already completed have vastly improved the built environment contributing to a higher quality of life for the inhabitants and enhanced their sense of community while empowering the value of taking care of the architectural heritage as having a direct impact on the daily quality of life.

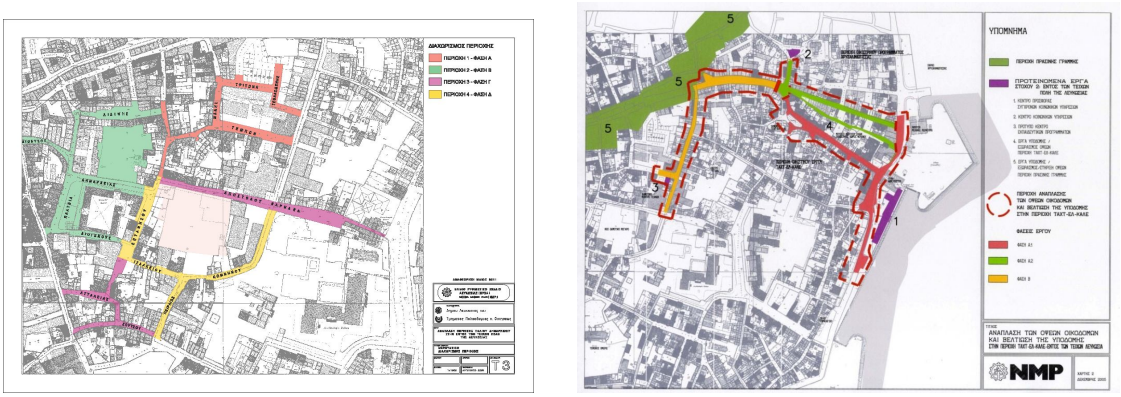

Fig. 5: Areas of urban regeneration projects in the walled city of Nicosia (NMP archives).

The inclusion of contemporary design projects within the city's historic context has been a topic of intense discussion. However, a living city encompasses built heritage from all periods of its history. A contemporary structure must be in the spirit of its own time while at the same time be in tune with the provision of the The Valletta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas, Article2(b), *''The introduction of contemporary architectural elements must respect the values of the site and its setting. It can contribute to the enrichment of the town, bringing alive the value of urban continuity.''*




Fig. 6: Solomou Square bus transit terminal (NMP archives) and Eleftheria Square proposal (ZAHA HADID Architects)


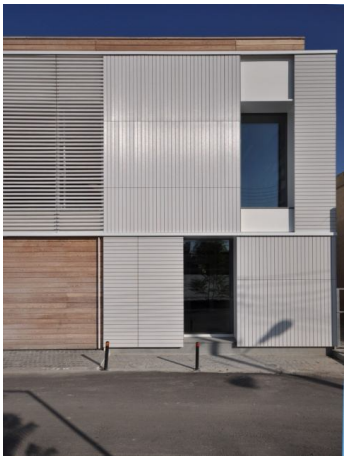
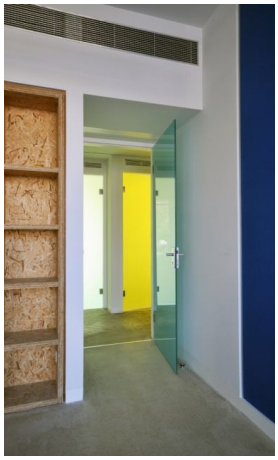

Fig. 7: The New Nicosia Town Hall by *irwin kritioti architects* at the centre of the walled city. An energy efficient contemporary building in an historic setting (irwin kritioti architects archives).

5. The Assessment of Bioclimatic Elements of Vernacular Architecture in the Historic Centre of Nicosia

In addition to the planning, restoration and sustainable urban regeneration concerns under the Nicosia Master Plan objectives, energy efficiency issues are increasingly at a point of attention in order to achieve minimize energy consumption in the city. The traditional building stock of the city presented an ideal setting for research in this field.

The research aims at establishing a bioclimatically-based approach in the conservation of traditional buildings and thus contributing to the regeneration and sustainable development of the urban environment of such a solid traditional historic core as that of the Walled City of Nicosia.

Through the study of the historic architectural evolution of the typology[3] of Nicosia it is clear that some elements that remained and have been used during all periods are: the central yard at the back of the plot, the arrangement of spaces around the yard and the prevalence of semi-open spaces (used as entrances and shelters). These elements underline the aim of the residences to adapt their dwellings to the climatic conditions of the area (hot summer, mild winter, limited winds). The dwellings were frequently arranged in compact patterns, closely built with common walls, one attached to the other, following the continous urban system leaving small empty spaces in the form of public narrow streets and private courtyards. Thus, the vertical surfaces (walls) exposed to exterior environmental conditions are reduced and the thermal protection of the building envelope is increased. The shade between neighbouring buildings reduces the warming up of their walls by radiation. Thus, topography, geomorphology and climate are important parameters that play a significant role in the design (Le vie dei Mercanti 2013).

The selection of appropriate building materials, apart from being partially imposed by availability, is also climatically driven. The suitable use of materials in the building's envelope provides direct protection from the climatic conditions, while the materials of the buildings' surroundings contribute to the development of desirable microclimatic conditions. The materials used in the vernacular Cypriot architecture are earth and stone which are to be found in abundance in the vicinity. The traditional dwellings of Nicosia constructed with earth and mudbricks, have stone foundations of local limestone, of Athalassa-Nicosia Formation called "Stone of Gerolakos", so as to protect the mudbrick walls from the rising damp (Le vie dei Mercanti 2013).

After an overall historic and architectural investigation of the area through historic documentation and survey maps, a study of a large number of buildings from a typological, bioclimatic and construction material point of view has been carried out. The bioclimatic strategies of heating, cooling and microclimatic conditions were studied in detail. The research showed the various environmental features of vernacular architecture (central yards, semi-open spaces, construction and materiality etc.) and the correspondent bioclimatic strategies. The data collected were tabulated and encoded for comparative investigation and analysis. These recordings defined the basis for the selection of a number of characteristic buildings for monitoring temperature, humidity, lighting levels and ventilation aspects. Weather stations have also been installed in the selected study areas and in the centre of a traditional courtyard.

The analysis of the data gathered showed that special emphasis in Cypriot urban vernacular architecture was given to the cooling rather than the heating strategies. The hot climate of the area probably led to the enhancement of the cooling strategies through cross ventilation and stack effect (openings) as well as shading (pergolas, shutters, iliakoi etc.). The combination of shading and night cooling reduces the interior temperature, keeping it at close levels to thermal comfort. On the other hand, the rather limited heating strategies incorporated, i.e. minimum exposure of surfaces to the south and small size and number of openings in the south facades, did not allow the house to take full advantage of the sun during the winter (CIAV2013).
The monitoring of temperature and humidity levels in selected buildings demonstrated the great importance of the building materials and techniques used in the construction of traditional dwellings. The significantly lower temperature fluctuations recorded in the internal spaces with eastern, southern and western exposure, confirms the high thermal insulation characteristics of the building envelope and the thermal inertia secured by the thick wall construction materials, which offer high thermal mass (PLEA2013).
The temperature data recorded, confirm the positive contribution of the semi-open spaces as sun shading elements. Moreover the reduction in temperature fluctuation observed in all cases studied, compared to the respective temperature fluctuation of the external environment, helps towards the achievement of more comfortable living conditions within these traditional dwellings. The "portico" generally shows smaller temperature fluctuations, compared to "iliakos", due to its greater "depth". The recorded relative humidity fluctuations of the semi-open spaces are significantly lower compared to the relative humidity fluctuations recorded at the courtyard and the external environment; this indicates the positive contribution of the semi-open spaces as relative humidity regulators (PLEA2013).
According to the findings of the preliminary stage of the research, it is noticed that the occupants of the traditional dwellings often proceed to interventions in the building envelope, which alter some of the original typology features. Some of the most common interventions encountered are: (a) the closure of the semi-open spaces "iliakos" and "portio" with frameless glass elements that can be opened, (b) the closure of the small openings on the upper part of the facade, called "arseres''.

Other interventions concern the external environment of the building, like: (a) the introduction of impermeable flooring (e.g. concrete floor) in the yard and (b) the filling up of the well.
The monitoring of houses with such interventions reveal that their impact is significant to the bioclimatic function of the building shell. The transformation of south orientated semi-open spaces into internal spaces has positive effect during the winter period as the space resembles the fuction of the green house effect and benefits from the direct solar gains. However, in cases with limited shading provisions, the effect is negative as the space is overheated. Therefore, the policy adaptated for such interventions of closure of the south orientated semi open spaces is either to assure the adequate shading during the summer period or to reestablish the space as a semi-open one, by maintaing the openings of that space wide open. In this way, the cooling strategy of the cross ventilation is assured.
The small size openings, located at a considerable height, mainly on the façade on the streets (called "arseres"), contribute to the forced ventilation and the extraction of hot air from the building envelope (stack effect) during the summer period, due to the difference in temperature and density of the air(CIAV2013). Therefore, their contribution to the passive cooling is significant and their presence should be conserved.

With regard to the strategies on the microclimatic environment, the existence of water elements (wells and shallow pools) in courtyards and in the areas surrounding the buildings, as well as the watering of the plants, provide evaporative cooling during the summer (CIAV2013). Adittionally, during the winter, as the surface materials (stones and/or earth) and the surrounding walls of the courtyard increase the urban heat effect, the interior tem-perature is higher in relation to the external envi-ronment (CIAV2013). Consequently, the materials used in the surrounding area of the building is also of great importance in a rehabilitation/restoration project.

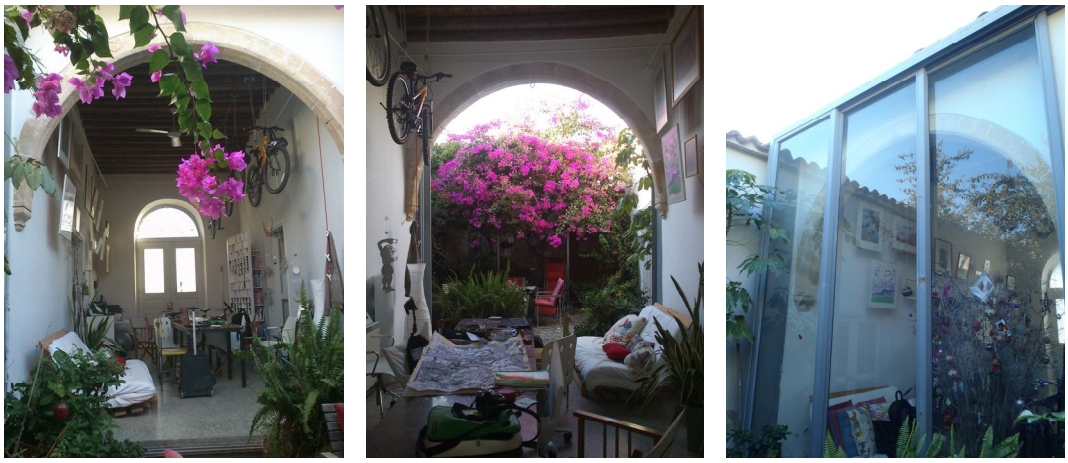

Fig. 8: The closure of the semi-open space “iliakos” with sliding glazing panels (*biovernacular* archives).

6. Conclusions

The historic city of Nicosia constantly undergoes having to manage the forces of preserving its cultural heritage, the forces of its divided centre and the need for sustainable contemporary development. All three areas exert tremendous pressure, often times in opposite directions. The challenge of successfully balancing the three areas in order to obtain a positive outcome for the city, its inhabitants, heritage conservation and its future is a difficult task. Nevertheless, success lies in the synthesis of opposing forces and the multidisciplinary collaboration between heritage professionals, government departments, local authorities, local communities, public and private stakeholders.

In the words of Robert Palmer, former Director of Culture and Cultural and Natural Heritage, Council of Europe, *“Heritage is not simply about the past; it is vitally about the present and future. A heritage that is disjoined from ongoing life has limited value. Heritage involves continuous creation and transformation. We can make heritage adding new ideas to old ideas.”* [7]

7. Acknowledgements

The research described in this paper is based on a research programme that is funded by the Republic of Cyprus and the European Regional Development Fund (Cyprus Research Promotion Foundation’s Framework Programme for Research, Technological Development and Innovation *Δέσμη* 2009-2010, *ΑΝΘΡΩΠΙΣΤΙΚΕΣ/ΑΝΘΡΩ/0609/ΒΙΕ*). The Host Organisation of the programme is Nicosia Municipality and the Partners are the University of Cyprus, the ICOMOS Cyprus and the Frederick Research Institute. Special thanks to the Nicosia Master Plan team for providing access to the NMP archives.

Bibliographical References

[1] NICOSIA MASTER PLAN. *The Nicosia Master Plan-1979 to 2004 & beyond*. Information leaflet, Nicosia: 2006.

[2] NICOSIA MASTER PLAN. *Final Report.* Nicosia: 1984.

[3] DEMI, DANILO. *The Walled City of Nicosia.* Nicosia: UNDP United Nations Development Programme, 1997.

[4] LEVENTIS, P. Twelve Times in Nicosia, Nicosia, Cyprus, 1192-1570: Topography, Architecture and Urban Experience in a Diversified Capital City. Nicosia: Cyprus research center, Texts and Studies in the History of Cyprus XLIX. 2005.

[5] PAPACHARALAMBOUS, G., *The Cypriot Dwelling*. Nicosia: The Cyprus Research Centre II, 2001.

[6] PAPADOPOULOU, A. , *''The Venetian Fortifications of Nicosia, Cyprus – A monument in transition. An opportunity for Protection, Management and Regeneration''*. In the proceedings of the Centro De Estudos De Arquitectura Militar De Almeida (CEAMA), Vol.10, 2013, 161-167

[7] COUNCIL OF EUROPE, *Heritage and Beyond*. Strasbourg Cedex: Council of Europe Publishing, 2009.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

ROOFING STRUCTURES IN ARCHAEOLOGICAL SITES: POMPEII INSULA OF THE CENTENARY [IX, 8]

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Abstract
Roofing structures in archaeological sites are continuously subject of studies. In Pompeii there are many examples of roofing structures, built using several techniques and guidelines.
Recently, within the agreement signed between the DICAM department of the University of Bologna and the Superintendence of Pompeii about the analysis of the structures and the study of the operations of consolidation and restoration of the Insula of the Centenary, the issue of designing roofing structures of various spaces of the Insula was addressed.
In particular the attention was focused on the covering of the main atrium. Firstly a prototype of a roofing structure covering a portion of the atrium was installed. Then, precisely fitted inside the ruins by means of a laser scanner survey, the structural design of three different types of roofing structures was defined:
• wood structure with roof tiles;
• aluminum structure and polycarbonate panels;
• steel structure and corrugated steel panels.
Various three-dimensional models were developed on the real geometry provided by the laser survey and analyzed with engineering software tools to track the effect of static and seismic actions on the whole structure.
Among all the other possible ones, the solution involving the use of a restoration roof covering in lightweight material, resting on the existing masonry after consolidating the latter and creating stringcourses at various heights on the wall ridges provides a result which is less invasive visually and, at the same time, leads to an improvement in the seismic behaviour of the whole.

Keywords: surveying, modeling, analysis, restoration, materials.

1. The Insula of the Centenary
The Insula of the Centenary, the eighth in the Regio IX of the archaeological excavations in Pompeii was given this name because it was excavated in 1879, the eighteenth centenary of the eruption of Vesuvius; it is a large, trapezoidal block, tapering towards the south with a general reduction in height from north to south (see figure 1). It appears to be hinged between the western part with square insulae and the eastern part with rectangular insulae and the demarcation to the north is an important urban decumanus, the Via di Nola, and to the east and west it is bordered by two alleys, the Maialino and the Centenario, while the southern boundary, on which the Casina dell'Aquila stands out, has not been excavated yet. The greater part of the Insula is occupied by the large domus of the Centenary while there are another two building units in the south western part: a small structure, the hospitium

Hygini Firmi and the rear of a house with a peristilium whose entrance is still beneath the hill. The Casa del Centenario shows traces of a long and troubled building history; restoration work has been carried out on various occasions, also on different floor levels and with variations in the dimensions of the rooms and their intended use and significant remakes of flooring and, especially, wall covering decorations. At the time of the eruption in 79 A.D. the appearance of the house was that of a large building with two atriums and a peristilium, one of the few in Pompeii. Looking out over via di Nola, where its two main entrances were located, the domus also included a western quarter which had been vastly restored in the last building phase. The peristilium was the heart of the home and the more elegant reception rooms to the north and the south opened out onto it.
Figure 1 (the part in color) shows the zenithal view of the Insula of the Centenary and the various types of roof coverings (present up to 2010) are indicated with letters as specified below.
Original roof coverings:
a – stone vaulting (regarding the roof covering of the thermal baths; all the roof coverings of the basement shown on the right hand side of the plan in figure 1 are also in original stone vaulting).
Restoration roof coverings:
A – sloped roofs, with guttering on the southern side, with a supporting structure in wood and roof covering in imbrex and tegula;
B – flat roofs in cement and bricks, all in a state of deterioration and underpinned at the moment;
C – structures with one vault (black oecus, at the top of the picture) and vaulted and level structures (Egyptian cubicle with the level part towards the atrium) all restored with iron girders and bricks or stones;
D – bearing structures in iron and roof covering in Ondulit with finishing in copper; maintenance carried out recently.
Temporary roof coverings:
E – bearing structures in steel tubular elements and roof covering in plasticised corrugated metal.
Experimental roof coverings:
F – bearing structure in tubular aluminium profiles and roof covering in polycarbonate alveolar sheets.



Fig. 1: On the left the existing roof coverings of the Insula of the Centenary (zenithal view from Bing Maps 2010), on the right the design indications for the new, hypothetical roof coverings with a structure made of aluminium and a roof covering made of polycarbonate.

1.1 Experimental roof covering in polycarbonate and aluminium

Following sponsorship by Makroform S.p.A., today called BayerSheetEurope, it has been possible to develop an experimental application of polycarbonate sheets (compact and alveolar) for the roof covering of sectors of the Insula and also for closing up openings and protecting wall paintings and inscriptions. In particular, in relation to the study of new restoration roof coverings, the experimental roof covering of the NW corner of the main atrium (figure 2) was realised with the aim of assessing the visual effect of the partial restoration with a view to carrying out a complete reconstruction of the roof covering of the main atrium. The bearing structure (if it is positioned on the masonry, the vertical supports are necessary only for the prototype) has been made in aluminium and has the characteristics of a temporary structure which can be dismantled and repositioned, if necessary, in another place since each single constituent element can be transported manually, if required. The plinths are laid on the floor and separated from it by a protective layer of rubber. The polycarbonate sheets installed are alveolar sheets, type 16XP, bronze coloured and they cover a surface area of approximately 16,0 m^2. No vertical closures are present. In general the alveolar sheets have elevated mechanical characteristics, good resistance properties to fire and chemical agents and, compared to glass, excellent impact resistance with no shards formed, excellent transparency and light transmission and a higher capacity to provide thermal and acoustic insulation.
In particular the technical characteristics of the 16XP sheets installed are:
- weight: 2,5 Kg/m^2 ;
- light transmission: 21% ;
- thermal expansion coefficient: 0,065 mm/m °C;
- protection from UV rays UV: 100% ;
- recyclability: 100% .

The sheets are guaranteed for 10 years regarding transparency and against breakage due to hail.
The entire prototype structure has the following, main characteristics:
Capacity of protection from atmospheric agents: the polycarbonate alveolar sheets filter and subdue sunlight; they imitate the appearance of the original covering and, at the same time, protect the covered area from the negative effects of sunlight and rain. The small amount of rainwater collected from the approximately 16 m^2 of roof covering is channelled into the impluvium.
Weight and transportability: the plinths in the design weigh about 560 daN, the rest of the structure, including the roof covering sheets, about 350 daN and, taking into consideration an increase due to the greater height of some plinths to compensate the subsidence of the supporting surface, there is a total static load of about 1150 daN which corresponds to a compressive stress of about 0,2 daN/cm^2.



Fig. 2: Prototype covering in the NW corner of the main atrium.

2. Design indications and the choice of the type of roof covering

Given that the desire to proceed with covering the most significant areas of the Insula is envisaged in the project (see figure 1 for the hypothesis with a bearing structure in aluminium and roof covering in polycarbonate), the choice of the type of covering can be subject to various constraints.

The masonry of the Insula of the Centenary is in a very delicate condition, often almost a safety hazard due to the vertical bearing capacity; this has been caused by previous historical events, natural deterioration following unearthing activities and also some consolidation and covering work carried out over time has led to further deterioration problems. All this has been made worse by the lack of regular maintenance. Therefore, even in the absence of new roof coverings, the masonry needs to be consolidated anyway, and, in particular, work must be carried out to check and improve the adhesion of the plasterwork which is still present.

During studies on new restoration roof coverings, the problem regarding the transfer to the ground of the new loads emerged immediately and consequently the choice of the type of support: should it be on top of the existing masonry or in complete autonomy, with the necessary new foundations.

In comparison to the autonomous foundations (either excavated or just positioned on the ground) it can be observed that placing them on top of the existing masonry would lead to some advantages:

- the exploitation of the existing groundwork with a transmission of loads over a greater surface area and consequently, a lower concentration of stress;
- the possibility of creating summit stringcourses, concealed in the thickness of the sacrificial masonry, on which to position the roof covering structure with a possible improvement of connections between orthogonal walls and non-orthogonal ones;
- lower impact/disturbance of vertical bearing structures.

Once the system for transferring new loads to the ground had been decided on, three types of possible roof coverings were analysed; all of them were positioned on the existing masonry as described below with particular reference to the area of the main atrium.

One characteristic common to the various types of covering is the impluvium shape; this is justified by the archaeological knowledge acquired about the part regarding the main atrium and sub-horizontal for all the others; this construction code is common for all restoration roof coverings in the archaeological area of Pompeii when the effective shape and original position are not known.

2.1 Coverings with structures in masonry and wood and roof covering in imbrex and tegula

In comparison with other types of roof coverings, as far as loads due to its own weight and permanent overload are concerned, the sole impluvium portion of the roof covering in wood and tiles (imbrex and tegula) has a weight of 76,0 daN/m^2 (figure 3). Then, taking into consideration other elements, the covering of the impluvium basin and the system of wooden beams and pillars, an overall weight of 12654 daN is reached.

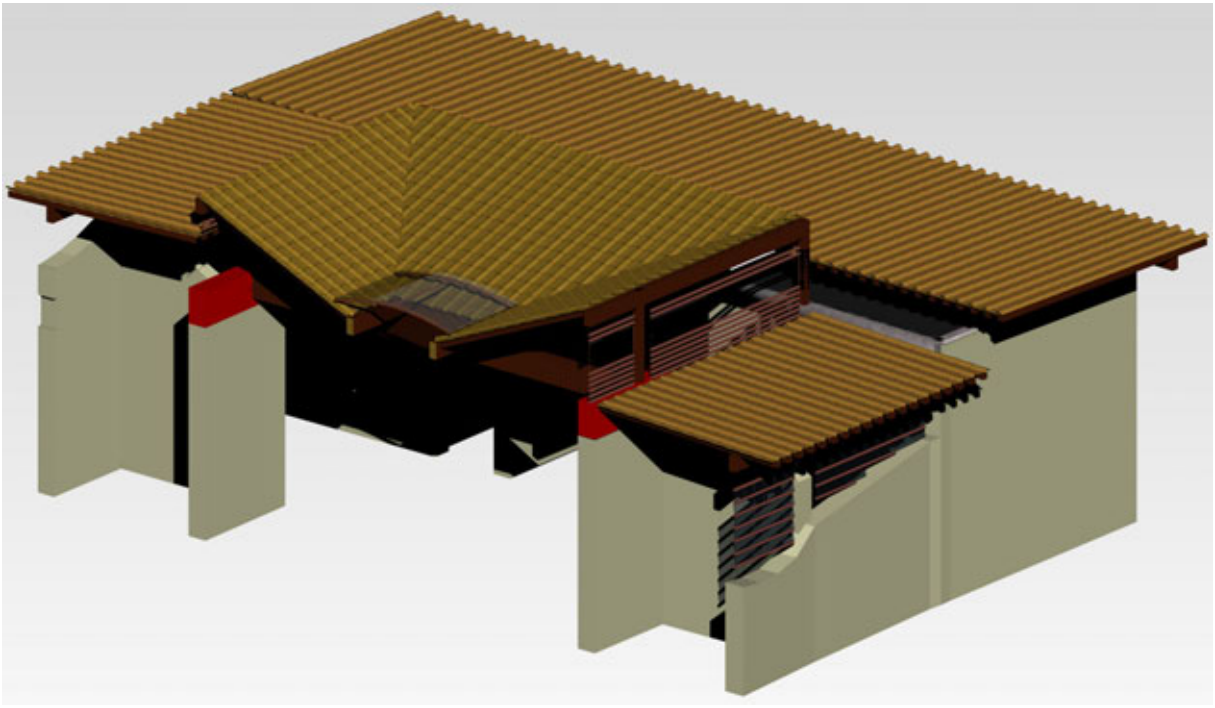

Fig. 3: Axonometric view of section E-W of the area of the main atrium.

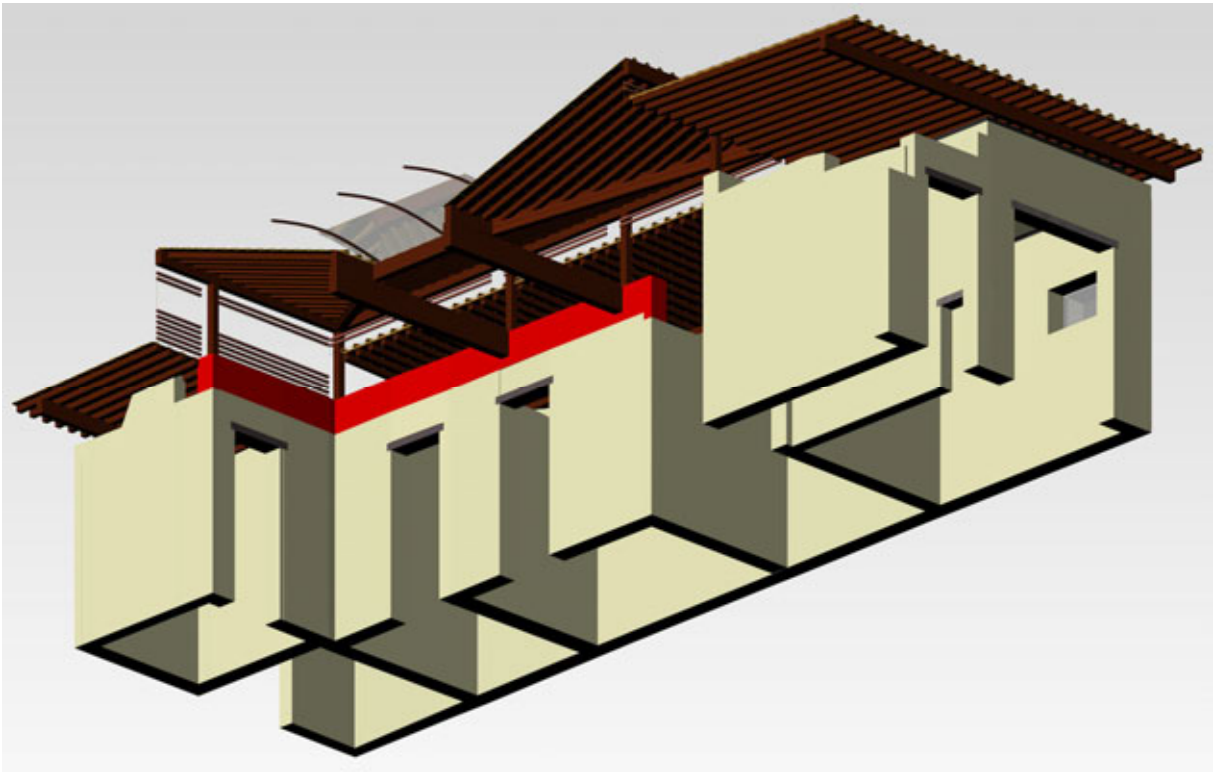

Fig. 4: Axonometric view from below of the N-S section of the area of the main atrium.

This overall weight, in relation to the surface area of the main atrium (equal to approximately 113 m^2), leads to an incidence per unit of surface area equal to 111,98 daN/m^2 as a result of the roof covering in wood, imbrex and tegula.
When using wooden roof coverings with imbrex and tegula it must also be remembered that it is necessary to build a suitable stretch of masonry (at least one metre high) in correspondence with the sides of the main atrium in order to position the main beams (the part highlighted in red in figures 3 and 4). The construction of this stretch of masonry would lead to a significant increase in stress on the original masonry due just to its weight and further stress in the event of an earthquake.
Finally, the weight of the other distribution stringcourses on the masonry and lateral elements for protection against sun-wind-water, which are the same for the various solutions, must be added. In order to make a comparison, it should be considered that the load per linear metre of a cement stringcourse, inserted into an adequate thickness of summit sacrificial masonry, in order to support the vertical bearing structures is equal to approximately 260 daN/m and running around a perimeter of approximately 30 metres (only the main atrium) contributes to the overall load by approximately 7800 daN with an incidence per unit of surface area of approximately 69,03 daN/m^2.

2.2 Coverage with aluminum structure and polycarbonate roof covering
The structural form used in the coverage with an aluminum supporting structure and roof covering in polycarbonate alveolar sheets, in terms of total geometry and single profiles, is the same as that used for the coverage with structural aluminum elements and roofing in corrugated metal. For the characteristics of the aluminum material, type avional 6082 was chosen, and for the roof covering, Makrolon UV 2/4-6 panels in alveolar polycarbonate (with a weight of about 3,5 daN/m^2).
An evaluation of loads per surface unit of the main atrium was carried out considering the following: the weight, deducted from the calculation model, only of the aluminum tubular profiles which make up the coverage (beams and small pillars), the weight of the polycarbonate central fairing (canopy), the weight of the roof covering in polycarbonate alveolar sheets, obtaining a total weight of 1503 daN and a surface unit weight of the main atrium of 13,30 daN/m^2.
Considering also the roof coverage which extends to all the surrounding areas of the main atrium and also to the secondary atrium (see picture 1), the total weight obtained (tubular avional aluminum elements, fairing and polycarbonate sheets over the whole area of the main atrium and part of the secondary atrium) is equal to 6405 daN which, for a covered surface of about 441 m^2, leads to an incidence per surface unit equal to 14,52 daN/m^2.
In picture 5, an axonometric North-West view of the main hall is shown, with the solution in aluminum and polycarbonate.

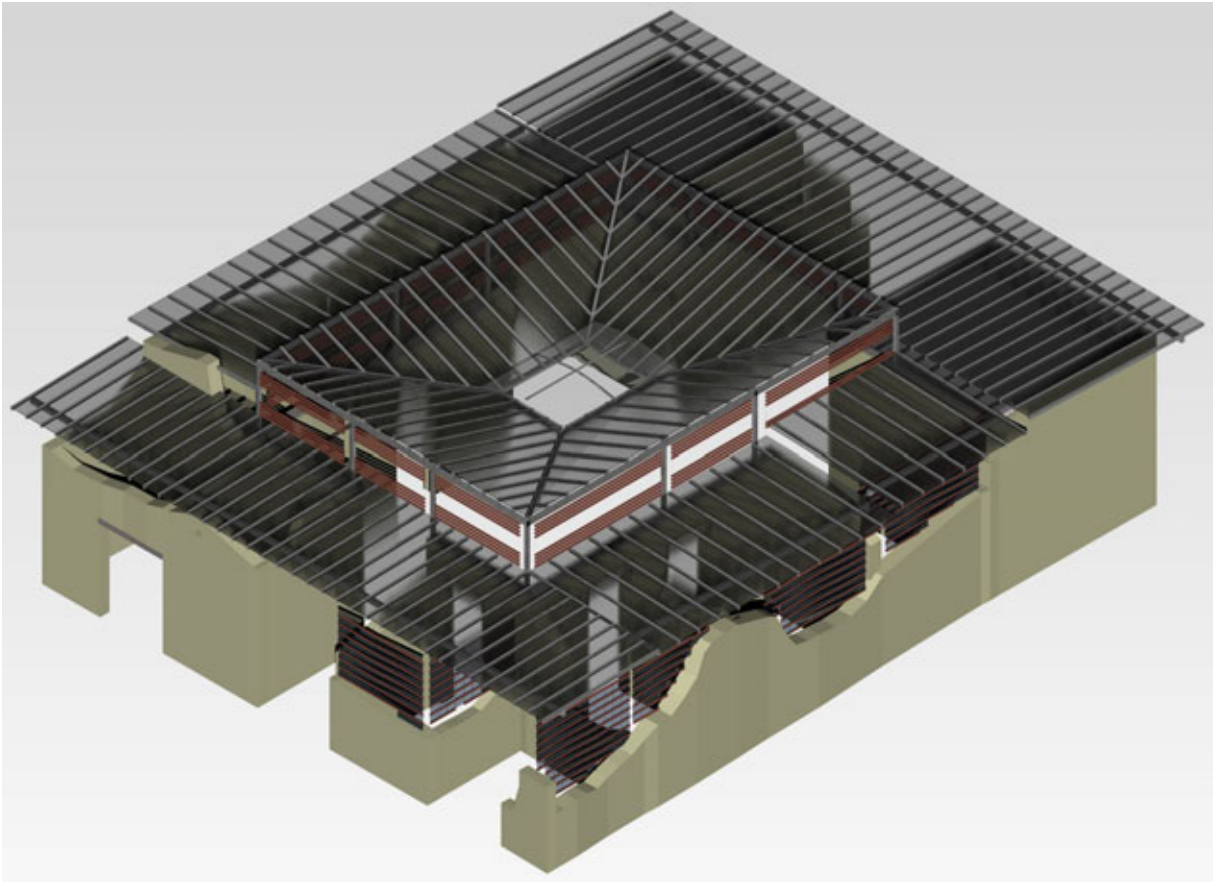

Fig. 5: NW-SE axonometric view of the aluminum and polycarbonate roof covering.

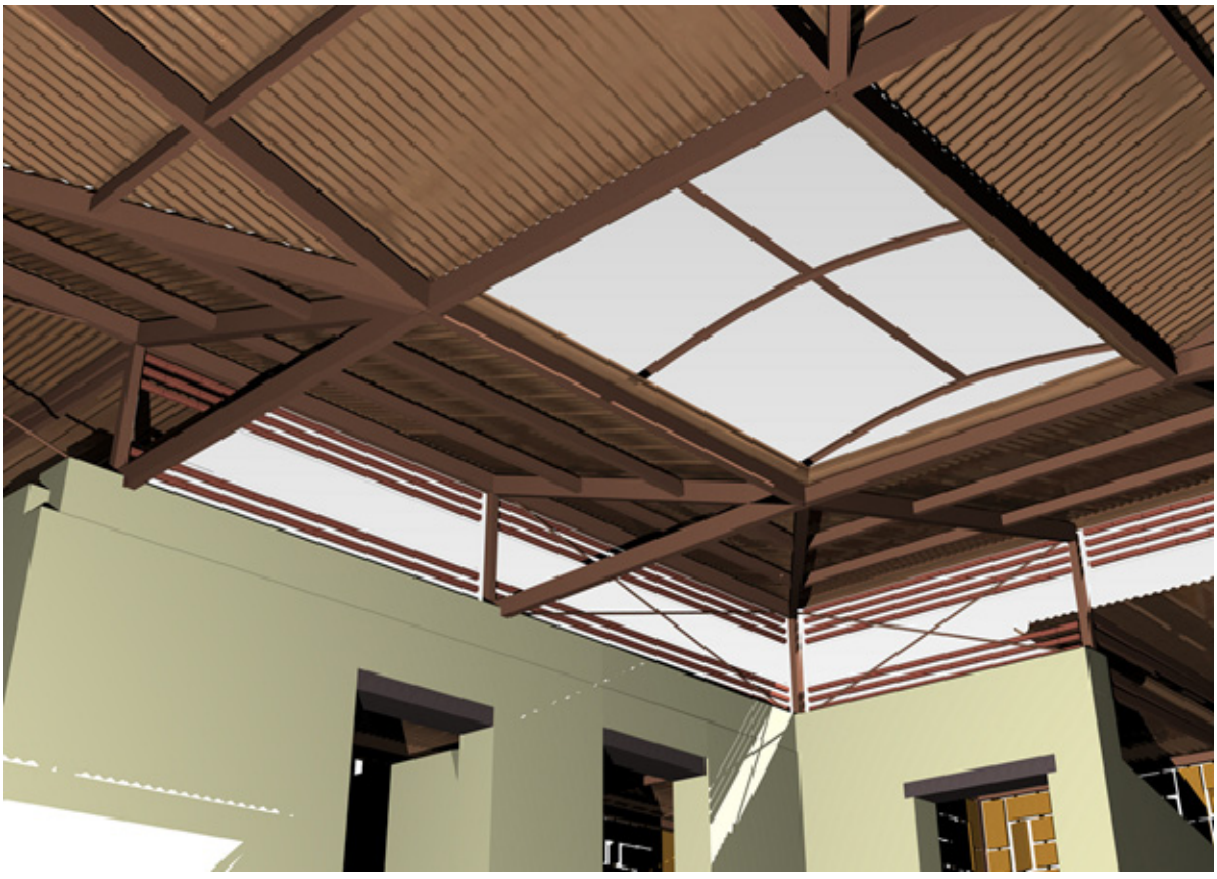

Fig. 6: SE-NW internal prospective view of the center of the main atrium of the steel and sheet covering.

2.3 Covering with steel structure and roofing in corrugated sheet

The structured form used for the steel and corrugated sheet coverage, in terms of total geometry and single profiles, is the same as that used for the coverage with aluminum structural elements and polycarbonate roofing. For the characteristics of the steel material, those of CorTen steel were chosen, and for the roof covering, the corrugated plate of the Ondulit Coverib type (with a weight of about 10 daN/m^2). The latter choice was determined by the presence of the same type of sheet, with copper finishing, used for the coverage of other areas of the Insula (type D coverage in picture 1).

An evaluation of the loads per surface unit of the main atrium was performed considering the following: the weight, deducted from the calculation model, only of the tubular profiles in steel which make up the coverage (beams and small pillars), the weight of the central fairing (canopy) in polycarbonate, the weight of the roof covering in Ondulit Coverib plate (10 daN/m^2 on an area of about 111 m^2 related to compluviate flaps). A total weight of 4206 daN was obtained and a weight per surface unit of the main hall of 37,22 daN/m^2.

Considering also the part of the roof coverage which extends to all the surrounding areas of the main atrium and partly also to the secondary atrium (see picture 1), the total weight obtained (tubular CorTen steel aluminum elements, fairing (canopy) and Ondulit Coverib plate over the whole area of the main atrium and in part of the secondary atrium) equal to 11891 daN which, for a covered surface of about 441 m^2, leads to an incidence per surface unit equal to 26,96 daN/m^2.

For a comparison, it is important to remember the load of the summit stringcourses that contributes to the total load for about 7800 daN for an incidence per surface unit of about 69,03 daN/m^2.

Finally, also the distribution stringcourses on the masonry and the lateral elements for protection against sun-wind-water, which are the same for the various solutions, must be added to the above weights.

In picture 6, a prospective internal view of the solution in steel and corrugated metal is shown.

3. Model and analysis of the new roofing structures

We need to update our analysis of the structures of the Insula in the light of the latest technical regulations (the “New Technical Standards for Construction”, Decree of the Ministry of Infrastructures of 14 January 2008, and the relevant circular), and of the regulations designed to assess and reduce the seismic risk to our cultural heritage (“Directive of the President of the Council of Ministers to evaluate and reduce the seismic risk to cultural heritage with reference to the technical standards for constructions” of 9 February 2011). This will apply in particular to the structures of the main atrium of the Casa del Centenario and to those of adjacent interiors, should new roofing have to be provided as part of the restoration. This topic is always of primary importance in interventions carried out in areas of archaeological interest

Our previous explanations clearly show how aluminium and polycarbonate roofing is the best solution from a purely structural point of view, as it is less of a strain on the walls. If, however, we take into account the current state of the roofing on the Insula of the Centenary, which has recently been covered extensively using steel sheet roofing, such as Coverib by Ondulit (a multilayer, protective, steel sheet, with a corrugated profile and an external, electrolytic copper covering to guarantee a long working life, and a high level of thermal and acoustic comfort and tensile strength), we understand this opportunity of making the new roofing consistent with most of what is already in place. We can, therefore, consider CorTen steel (steel with high tensile strength and corrosion resistance which guarantees long term restoration) and sheet metal, such as Coverib by Ondulit, as being a suitable solution. On the other hand, the more difficult solution of wood and tiles would require further investigations and major structural work to strengthen the supporting walls.

The choice of materials in the project design was fundamental for load transfer to the ground. For the reasons given in the previous pages, we studied a means of resting the roofing on the existing walls, which would minimise the increase in stresses by introducing, where possible, perimeter stringcourses (with stainless steel reinforcement rods). Some of the models and numerical analyses made using commercial, finite element software are given below.

3.1 The geometric-structural model and stress analysis

We used laser-scanning technology for a fundamental survey of the geometry of the main atrium and the neighbouring interiors to provide a correct, three-dimensional reconstruction of the elevations. We divided the structural model as follows:

- model of the main atrium in its current condition, with an assessment of the tensile stress induced by its own weight and by an earthquake in both directions X and Y perpendicular to each other (with the X axis parallel to via di Nola);
- project model of the main atrium under corrugated sheet roofing supported by tubular steel profiles, with uprights resting on perimetric, reinforced concrete stringcourses, and an assessment of the tensile state from its own weight and from an earthquake in the aforementioned directions.



Fig. 7: Model of the load-bearing structure of the hypothetical steel roofing within the point cloud data.

Numerous sections were made on the point cloud data of the laser scanner survey to model the current geometry, and we reconstructed a three-dimensional model of the atrium of the Insula of the Centenary. We also made adequate models of previous restoration and salvage works, such as wooden or cement architraves and clay-cement roofing, as in the two oecii, strengthened during the project. In particular, we suggest the seriously damaged roof of the white oecus, which is currently under-pinned like so many others, be replaced with a mixture of wooden beams and planks and a concrete slab anchored to an existing, perimeter stringcourse (which will be replaced). To model the structure of the walls we used “shell” finite elements, automatically generated by the programme. The hypothetical roofing, modelled very precisely within the point cloud data (figure 7), will rest, where possible, on new stringcourses on top of the perimeter wall of the main atrium, after a reconstruction or replacement of a stretch of sacrificial masonry at obviously variable heights.

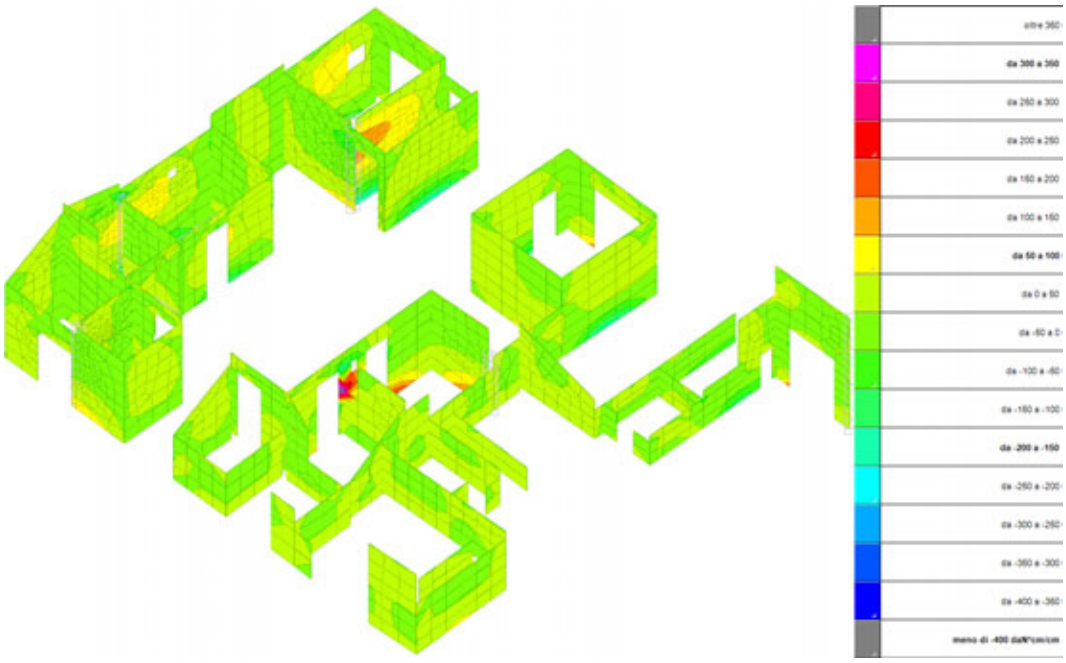

Fig. 8: Stresses Mzz for earthquake -X in its current state.

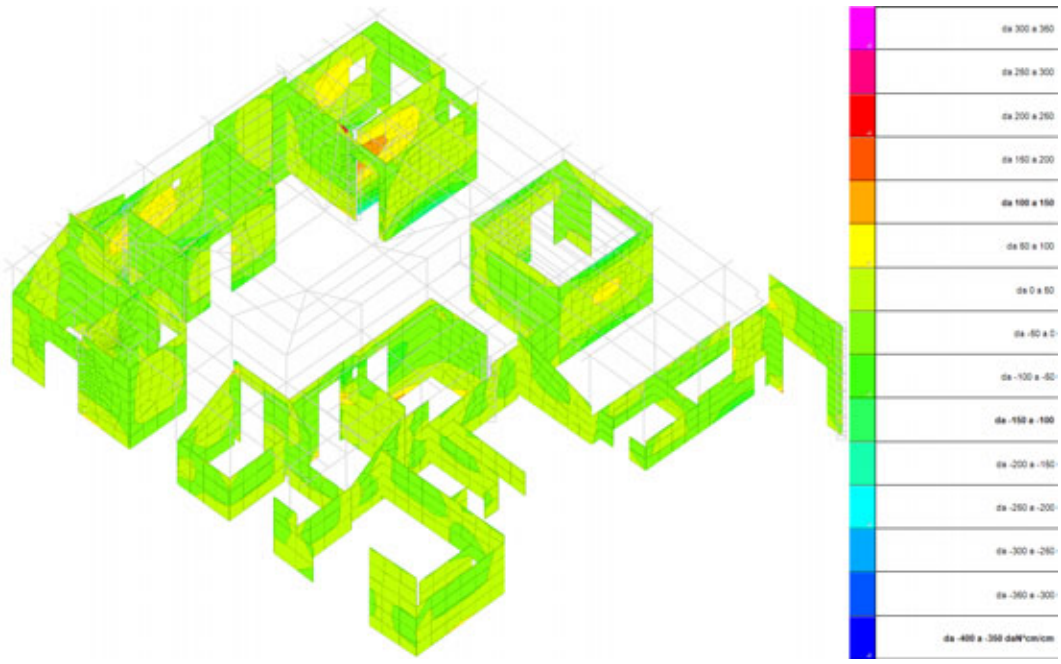

Fig. 9: Stresses Mzz for earthquake -X after roofing.

Injections of binding mixtures to strengthen the masonry were also considered.
A linear, elastic analysis was carried out. Figures 8 and 9 show the current state and the state of the project design, the tensile states for a typical Mzz stress (moment by unit of length, which represents the buckling of the wall panel under an orthogonal load on the panel itself) from an earthquake along the -X direction. A clear improvement can be seen in the stress state after roofing, due to the combined stiffening of the stringcourses and to the roofing structure itself.
From the analyses made on the model, it appears obvious how the tensile state, due only to its own weight, is not currently at a critical level, and how the increase in tensile stress, due to the new roofing, has no negative effect on the estimated torque capacity of the masonry of the main atrium. The checks carried out clearly show how the majority of the wall bays do not comply with the requisites set by the Ministerial Regulation of 14/01/08 for shear stress and combined compressive and bending stress tests. They also show the benefit of stiffening by the stringcourses, which redistribute tensile stress more uniformly and diminish the critical state of the perimeter walls of the atrium and the roofing structure. Lastly, further improvement is provided by the injection of binding mixtures.
In addition, the horizontal action forces in the white oecus are more equally divided and behave more like a box action since the floor has been replaced.
The proposed roofing rests on the perimeter walls of the atrium and becomes one with the existing structure. Even though, on the one hand, it leads to an increase in stresses, on the other, it enables a better distribution of the horizontal action forces, as a result of the perimeter stringcourses it rests on.
Finally, even though we used extremely precautionary resistances for the masonry, we will have to closely ascertain the condition of each individual wall panel, with probable local reinforcement in addition to what is already envisaged for the external facings (including work to re-adhere the plaster) and for the inner nucleus.

4. Conclusions

In the light of all this, we can see the urgent need to put roofing in place, given the frequent traumatic events in the area of the excavations of Pompeii. The roofing we have studied is an acceptable solution, as it will enable us to tackle the main problem of attempting to drastically slow down the deterioration of the walls caused by severe weather. By enabling a better distribution of the horizontal action forces on the walls, it will also contribute to improving structural strength in the event of an earthquake.
The activity done involves some aspects proper of the structural engineering: from the actual prototypal model to the mathematical model, to the analysis of data used, to the analysis of the results and their degree of reliability. A deep interaction with other teams of research is necessary, in particular for the archaeometric survey, the final effect is an enrichment of the knowledge in the conservation of the archaeological estate.

5. Acknowledgements

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The Authors, in particular, belong to the DICAM, ("Scienza delle Costruzioni" Section) and they deal with the structural analysis of the masonry of the Insula.
Numerical facilities have been provided by LAMC, Laboratory of Computational Mechanics of the DICAM Department. The company from Padua, Concrete S.r.l., designed the structural code, SismiCadUndici, for research. Its unusual features provide the opportunity to tackle all the phases of an analysis and testing envisaged by the recent NTC regulations of 2008 [Technical Construction Regulations], for the simultaneous use of masonry, cement, steel and wood structures.

Bibliographical References

[1] ADAM J. P., *L'arte di costruire presso i Romani – Materiali e Tecniche*, Longanesi & C, 1988, Milano.

[2] GIULIANI C. F., *L'edilizia nell'antichità*, Carocci, 1990, Roma.

[3] VARAGNOLI C. (a c.), *Conservare il passato – Metodi ed esperienze di protezione e restauro nei siti archeologici*, *Atti del convegno – Chieti – Pescara – 25-26 settembre 2003*, Gangemi editore, 2005, Roma.

[4] MBAC – Istituto Centrale per il Restauro - *Le coperture delle aree archeologiche – Museo aperto*, a cura di M. C. Laurenti, Gangemi Editore, 2006, Roma.

[5] RANELLUCCI S., *Coperture archeologiche – Allestimenti protettivi sui siti archeologici*, DEI – Tipografia del Genio Civile, 2009, Roma.

[6] SCAGLIARINI CORLÀITA D., CORALINI A., La Casa del Centenario (IX 8, 3-6.a), in D'AMBROSIO A., GUZZO P. G., MASTROROBERTO M. (eds), *Storie da un'eruzione. Pompei, Ercolano, Oplontis*, Napoli, 2003, pp. 283-291.

[7] SANTORO S. (a c.) - *Pompei. Insula del Centenario (IX, 8) – I – Indagini diagnostiche, geofisiche e analisi archeometriche*, Ante Quem, Bologna, 2007, pp. 317.

[8] CUSTODI A., SCIORTINO L., CASTELLAZZI G., GOVONI L., RIVOLA M., *Rilievo, modellazione e analisi strutturale delle murature dell'Insula del Centenario a Pompei*, in CUSTODI A. e SCIORTINO L., proceedings of the day of study: *"Rilievo, modellazione e restauro di murature antiche. Il caso dell'Insula del Centenario a Pompei", Bologna, Facoltà di Ingegneria, 16 settembre 2005*. Edizioni Thyrus, Terni, 2006, pp. 37-57.

[9] CUSTODI A., SCIORTINO L., *Survey, analysis and structural modelling of ancient masonry building: the case of the "Insula del Centenario [IX, 8]" at Pompeii*, in LOURENÇO P.B., ROCA P., MODENA C., AGRAWAL S. (EDS) proceedings of *"Structural Analysis of Historical Construction (Set of 3 volumes): Possibilities of numerical and experimental techniques. V° International Conference on Structural Analysis of Historical Constructions"*, New Delhi, India, 6, 7 and 8 november 2006. New Delhi, Macmillan India Ltd., vol. 3, 1851 – 1858.

[10] CUSTODI A., SCIORTINO L., *Il Rilievo Laser Scanning nell'insula del Centenario [IX, 8] a Pompei*, in GUELI A., proceedings of *V° Congresso Nazionale di Archeometria "Scienza e Beni Culturali", Siracusa, 26-29 febbraio 2008*. Siracusa, Morrone Editore, 2008, pp. 379-387.

[11] CUSTODI A., SCIORTINO L., *Dal rilievo all'analisi strutturale. Consolidamento e restauro nell'Insula del Centenario (IX, 8) a Pompei*. In CORALINI A., proceedings of international conference *Vesuviana. Archeologie a confronto. Bologna, 14 -16 gennaio 2008*, Ante Quem, Bologna, 2009, pp. 623-635.

[12] CUSTODI A., SCIORTINO L., *Una copertura di restauro per l'atrio principale della casa del centenario a Pompei*, in VEZZALINI G., ZANNINI P., proceedings of the congress: *A.I.Ar. 2012 Modena - VII Congresso Nazionale di Archeometria - 22-24 febbraio 2012*. Pàtron Editore, Bologna, pp. 730-741.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Renovating the existing to redevelop the territory. Restoration and reuse project of an eighteen century country house in Casalvecchio Siculo (Messina - Sicily) and realization of a farm holyday center

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Abstract
Country houses are a very important cultural and historical Italian heritage, which represents the identity card of their own region; so their restoration is, not only, the means to preserve the Country memory but also the way to make small villages more modern, livable, source of development. This thesis project focuses on Casalvecchio Siculo (Messina - Sicily), a pleasant medieval village with a strong tourist value. The country house, dating back to the late eighteenth century, is very characteristic; it was the summer residence of a well-to-do Sicilian family and it is surrounded by vineyards and pastures. I explored and recognized the building tradition of the area through an historical and functional analysis, after that, I found geometries, materials and degradation of the building so, I proceeded with the restoration project of the existing house and I designed the addiction structures such as new rooms, stables and horse riding in order to realize a farm holidays center. The project uses local materials, such as sandstone and oak wood, to build a modern architecture but linked to the territory; it contemplates both new technologies and traditional forms that integrate together with the natural environment by utilizing its picturesque landscape and the favorable climatic characteristics. The aim of the project is the restarting of the economic recovery of the area thanks to the restoration of traditional production functions, and tourist offer of hiking and wine tasting tours.

Keywords: country house, environment, territorial requalification, agricultural economy, tourism.

1. The historical farm buildings and their impact on the environment
Within the wide variety of Italian architecture, there is not only the "high" one, which has always dignity in historical culture, but also the "popular" one. Although it seems repetitive and accidental, rural architecture is actually the result of the centuries-old practice and experience that has led to the refinement of techniques and use of materials. During the twentieth century there has been a historical change of mentality and sensibility that has led us to consider rural houses as part of the cultural and material heritage of a civilization - worthy of being studied and to have the same protection and enhancement of monuments, buildings and urban architecture, considered by more and more important. Today, the study of the rural experience is important as the basis for the development of a more environmentally conscious architecture, based on the use of readily available materials and the use of low-impact machinery and construction techniques – an architecture that is "conscious" in all its phases, design, construction, maintenance, and eventual disposal.
My main goal is to investigate how the environment has influenced the architectural development in modern rural Italy and, particularly, in the area of eastern Sicily – I'll try to understand how all this is translated in the specific case of the restoration of a farmhouse in Casalvecchio Siculo, in the province of Messina, and finally, how the project of re-use and recovery of the old production functions can favor the development of tourism in a small village, and give an input to the small local production, which is currently fragmented and poorly organized.

1.1 Connection between architectural practice and local spaces

The geographical position and the wide variety of environmental conditions of the Italian territory, as well as the complex historical events, has led to the development of a remarkable breadth of agricultural scenarios: from large terraces, to allow the greatest possible exploitation of cultivable areas in the mountain and hilly regions, to the intensive cultivation techniques of the great plains with the use of large irrigation canals. Each different background has influenced the techniques of cultivation, so the rural architecture, takes different shapes and materials, and different arrangement of spaces depending on the climate, topography and cultivation. The Italian agricultural landscape as we know it, was born with the beginning of the large land reclamation plain, the clearing of great hilly and mountainous areas, large crops of trees and shrubs that included spaces wider and wider and when the lack of manufacturing resources already present in other nations, has forced the Italian population to consider the agriculture as the main activity for their livelihood.

Rural architecture is very closely linked to the territory and can be included in the history of architecture thanks to the variety of its constructive solutions. Its importance is that develops in a context of scarce resources that led the ancient builders to the study of ingenious technical and formal solutions that today are taken into account in processing of sustainable architecture, in the development of new materials and in the refinement of traditional building techniques. So why do a restoration project of the existing rather than building a new structure according to techniques and modern materials? First of all, for strictly *practical* reasons. The traditional building techniques are based on a fundamental assumption: get the maximum results with minimum effort. In this case the "minimum effort" is the use of the construction area materials, that are now called "short chain" or "zero kilometer" - materials such as stone, wood and brick, with high efficiency and that are excellent thermal insulators and excellent heat accumulators, which were chosen by the ancient builders for the ease of availability and the final result which ensured. The construction techniques are the result of studies based on the practice that have their roots in history, and which have been perfected over time to get buildings comfortable and high-performance. Then, comparing the traditional ideology with the new modern research in the field of sustainability we cannot help but notice that, in fact, their main points are perfectly superimposed. So why not take advantage from an already well-established centuries-old practice and based on it to improve it and perfect it with the new technological knowledge?

Another reason is *historical*. The study of a place is necessarily an analysis of its architecture and rural ones are very important for Italy which has based its historical economy on agriculture – there are so many cases so it is fascinating to discover how the large kind of Italian countryside has led to such different developments.

1.2 A brief history of the Italian settlements: different territories, different types of buildings

The building typologies of rural architecture, being in close contact with the land they occupy, change in shape, materials, and aggregation than that they are in the north or in the south, in the plain, in the hills or in the mountains. It's definitely impossible to give a complete and accurate description of all building types and kind of territories so I will make a brief introduction of the main Italian types and focus, then, on the Sicilian case and on the project. In Italy, from the agricultural point of view, we can identify two big geographical areas, north and south, divided by an imaginary line that can be positioned below the Tuscany. The north is a land rich in water, well drained and irrigated over the centuries, which is used for intensive agriculture, with plantations of rice, cereals and fodder. To the south, however, we find dry lands, often arid, without any type of irrigation until a few years ago, with cereal crops and forage, vines and fruit trees. As these environmental characteristics affect form and



Fig. 1: Aerial photography, historical and cadastral plan of the intervention area in Casalvecchio Siculo.

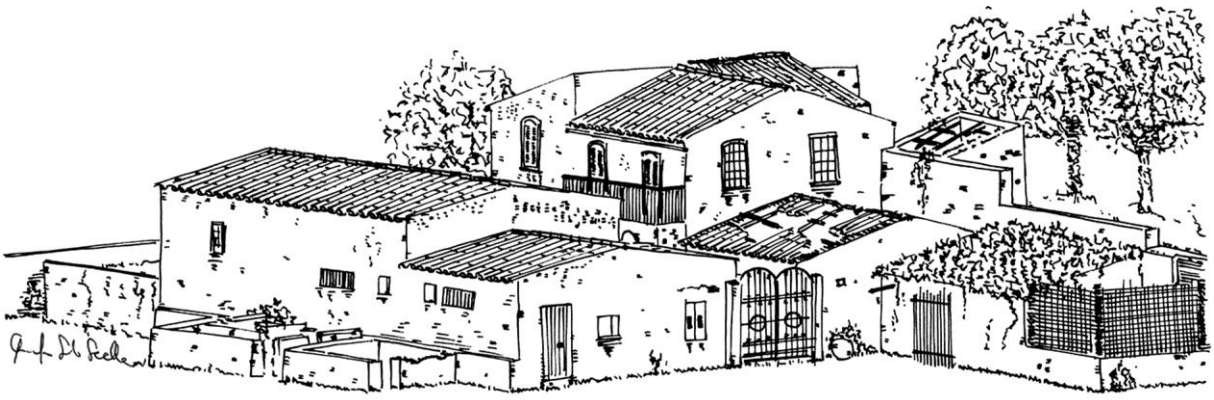


Fig. 2: Study sketch of the country house object of restoration.

function? The Po valley, lush and easily irrigable, was the perfect place for a fruitful and intensive cultivation. Thanks to the adoption of the system of rotation of the earth, the heavy plow and the reclamation of land, developed large farms that had larger buildings, with U-or L-shaped, with animal shelters in the north, the houses of the factors and deposits for tools on the east and west, and the home of the conductor and the warehouses to the south. These large companies also led to the birth of the farms, called "*cassinot*" or "*cassina*" ranging in size from high to low valley.
Another example is the farmhouse – the *casa colonica* - typical of the Piedmont hills, the lower Veneto, Emilia, Tuscany, Marche and of many South areas. In this case, buildings had a unique fabric and were isolated only the pigsty, the oven, the chicken coop and shed a few. On the ground floor were the kitchen and deposits, to the first floor bedrooms.
The case of Emilia Romagna is particular, in fact, the environmental variety has made possible the emergence of human settlements very different between them. In the area of Imola-Faenza, the house is a courtyard, built with blocks of chalk, while in other areas is a threshing floor, built with adobe bricks and river pebbles and sometimes in blocks of conglomerate stone.
In the northern Lazio, in the Maremma and Tuscany, developed sharecropping. In 1400 the large estates were divided into many small farms, where the farmer paid the landlord with some of the goods of the earth. The home-based company of the sharecropper, in a dominant position respect to the farm, and sometimes enriched by architectural models such as citizen, tried to provide as much as possible to the maintenance of family farming, producing his own corn, wine and oil.
The first Tuscan country houses dating back to the sixteenth century, were usually built in correspondence of existing isolated fortifications. These, usually made of stone or brick, often had two or more levels, with the roof covered with brick tiles. To the north there were spaces for the chicken coop, stables for cattle and pig sty. Inside the farm were also oven, well, wine and olive presses, and sometimes even the furnace.
In the islands and in southern, latifundia, the large estates of nobility and church, was characterized by the cultivation of extensive type. The owner of the funds often resided in the city and entrusted to an administrator the management of land. South territories have, for reasons related to the above, extensions much larger than those in the center and north of Italy. In large cereal and pastoral of the South and Sicily it is common continuous grouping of all the buildings around the house of the conductor.

1.3 Agricultural lands: relationship with the modern economy

The rural house "is first of all the point of reference and identification of a certain company, its core function: and therefore is a summary of what takes place in the company. You can categorically say that the company is reflected in it: both with its agronomic organization and with its production and management relationship" (Gambi 1976). The agricultural scenery is, physically, large part of the Italian territory as well as a very important system both from the architectural, cultural and economic point of view. Throughout the nineteenth century Italy remained essentially rural. At the time of Unity, about 70% of the population was engaged in agricultural activities.
In the modern period, particularly after the Second World War, the politics of urbanization has led to a rapid depopulation of the countryside with consequent nutritional needs of the population against a diminishing agricultural laborers. This has led to overfishing of some areas and the progressive abandonment of the remaining (mostly in terms of size). In recent decades, attention to form, materials and rationality of the buildings, was replaced by the building of low-cost little inserted into the rural landscape.

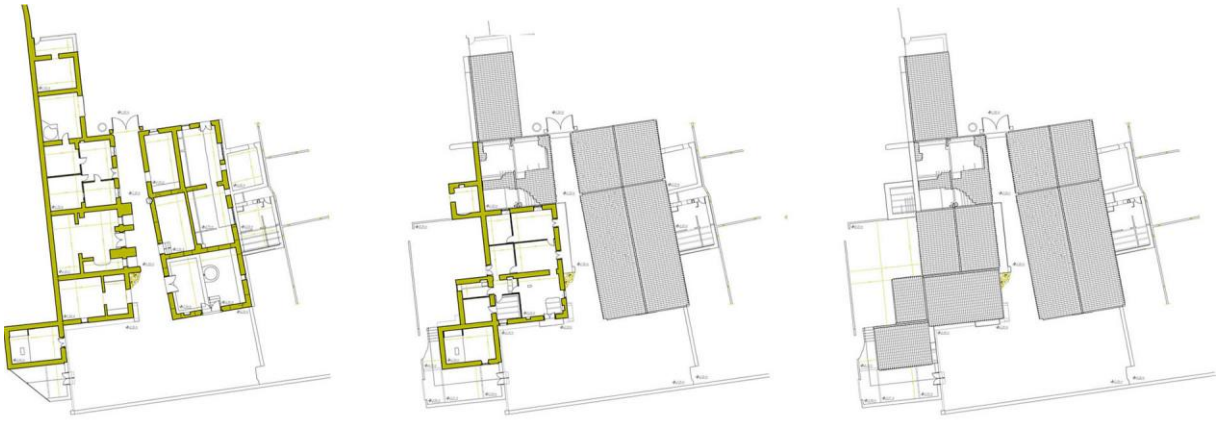


Fig. 3: Plans at present of the ground floor, first floor and roof.

Unfortunately, in an already so critical context, the local government did not support the agricultural areas with an initial lack of interest of the farm buildings and a subsequent “wild” liberalization of recovery permits of old farm buildings that are now often small rural "condos" with questionable results from the architectural point of view and which are not reintegrated into a broader economic context. Recovery of rural buildings should be included in a redevelopment plan for the campaign and restocking of small villages; old farm buildings should be recuperated in accordance with their architectural, functional and contextual characteristics.

2. The Sicilian case

Historically, the dominant form of rural settlement in Sicily has been the *latifundium*: a widely large agricultural land, usually poorly cultivated and used in extensive crops often alternate to grazing, led by landowners who lived away from their lands and resided in the city. 1950’s are marked by the *agrarian reform*, which imposed the expropriation of a large number of estates to divide them into smaller properties in favor of the peasants. The plan, however, did not favor the emergence of companies organized according to modern standards and instead created a large number of plots so small as to be just sufficient for the subsistence of small farmers. In these years was started the industrial development of the country through the Marshall Plan aid, and between 1954 and 1963 took place the so-called economic miracle that in a few years led Italy to become one of the major industrialized countries in the world. Since the reform, the latifundium has been gradually disappearing until no longer exist today, and it came to the progressive marginalization of agriculture and agricultural labor.

2.1 The shapes of the Sicilian architecture

The typical rural house has always been in masonry, in most cases to very simple structure. The more modest houses, those of the so-called "*viddanu*" were originally single cell, in which all the essential functions of housing, shelter animals, and storage, were conveyed. These houses no longer exist, in part because they have collapsed, in part because they have been modified and elevated. Instead, the wealthy farmer's house has retained its original character over time. He, known as "*burgisi*," possessed of an estate of a certain size and possessed cattle. This type of housing differs from area to area. In Catania, it consisted of two or three rooms on the ground floor, one of which is used as a warehouse and deposit for the wagon and characterized by a large arched door.



Fig. 4: Photographs at present: north prospectus, chapel and between the two fabrics.

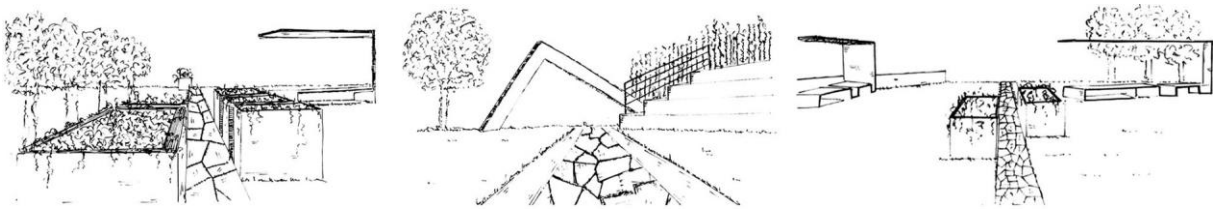


Fig. 5: Study sketch of the new essences park.

Trapani's burgisi home was generally two-storey, with the deposit for the wagon, kitchen, stables and stores on the ground floor and the room upstairs. Even in the area of Messina the house has more than one floor. A common feature to the whole Sicilian architecture is the rational use of spaces: various lockers were made in the walls and the tools were often hung on the wall. Common to many rural dwellings, is the cover with woven reeds and lying on the wooden beams on which were placed the tiles of clay.
The houses of the Sicilian countryside reflect the peculiarities of the environment. To better attune with the look of the agricultural landscape is probably the home country of western Sicily, almost always without plaster and built with materials from the bystanders quarries. In the Sicilian countryside, however, we also find homes that have nothing to rural areas. For example, the architectural elements of the mansions of eastern Sicily are derived from urban, particularly those from Catania and Ragusa where the owners spent half of the year.
The differences between the true rural dwellings are very pronounced depending on the areas considered. In the area of Pantelleria, the "*dammusi*", stone buildings with vaulted ceiling, were very characteristics. Particular were also the typical houses of the Aeolian Islands with regular mass and a terrace roof, representative of the Mediterranean areas. The *baglio* of Trapani, since the seventeenth century, had a dominant role in the urbanization in scattered houses; it consists of a large square-shaped building that surrounds a large open courtyard called "*bagghiu"* around which there were functional buildings (stables, warehouses, storage) and dominant was the manor house and chapel. After the agrarian reform many of them have hosted the first factories that produced the Marsala wine. Very similar to the structure of the baglio is the *masseria* with the same lack of homogeneity of its buildings and the appearance of a fortress. This is the only form of block present in all the provinces of Sicily. The Sicilian rural architecture, thanks to its variety, can therefore be considered as an encyclopedia of the history of all the civilizations that have ruled the island, from which you can take shapes, architectural elements and techniques, which are essential for the development of a new kind of contemporary architecture.

2.2 Materials and construction techniques

The study of masonry techniques of rural dwellings is useful to reconstruct the local customs, social and geographical characteristics, the nature of the construction materials and processes, from installation, to finishes. The attention to the historical architecture and for its preservation is essential to prevent demolition, replacement and restoration in style which break with the Sicilian history. The study of techniques becomes, therefore, a further advance knowledge at the service of the conservation and is essential as a preliminary diagnostic phase. To know the distribution of voids within a wall section or the number of garments that form a structure, is a fundamental indication to intervene with an appropriate consolidation.
In the rural buildings type, the facing wall varies in accord to the kind of material that offers the area. The system with squared elements is often used when easily machinable materials are nearby available. The differences in the use of building materials, especially affecting the choice of technique to be used. Commonly, around the island, there is the adoption of the wall texture in squared rows but in the area between Messina and Catania, the squared masonry is replaced by the mixed one. The walls are built with carved elements of variable size in height. The elements used do not comply with standard sizes but vary in order to allow a greater economy in the shipyard, allowing the recovery of more modest pieces of material.
The types of masonry are many: with *square blocks* used for the entire prospectus and often left to face view, with *mixed elements* such as blanks built with fragments of brick or river stone and almost always plastered, or the more modest homes walls made of stone combined with mud. The square stone was also used for hollow masonry and was often used, with other irregular elements, to compose the inner face of the walls that were expected plastered. The foundations were deep and rested on a strong ground. The average thickness of the walls was between 50 and 70 centimeters.



Fig. 6: Photorealistic image of the overall project.

3. Case history: restoration and reuse project of an eighteen century country house in Casalvecchio Siculo (Messina-Sicily) and realization of a farm holyday center

In reference to the above, the project aims to work on a farmhouse in Casalvecchio Siculo, a small medieval village in eastern Sicily, in the province of Messina. The restoration of the building aims to the recovery of historic property, dating back to the late eighteenth century, particularly interesting from a historical and formal point of view. Typical of rural dwellings that have changed over time, even in this case there is the aggregation of original cells with more recent others that have occurred over the course of two centuries, and it was decided to preserve as a witness of the historical events that have influenced the current shape of the building and the succession of the different construction techniques and new materials.

The project main goal is the creation of a productive, educative and touristic center. For this reason it was decided to restore the old features, such as wine production, and integrate them with new ones, respecting the traditions of the area and its agricultural characteristics. The massive presence of citrus trees on the property, which are currently untapped, inspired the production of citrus liqueurs, such as limoncello, typical of Sicily. The plan expected to restore the oven and use the remaining spaces for the creation of stands for wine tasting tours and as a basis for external producers, in order to encourage local production. Project interventions will be designed, as much as possible, to restore and recovery the original typology through the use of construction techniques and traditional materials such as stone and wood, in agreement with the necessary safety adjustments of the artifacts.

3.1 History of Casalvecchio Siculo

Casalvecchio Siculo is a small village with 887 inhabitants in the province of Messina in Sicily. Located on Mount St. Elias at 370 meters above sea level, the village is 39 kilometers far from Messina, 5 from Taormina and 20 from the *Ionian coast*. According to the topography, the country has typical medieval features, with a succession of narrow streets that intersect themselves and unfold in underpasses typical of medieval Spanish and Arabic.

Casalvecchio is very ancient: it already existed in the Byzantine era with its Greek name *Palachorion* that mean "*old farmhouse*" or, in Italian language, *"vecchio casale"*. The country has achieved a remarkable demographic growth up to the 1930's when there were almost 5000 inhabitants. Subsequently, some of its fractions were removed. Therefore, the village underwent a progressive reduction in the number of inhabitants for a process of emigration due to lack of work. Periodically, during the summer, Casalvecchio is repopulated thanks to the return of migrants.

The site of Casalvecchio, that is one of the most charming little town along the Ionian coast of Sicily, has a strong tourist destination, thanks to its breathtaking views and its particular natural value. Casalvecchio is a great tourist destination and it is suitable for hosting important events and it is able to integrate with the surroundings and constitute a source of great curiosity for tourists. Therefore, as part of the restoration of the rural house, new structures have been designed to integrate the original ones, to give birth to a farm holiday center.

3.2 Analysis of the building type

The country house consists of two buildings, the first, which has one level, had productive and remittance use, the second had residential purposes. The building, dating from the late eighteenth century, with additions dating from the Second World War, has a *slope house* typology *(casa di pendio)*. This is a typical form of rural settlement, both spread and centralized, which uses the slope of the ground to eliminate the staircase connecting between the two floors of the building. The house is

above the rustication which included the oven and wineries. In front of the main building there is a second fabric, similar sized, with the fold, the stables, the barn, the drying and the production of wine. Fold and barn exploit the slope of the land having, the first, the entrance to the valley, and, the second, on the mountain side, with a gabled roof and small windows. The main fabric also includes a chapel containing niches for dead people, used until 1806, the year of the entry into force, in Italy, of Napoleonic edict of Saint Cloud that prevented the burial of the dead within the city walls. Interesting feature of the building is the rational use of spaces; there are several lockers, made in the walls, in many rooms. Another feature of the house is the presence of large outdoor spaces, that were exploited through a circle columned structure originally covered by a pergola, now collapsed, used as a resting place during the summer.
The compartments are delimited by load-bearing walls with a thickness of 55 cm; the division of the interior is made with light partitions in wooden barrels, covered with rough coat of plaster and finishing, structurally independent from the masonry. The walls of the facades have many openings, especially in the one level building, to allow access (usually a separate access from the ground floor and first floor) and to give adequate lighting to interior compartments – conversely, interior walls have few openings between rooms. The productive building has five cells, two of which are added after 1945 - four rooms have their own entrance in order to witness the functional differentiation between them. Additions have a lower internal height than the historic building. Therefore, in this structure, we can find: to the east, two adjoining *stables* with masonry mangers; to the south, a *room for pressing grapes* which contain a large masonry tank connected to a smaller pool of circular shape, in which flowed the wine must; to the west, a *depot* and a *drying room* with a separate entrance. Outside there is a brick and concrete small structure used as a *chicken coop*. The second building, on two floors, includes different functions. It contains - according to oral sources and by analyzing the type of construction and materials – a stratigraphy of additions over time. At the ground floor, from nearest to farthest respect the main entrance of the building, to the north, there are: an independent room of which we do not know the original function; the masonry *oven*; a four rooms *residence*, is a state of decay because of the collapse of roof; next to it there is the *wine cellar* and another room probably served as a *warehouse* and the *chapel*. The main entrance of the first floor is on the opposite side respect the ground level and it is accessed by an external staircase. Here there is a second residence, probably the manor house, consists of 7 rooms including entrance hall, kitchen, two bedrooms, a bathroom (added in 1950 approximately) and a lounge and with two balconies (south and east). Outside there is another compartment of which the function is unknown and probably, originally, flanked by another local, now collapsed.
From the structural point of view, foundation is probably deep and rest on a resistant ground. The thickness of the walls is between fifty sixty centimeters. The walls are entirely structural, mixed and double row, with transverse elements of connection. It consists of a large stone blocks base arranged horizontally to a height of about 50 centimeters beyond which the stones become smaller and are integrated with bricks, either whole or in fragments and with pebbles. The masonry is tied with lime mortar. At the openings, both windows and doors, there is a strengthening through frames of solid bricks. The mostly used stone for decorative details exterior is *yellow sandstone*.



Fig. 7: Photorealistic images of the restoration of the existing building, new stables and horse boxes, bar-restaurant and new room buildings.

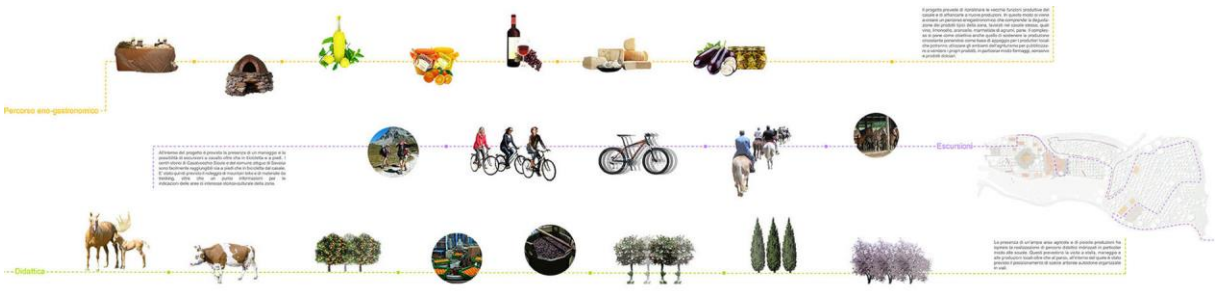


Fig. 8: Example of the possible routes: educational, hiking trail and eno-gastronomic.

3.3 Analysis of the degradation and restoration

The building has a widespread degradation that involves the walls, the roof and the windows. The set of degradations and failures detected is mainly due to lack of maintenance. The house is abandoned for nearly fifty years and the progressive degradation caused a partial loss of the roof and of the floor of the second level. In addition, because of the malfunction and the partial lack of drainage channels that led to the decay of the supporting structure of the roof, over time, slight cracks were formed in the walls, and a masonry collapsed. On the outer surface of the facades, the lack of maintenance has caused, locally, the disintegration of the plaster, and when the latter failed, the disintegration of the joints and the progressive loss of mortar and elements of integration (brick, pebbles) between the stones of the masonry. The main actions that are planned for the restoration are: the reconstruction of parts of the floor, walls and roof collapsed, the integration and consolidation of the support plates of the shell, and the consolidation of the wood and iron fixtures.

3.4 The reuse project: expectation about its impact on the area

The reuse project involves the restoration of the original house that will include local for wine production, wine cellars, furnace and production of citrus fruit liquors such as limoncello and mandarinello. These activities will be supported by educational paths and hiking trails, and for this reason, in the historical building will be located offices, information center, bicycle rental and hiking equipment. There will be a small excavation of 2 x 5 meters in the entrance hall in accord to the placement of stairways and elevators, before non-compliant, for the upper level access. The new buildings consist of 8 new fabric that contain 10 rooms for overnight, oriented according sunshine/shading, ventilation and the enjoyment of the view of the landscape; each room is served by a small patio sheltered by sliding brise-soleil panels. Another part of the project involves the construction of the bar-restaurant with 70 seats inside and 150 outside, with an adjoining office. There will be a park of essences, with tree-lined avenues, each of which will have a different tree species. Within the park there will be shelters and portals made of COR-TEN steel. The stables are designed away from the center, in addition to the barn I plan stalls for horses and horse riding. The other activities planned for integration of these routes are bike rental and hiking equipment. The residences will be restored and integrated with new rooms with separate entrance, included in the new park and they will be serviced by a bar-restaurant. The chapel will retain its original use. The projects of the barn, stables and citrus storage consist of very simple volumes: the brise-soleil system entirely covers the buildings, creating a sort of boxes. These are closed at the bottom by perimeter walls that are interrupted up to 3 meters in height; at this point the wall is interrupted and the structure of wooden beams continues to support only the brise soleil which leave the top of the buildings completely open, in order to favor ventilation and the passage of natural light. The stable consists of the stockyard, the tool sheds and the barn. The citrus storage consists of a large open area and a office. The particularity of the brise-soleil band, open to the top, allows, in addition to natural ventilation also the passage of light from the outside to inside and reverse - the interior lighting, in fact, is visible on the outside of the buildings making them illuminated boxes during the night.

4. Conclusions: objectives and expected results

This project is an expedient that start from the restoration of a farmhouse with its area of relevance to fit into a broader context of urban redevelopment of a historic city such as Casalvecchio Siculo. We expected that the restoration of the old production functions can be a base for small local producers, now disunited and with little chance of expansion, for a more united development that spreads like wildfire and can allow a pleasant village to become a strong touristic attraction – a village that can offer not only its natural beauty, but also cultural tours and small excellence productive activities, exploiting the agricultural products of very high quality, offering by a rich territory like Sicily. Even if the project intervenes on a specific building, it wants, however, to be an attempt to integrate the wide surrounding area. It is a basis for cooperation between operators in the region, whether they are

farmers, small producers, local and municipal authorities. Specifically, the functions of the old and new tourism center will convey into three main *routes* in order to offer a big range of targeted services and that, in this case, I will use to better illustrate the real purpose of the plan.
The first of the three paths is *educational*, that is targeted to both tourists and the many schools in the district. It is run from the new stables and horse riding, continues with a visit to the production places (processing citrus fruit, wine, cheese and oven), to finish to the essences park in which there are small ways flanked by several native species of trees. The main purpose of the route is to provide an alternative education for children in the area, who have few opportunities to enjoy nature, that can be instructive, challenging and fun at the same time. The second is the *hiking trail*: riding, cycling and walking; inside the farm was expected, in fact, the hire of mountain bike, and hiking equipment. This type of activity also involves the remaining inter-municipal territory, in fact the historical centers of the main towns of the area can be easily reached, so these tours range from the natural to the historical territories. Finally we have the *eno-gastronomic* route of the products of the farm (wine, citrus marmalade, limoncello, bread, cheese), it use the considerable spaces of the farm to include a stand area that can be used by local producers to advertise their products. In conclusion, this intervention is not isolated but is part of a rich territory from a historical and productive point of view, but that is today, unfortunately, underused. The project, of course, may not contain all the useful functions to the economic recovery of the area but it want to give an example from which the area can start for a wider program of planning – an intervention which going to affect growing parts of the territory in order to create, in collaboration with stakeholders, a large scale plan that allows an economic recovery but that does not distort the intrinsic characteristics of Sicily.

Bibliographical References

[1] AGOSTINI, Stella. *Recupero e riuso degli edifici rurali. Elementi di progetto e di piano. Integrazione nel paesaggio*. 1ª ed. Bologna: Maggioli Editore, 2008.

[2] BARBIERI, Giuseppe, GAMBI, Lucio. *La casa rurale in Italia*. 1ª ed. Firenze: Leos Olschki, 1970.

[3] DI MARTINO, Mauro, LIBERTO, Marco, ODDO Giuseppe. *Sicilia rurale: potenzialità e realtà agrituristiche.* 1ª ed. Palermo. Regione Siciliana Assessorato Agricoltura e Foreste Servizio allo Sviluppo, 2010.

[4] FIORANI, Donatella. *Restauro architettonico e strumento informatico. Guida agli elaborati grafici*. 1ª ed. Napoli: Liguori, 2004.

[5] GIUFFRE', Antonino. *Sicurezza e conservazione dei centri storici. Il caso di Ortigia*. 1ª ed. Bari: Laterza, 1993.

[6] LANER, Franco. *Tecnologia del recupero delle strutture lignee*. 1ª ed. Mestre: Flap Edizioni, 2005.

[7] MUSSO, Stefano. *Tecniche di restauro aggiornamento banca dati*. 1ª ed. Torino: UTET Scienze Tecniche, 2013.

[8] VALTIERI, Simonetta. *Vademecum. Per un progetto architettonico*. 1ª ed. Roma: Ginevra Bentivoglio EditoriA, 2007.

[9] ATTOLICO, Angelofabio, MICELI, Maristella. *Vademecum. Casali rurali in età medievale in Agro di Grottaglie (TA): alcune riflessioni sugli insediamenti rupestri, problemi e prospettive di ricerca*. In AA.VV. *Paesaggi, comunità, villaggi medievali*. Spoleto: Fondazione Centro Italiano di Studi sull'Alto Medioevo, 2012, pp. 733-753.

[10] BARONE, Zaira. *Tecniche costruttive murarie nell'architettura siciliana tra XV e XVI secolo: studi per la conservazione*. PhD thesis.

[11] AA.VV. *La casa rurale in Romagna tra XIX e XX secolo.* In www.scienzegeografiche.lettere.unibo.it.

[12] ROSSI, Luca. *Fabbricati rurali e territorio*. In http://www.agronomimodena.it.

[13] STAGNO, Anna Maria. *Casa rurale e storia degli insediamenti. Un approccio geografico per l'archeologia dell'edilizia storica*. In www.academia.edu.

[14] http://www.treccani.it/enciclopedia/costruzioni-rurali_(Enciclopedia_Italiana)/

[15] http://it.wikipedia.org/wiki/Casalvecchio_Siculo

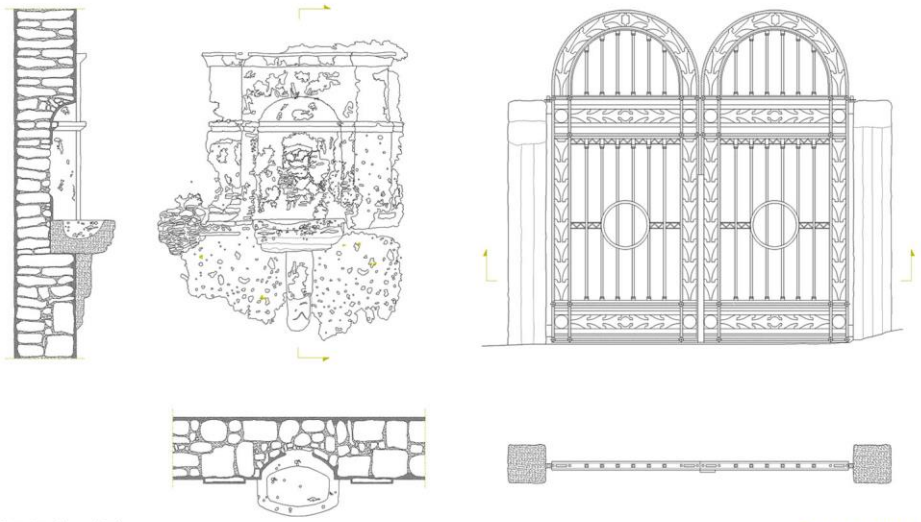
[16] http://it.wikipedia.org/wiki/Categoria:Architettura_rurale_in_Italia

RESTORATION AND REUSE PROJECT OF AN EIGHTEEN CENTURY COUNTRY HOUSE IN CASALVECCHIO SICULO (MESSINA) AND REALIZATION OF A FARM HOLIDAY CENTER.

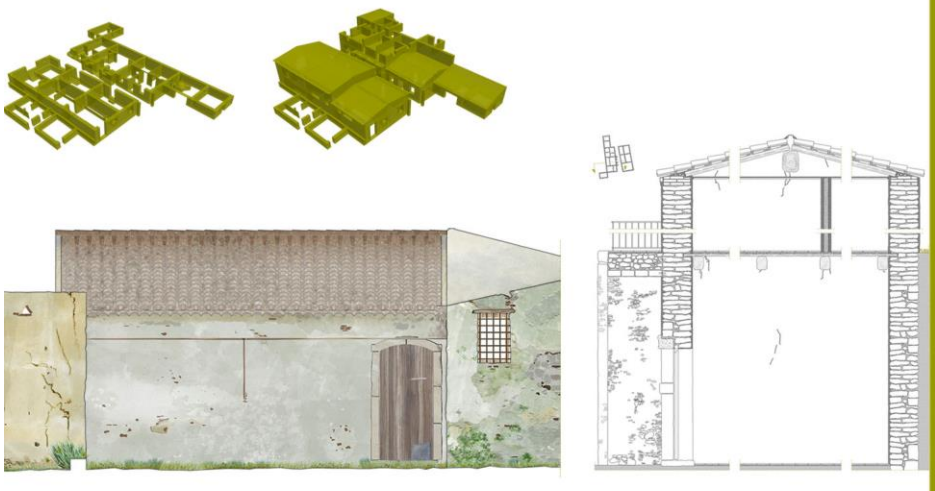
Arch. Alessandra Maniaci
Arch. Gianfranco Salemi Scarcella



Prospectus east



Construction details



Constructive section



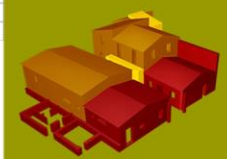


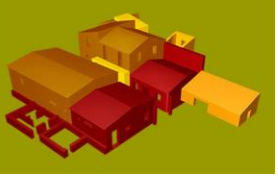
Prospectus north











XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Memory Vs Oblivion. Best practices for the constitution of the museum of Reggio Calabria

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Abstract

A work in progress for the establishment of the Museum of the City of Reggio Calabria according to the use of methods, techniques and tools for digital documentation of cultural heritage represented by fragments of pre-earthquake Reggio, from the National Archaeological Museum, given in custody to the Mediterranea University of Reggio Calabria, on the occasion of the renovation of Piacentini building.

With the Unité Mixte de Recherche CNRS / MAP (France), the "Mediterranea" has embarked on a teaching experimental activity for a renewed idea of enhancement of the architectural and artistic heritage, with particular reference to the lost city after the earthquake of 1908 giving strength to a new professional skills in the field of communication and promotion of cultural heritage. This project was developed with the aim of collecting the fragments of a city reduced to zero by the physical and oblivion disaster, which aligns with the common notion of resilience (a concept which refers to the ability of a community to rebuild the equilibrium conditions as a result debilitating external events) and to create shares of thought and memory among individuals.

The use of experimental softwares developed by the MAP Laboratory of CNR has allowed the surveys of several stone artefacts and the subsequent processing of the acquired data aimed at the construction of interactive 3D representations for digital documentation which will form part of the exhibition project.

Keywords: memory; 3D models; virtual museum; virtual reconstruction

1. An idea to build a virtual museum of the city (FF)

In July 2013, within the framework of the European Project MIUR "Messaggeri della Conoscenza", with Livio De Luca, we shared the scientific responsibility for the educational/scientific project *Methodologies, techniques and tools for the digital documentation of built heritage* in which about twenty students of the *Mediterranea* University have experienced a detection protocol with SLR camera equipment, data processing system Tool and Acquisition Protocol for ENhancing Artifact Documentation (TAPENADE) and 3D modeling.

The procedure was applied to some fragments of Reggio before earthquake, from the National Archaeological Museum, and held in custody at the University of Reggio Calabria during the renovation of the Piacentini building.

This experience proved to be of great scientific openness to the results produced, both for the technical skills acquired digital, for communication projects for cultural heritage that have sprung up.

The field of cultural heritage is an ideal field of application for digital experiments related to the historical and archaeological heritage, and in our case involves the disciplines of visual representation and communication, aimed at creating virtual catalogs, at the museum with prototypes of parts historical heritage, achievements in anamorphic and specific sections dedicated to virtual reality and augmented reality.

The *Mediterranea* University in May 2013 has been in temporary storage, a collection of over 200 architectural pieces found or saved from demolition in the city of Reggio Calabria and the surrounding area after the earthquake of 1908. The collection of "fragments" architectural and sculptural , held until April 2013 in the holdings of the National Museum of Archaeology and unknown to most people, is now kept at the *atelier* of the former Faculty of Architecture and set up as a temporary exhibition in collaboration with the Tech Office of the University, under the direction of the Superintendent of Archaeological Heritage in the Region of Calabria. It is a heritage of Reggio's memory that emerges after a long silence to ask the attention of scholars and citizens to witness the history of the city and revive awareness of the materiality and physicality of "pieces" directly from the buildings disappeared, witnesses to the quality of architectural history and building of the city until the nineteenth century.

A set of documents that can be profitably connected and "crossed" with the cognitive data from other "fragments " of the city's history , those made from less valuable papers, drawings and projects are preserved in the Archives of State and the Historical Municipal Archives.

The collection gives an account of the relevance of a documentary heritage that reveals the potentialities of the possible interaction of the same - for the purpose of historiography that museological - with material evidence architectures disappeared. The series of exhibits is due to urban history from the sixteenth century, both the architectural and sculptural elements that graphic testimony and documentary Reggio stem primarily from the late-eighteenth and nineteenth centuries built after the earthquake of 1783.

Taking this opportunity, presents itself today the opportunity to study with more knowledge of the history of town planning and building cities, leading to a true reconstruction "virtual" Reggio before 1908, and, above all, the creation of a true Museum of the city, assisted by a virtual catalog of the pieces recovered.



Fig. 1: A neighborhood of Reggio in an image after December 1908

To Reggio Calabria, a *Museum of the city* should aim to collect the fragments of a city reduced to zero by the disaster by the disaster and physical oblivion , an event of enormous scope that was accomplished in a period of a few minutes and that changed that part of the world that would never be the same again.

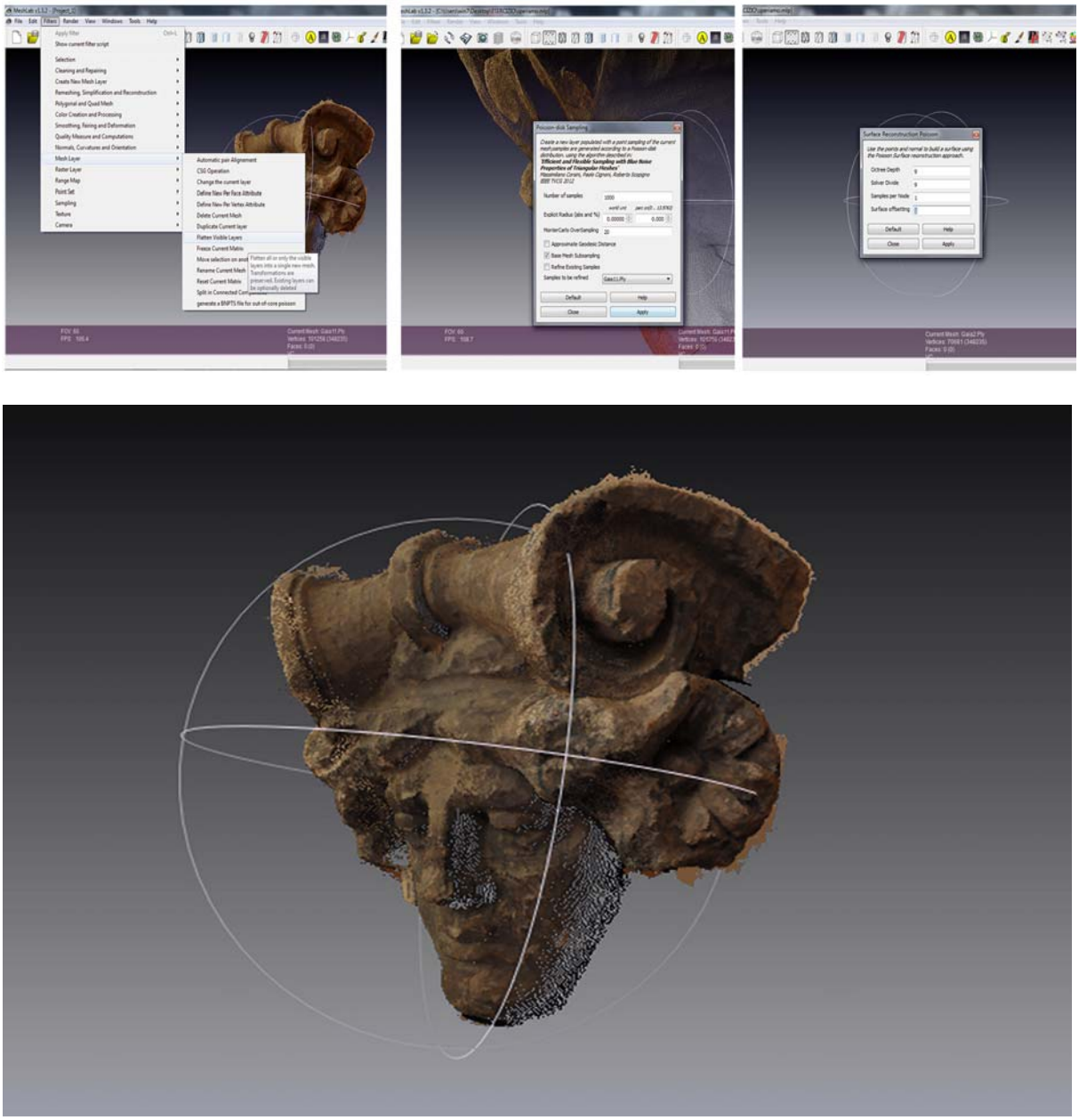
The earthquake of Reggio and Messina, more than a hundred years after its occurrence , it reads like the paradigm of discontinuity and loss of memory that seems to afflict modern man , and particularly for this section to design a virtual disappearance of the city , it means creating a documentation center and orientation of cultural tourism , it means a place devoted to the city on the city, what was there and that does not exist today if not through those fragments with a careful reading of semantics can be re- arranged in a spatial dialogue capable of giving thickness town living. A pole documentary and public dissemination of culture, a place of identification and selection , by the scholar , or the lover of the tourist places to visit and discover virtually. The realization of the survey and modeling of the findings of the destroyed city also arises as a starting point to help change the approach to culture and knowledge for all citizens, particularly, for example, the teaching of cultural heritage in connection with educational institutions and universities that will use structured pathways to areas accessible through the use of interactive multimedia equipment.



Fig. 2: Phases of acquisition of a photographic exhibit

One hundred years later, the architecture that has reshaped the face of the city destroyed, and perhaps even the soul, has always maintained a bond that postpones housing to those organizations that had settled over the centuries and that the earthquake has cleared. The bodies of the city (which is lost reconstructed) describe the morphology of the territory and the new image that you have set up, compared to the old one, highlights the inevitable differences for a reconstructed identity. The catastrophe in this way can be interpreted rather than a point of failure or crisis as a turning point or new opening phrase . The reconstruction of Reggio and Messina formed inevitably an opportunity to review the strength of local identities , to address his injuries and the laborious reconstruction, to put in the yard of the a-seismic houses construction techniques and new technology of reinforced concrete, the urban conceptions population centers, but - much more difficult and require - the restoration of memory and identity of places.

This ability to find a positive reactive power, able to recover memory and regeneration, aligns with the common idea of resilience, a concept that refers to the ability of a community to rebuild the equilibrium conditions as a result of external events in order to create debilitating shares thought and memory among individuals and groups protagonists of constructive changes in contemporary society and therefore the virtual museum is part of this good practice giving strength to a new professional skills in the field of communication and promotion of cultural heritage. The use of experimental software developed by the MAP Laboratory of CNR has allowed the survey of several stone artefacts and the subsequent processing of the acquired data aimed at the construction of interactive 3D representations for digital documentation which will form part of the exhibition project.



Figg. 3 / 4: Stages of development of the model and its representation of the overall (student A. Balestrieri)

2. Experimental methodologies and tools (LDL)

With the aim to assist this project from a methodological and technological point of view, CNRS MAP laboratory is providing experimental solutions for the digital surveying, modelling, structuring and representation of the studied artefacts. Our contribution starts from the idea that even if today one can use new (and sophisticated) tools, specific requirements coming from the architectural documentation and conservation fields remain and need the development of “intelligible” representations. In this sense, the alignment of the emerging techniques to the conventional codes of the architectural representation is a main issue of our approach. In this way, an important issue of our approach aims to introduce a methodological dimension able to bringing out the importance of the “interpretation” of the geometric nature of architectural shapes. This purpose is firstly oriented to the definition of relevant techniques of spatial data acquisition, geometric description and visual and semantic enrichment (see sections 2.1 and 2.2). A second issue relates to the architectural documentation (see sections 2.3) and the development of informative systems at an architectural scale. We consider that digital models can be used as ”interfaces” for accessing to various kinds of cultural heritage data: firstly, the ones related to the building current state, secondly, the ones related to its geometry interpretation and finally, the ones concerning the formulation of assumptions on its past states.

2.1 Acquisition protocols for automated Image-based-modeling

With recent advances in automatic processing of photographs, several solutions are available today to automatically generate 3D point clouds from a set of non-oriented images [Bundler; Microsoft Photosynth; Autodesk 123D catch; ARC3D]. These solutions are mainly based on computer vision methods and allow the production of 3D representations also starting from images acquired by non-experts (without knowledge on photogrammetry). While providing access to some satisfactory results from a visual point of view, these solutions have the major disadvantage of the overall reliability of their metric results [Remondino et al., 2012]. Nevertheless, in the field of cultural heritage, the strong geometric and visual consistence of a 3D representation is an essential condition for the documentation and analysis of heritage artefacts. Within the framework of the [Culture 3D Clouds] project (a cloud computing platform for 3D digitization, documentation, preservation and dissemination of heritage artefacts), the CNRS MAP laboratory, in collaboration with IGN, INRIA and Telecom ParisTech, is coordinating the development of image-based acquisition protocols for the accurate and effective 3D reconstruction of cultural objects. Unlike the approaches mentioned above, mainly based on the identification of general rules for image acquisition (overall acquisition configuration, image overlapping, etc..), the general approach that leads the development of these image processing procedures is based on the analysis and classification of several types of artefacts (buildings, facades, interiors, bas-reliefs, sculptures, etc.) as well as of several graphical representation purposes (sparse and dense point clouds, textured meshes, orhtophotography, etc.). For each specific acquisition protocol, an automated processing workflow is developed, by defining an ideal setting for camera calibration, bundle adjustment, multi-view stereo correlation, surface generation and visual enrichment [Martin-Beaumont et al., 2013].

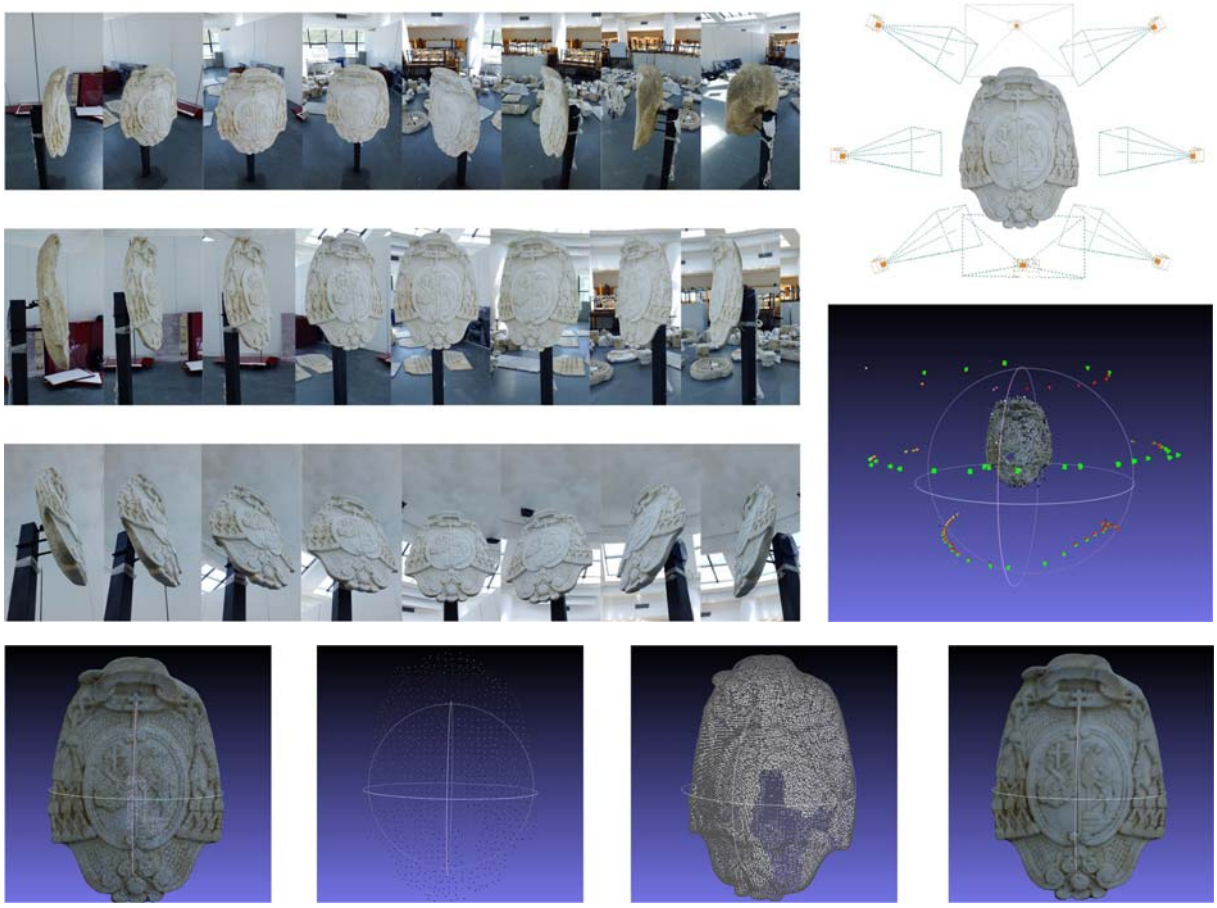


Fig. 6: Surveying project (student M.G.I. Bruno)

2.2 Reasoning from semantics to geometry and vice-versa

The introduction of new acquisition and processing protocols has given rise to new research perspectives. The opportunity to combine records, geometric analysis and characterisations about several artefacts could also be used for developing new approaches for shape classification and interpretation. The availability of flexible solutions for collecting morphological data on masses of

artefacts allow considering the shape analysis as a fundamental moment for reasoning about the relationships between geometry and semantics and in a bidirectional analysis approach.

In the first case (from semantics to geometry), the idea is to explore ways to insert architectural semantics within the surveying procedures, by associating them with dimensional information [De Luca et al., 2007]. This would allow an immediate reading of dimensional parameters corresponding to architectural concepts that characterize the artefact. This kind of approach can provide great advantages in the 3D reconstruction process. A correct (and knowledge-based) interpretation of data prevents the production of unrealistic architectural shapes and would provide models linked to specific vocabularies and grammars. In this context, significant efforts on formalizing typical architectural elements can be carried out, including the study and re-interpretation (in the context of the digital modelling domain) of architectural treatises (description of typical shapes, compositional rules, constraints of positioning and orientation, principles of scaling, etc..).

In the second case (from geometry to semantics) it's necessary to investigate solutions for the shape segmentation but also the issues related to semantic annotation. We recently started working on a shape analysis method combining a bottom-up approach [Lo Buglio et al., 2013], in which the meaning of the elements comes from the combination of a low-level, and a top-down morphological analysis, which takes advantage of pre-structured knowledge.This kind of approach is therefore based on the identification of generic models that can integrate multiple instances (e.g. objects belonging to the same stylistic trend) by bringing out common morphological features by means of the identification of semantic /geometric classes.

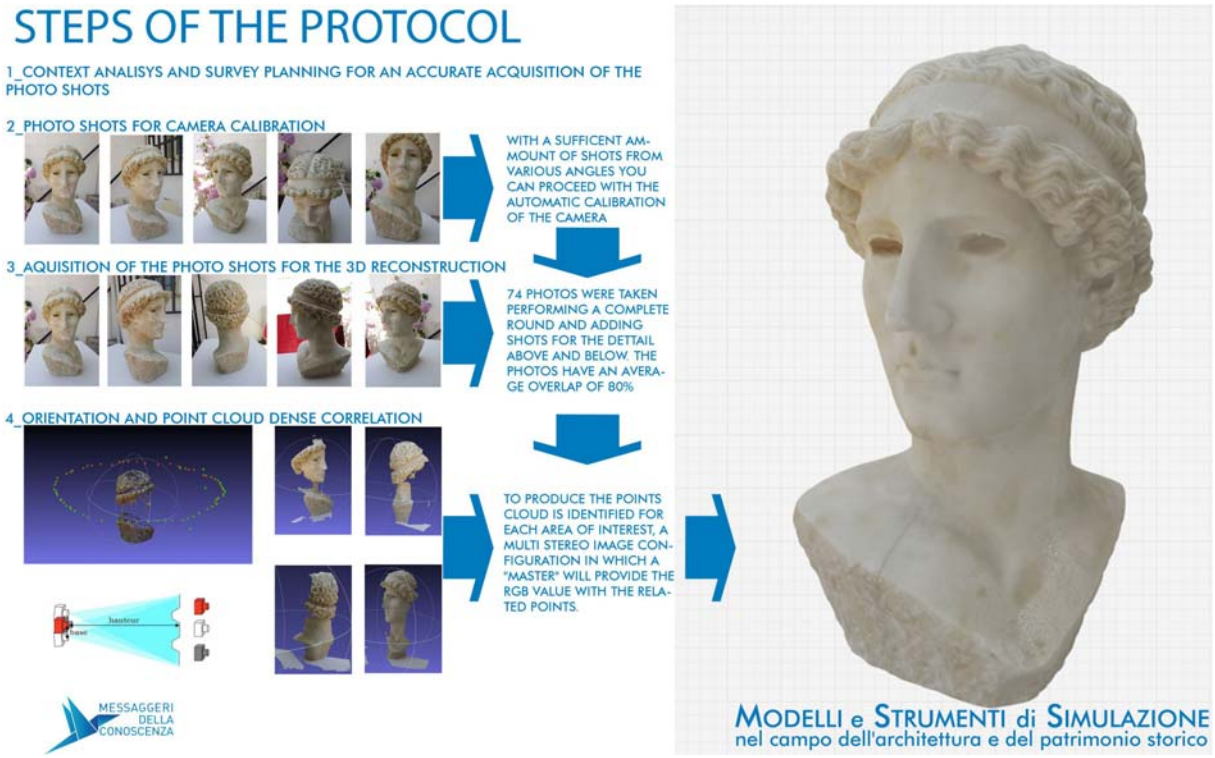


Fig. 7: Steps of the protocol (student R. Idone Cassone)

2.3 Semantic-driven structuring of 2D/3D/4D representations

With the aim of designing a methodological framework for the representation of buildings based on their morphological description, we introduced the principle of point of view as a concept determining the structuring of semantically-enriched 3D models [De Luca et al., 2007]. A point of view includes three aspects: the use of a vocabulary to isolate elements from the building; the identification of a relevant logic for the regrouping of these elements in a coherent unit; the choice of a type of representation able to extract from the gathered data the information necessary to the analysis.
In line with these principles, we build around the morphology of the building a description model defined by three distinct levels: semantics, structure and representation. This three-levels description confers an important degree of freedom in the exploitation of the data resulting from the surveying

phase: starting from the same geometrical model, one can work out various semantic descriptions by exploiting a multi-representations system. Moreover, our model of description is not only used for the structuring of the three-dimensional model and its possible representations, but may become the common denominator for the establishment of bilateral relationships between the morphology of the object and heterogeneous documentary sources. By basing on the definition of this model of description, we started the [NUBES Project] that focuses on the development of an information system at the scale of architecture [De Luca et al., 2011], taking into account the relations that can be established between the 3D representation of historic buildings (shape, dimension, state of conservation, hypothetical restitution) and heterogeneous data concerning various domains (such as the technical, the documentary or still the historical one). The main purpose of this project is to allow users to organise multiple representations (and associated heterogeneous data) around a semantic description model with the goal of defining a web information system for the multi-disciplinary analysis of heritage buildings. The NUBES platform will be used within the framework of this collaboration as a general web database for collecting, annotating, enriching and presenting the results of this on-going project on the Museum of Reggio Calabria.



Fig. 8: Moments of work during the workshop at the Atelier of the Faculty of Architecture (july, 2013)

Bibliographical References

[1] FATTA, Francesca, La rappresentazione dell'Africa romana. Una idea di museo virtuale per le politiche di progettazione, tutela e governo dell'ambiente mediterraneo. In (a cura di) Giovannini M. Prampolini F. Spazi e culture del Mediterraneo, vol.3., Centro Stampa di Ateneo, Reggio Calabria, 2011, ISBN: 978-88-89367-60-5.

[2] CARACENI, Simona, Musei virtuali-Augmented heritage. Evoluzioni e classificazione delle tipologie di virtualità in alcuni case histories, Hoepli, ISBN: 8880497669

[3] REMONDINO F., DEL PIZZO S., KERSTEN T., TROISI S. Low-Cost and Open-Source Solutions for Automated Image Orientation – A Critical Overview. Proceedings of Euromed 2012 - International Conference on Cultural Heritage. Lemesos, Cyprus Oct 29th - Nov 3th 2012

[4] MARTIN-BEAUMONT N., NONY N., DESHAYES B., PIERROT-DESEILLIGNY M., DE LUCA L., Photographer-friendly workflows for image-based modelling of heritage artefacts. Archives of the

Photogrammetry, Remote Sensing and Spatial Information Sciences, XXIV International CIPA Symposium, Strasbourg, France, 2-6 September 2013

[5] DE LUCA L., VÉRON P., FLORENZANO M., *A generic formalism for the semantic modeling and representation of architectural elements. The Visual Computer.* Volume 23, Number 3. Pages 181-205. Springer Berlin / Heidelberg. March 2007.

URL http://link.springer.com/article/10.1007%2Fs00371-006-0092-5

[6] LO BUGLIO D., LARDINOIS V. DE LUCA L. *Revealing shape semantics from morphological similarities of a collection of architectural elements. The case study of the columns of Saint-Michel de Cuxa*. 2013 Digital Heritage International Congress (DigitalHeritage), Vol. 1, IEEE (ISBN: 978-1-4799-3169-9)

[7] DE LUCA L., BUSARAYAT C., STEFANI C., VERON P., FLORENZANO M. *A semantic-based platform for the digital analysis of the architectural heritage. Computers & Graphics*. Volume 35, Issue 2, April 2011, Elsevier. Pages 227-241.
http://www.sciencedirect.com/science/article/pii/S0097849310001780.

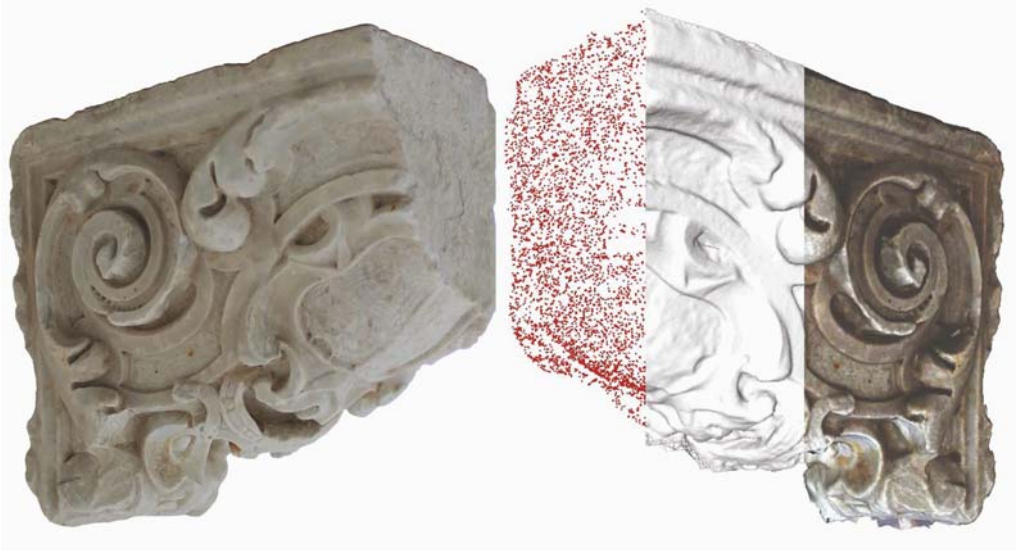


Fig. 9: The cultural heritage from the real to the virtual (student C. Belli)

WEB References

Culture 3D Clouds, une plateforme d'informatique en nuage pour la numérisation 3D, la documentation, la conservation et la diffusion du patrimoine culturel : http://c3dc.fr/

NUBES project : http://www.map.archi.fr/nubes

Bundler : http://phototour.cs.washington.edu/bundler/

Microsoft Photosynth : http://photosynth.net/

ARC3D: http://www.arc3d.be/

Autodesk 123D Catch : http://www.123dapp.com/catch

Tutors at the Workshop "Messaggeri della Conoscenza": Manuela Bassetta, Andrea Manti, Chiara Scali.

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BUILDING INFORMATION MODELING FOR STRUCTURES

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Abstract
The computerized graphic software, takes over to the old method of hand graphic drawings. Now, thanks to the Building Information Modeling methodology, the different professionals involved in a project, can interact during the phase of ideation, planning, computation, structural analysis and realization of a work.
Using B.I.M., the exchange and the acquisition of information becomes easier. The target of this paper is the analysis of the integrated and structural planning, which represents the foundation for the success of a design project. The actually legislation about technical, imposes the need to operate in a multi-tasking environment.
The designer interfaces with the structural and plan engineers and with the employer to face the preliminary work before it starts. The virtual realization of a plan, through the 3D model is important to make visible an object, before to make it concrete, studying its plant design, its spatial, functional, morphological, and structural dimension, and, of course, its aesthetic.
On the B.I.M. model working, in concrete, the competences of several professionals who cooperate to the same target (for example, the planning of a new work or the recovery of the current one) and the methodology mix the 3D representation with the structural data.
In this paper it will be analyzed the interaction between the structural analysis and the virtual representation field.

Keywords: Building information modeling, structures, structural analysis

1. Introduction
Since 1800 in Europe the structural engineering theory was developed. It was a discipline different by the architecture understood as aesthetic representation of buildings. Only in modern times it lost the dualism between these two disciplines: representation and structures.
They began to penetrate each one into another one and they become both indispensable for the success of a quality architectural design.
The architecture discipline adds to its historical significance also that relative to the structural parts of the building and the engineering discipline adds to its known significance, the formal aspect of the architectural structures .
The knowledge evolution of the constructions techniques and building materials has led to the formulation of appropriate software for the calculation and verification of structural seismic response of buildings. By using sophisticated software for structural modeling , it get to predict the impact of the earthquake on the buildings. This system is part of the building information modeling methodology.
By B.I.M. model, the materials, the shapes, the spaces, and especially the relationships between parts of a building are represented.
Creating a single working platform, the architecture and engineering disciplines involved in one building design began to talk the same language.
It was created a knowledge network able to share in real time the technical data of the building to the different actors involved in the design process.

The interaction between the structural, the functional and the aesthetic elements into modern design software, represents a serious challenge for many graphic programs, but B.I.M. differs from the others one thanks to its ability to compare and interchange data. Structural computation programs have interfaced with graphics programs just after B.I.M. creation.
The method developed is able to working different players on a single computerized platform. Data entered shall respect all common features present in simple 2D graphics programs, up to the most advanced structural calculation [1].
The B.I.M. model exceeds the simple graphical representation of structure in three dimensions.
The older defined a B.I.M. like this: “B.I.M. is a software application, for some it is a process for designing and documenting the building information, for others, it is a new approach to practice and advancing the profession which requires the implementation of new policies, contracts and relationships between project stakeholders”.
The most recent definition of B.I.M. is "a model of virtual intelligence able to build in 3D. An intelligent format that can be used to develop constructive solutions to optimized risk reduction and to increase the value before committing a design proposal focuses on the design perspective" (Woo et al., 2010)
But the official definition credited to the National Building Information Modeling Standards (NBIMS) is:
" ... A digital representation of physical and functional characteristics of a facility. B.I.M. is a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life cycle, defined as existing from the first conception to demolition. B.I.M. is a shared digital representation founded on open standards for interoperability. A basic premise of B.I.M. is collaboration with different actors at different stages of the life cycle of a facility to insert, extract, update or modify the information in the B.I.M., to support and reflect the roles that stakeholders ...” (NBIMS, 2007) .
In this paper it creates the opportunity for two disciplines such as representation and structures to find an efficient and common connection point. The B.I.M. platform is able to answer, at the same time, to the architectural and structural needs.

2. Building Information Modeling

Jerry Laiserin popularized and standardized the term B.I.M. as a common name for the digital representation for constructions. In 1987 the GraphiSoft already identified this technology as "Virtual Building". Later Bentley Systems named it "model of integrated projects" and Autodesk as "Building Information Modeling" (Figure 1).The B.I.M. as Computer aided modeling is an innovative way to manage the project.



Fig. 1: Example of school building virtual design by Ingrid Titomanlio

Building Information modeling methodology starting from the digital graphic representation in three dimensions of the construction is able to arrive to the management processes of the model, production, communication and structural analysis.
Each one of building components contain parametric data that describe the attribute included in 3D model process.
If one of building component change, every part of the design linked to that will change.
The benefits create by using B.I.M. platform is because several databases are interface and connect together.
The actors are involved in the design process and they can simulate the negative or positive interactions and to interchange the data.
On B.I.M. platform, each element is drawn, not with simple lines, but with structural elements; geographically, spatially and quantitatively characterized, as well as, by geometrical lengths, thickness, volume, materials, lighting, stamina a.s.o....
This methodology has advantages: it avoids mistakes, the constructive elements are drawn only once and they can visualized in all views, if you make a change during a processing phase, it automatically modifies the element in all views that it is generated.
Comparing the traditional approach to the design and the B.I.M. method, it is observed that the first one visualized the building elements as vectorized lines geometrically represented but the second one adds to this characteristic the economic and textural attributes.
By using B.I.M. process there is not loss of data during the design phase and it can be visualize the building vulnerability in three dimensions [2].
In Europe facilitates the management of contemporary design and it is a multi-disciplinary approach to facilitate the identification of the spatial geometry, of the surveying, and about the quality and quantity of materials building components (Figure 2).



Fig. 2: Architectural BIM modeling Belgrade Plaza, Coventry, UK - by XSCAD work.

3. B.I.M. and structures field

The B.I.M. method definition is not universally accepted by scientific society that have different point of view about this technique.
In 2007 the GSA (General Services Administration) published this definition …""Building Information Modeling is the development and use of a multi-faceted computer software data only to document a building design, but to simulate the construction and operation of a new facility or a recapitalized capital (modernized) structure. The resulting Building Information Model is a data-rich, object-based intelligent digital representation and Parametric structure, which sees adapted to the various needs of users can be extracted and analyzed to generate feedback and improvement of the design structure."
The development of the technology has increased the need to enlarge the knowledge design field and to improve the connection between different skills to create a virtual multiple dimensions design [3].
To introduce the B.I.M. methodology in structures fields is experimental research experience.
The B.I.M. is the link ringing between the representation and structures fields.
Thought this model, each building structural elements are related to each other and the final design is an integrated solution of different disciplines (history, structures, representation, environment).
The platform on which different competences work on is unique. One element is visualized at the same time by structural skill and by representation skill [4].
The process in three dimensions is planned with all the elements which change information, in order to adapt the geometric survey of structures to the model for the numerical analysis (Figure 3).
In the knowledge process, the first step together with the historic phase is the survey.
Today by using laser scanner equipment, the building survey is become very good.
From the structural point of view, a building can also be known during the inspections, and the data to record are different than the simple relief of the geometric state.
Detecting the roof of a building, it is necessary to write down the geometric data, in the plane, and in thickness, to identify the thickness of the various components of the roof, the quality of the material which it is made, the role of the roof (terrace, support, partition and the existing connection between this element with other structural parts of the building.
It is very important to proceed to acquired correct information to realize the digital structural model.
The right approach doesn't start only from geometric data detected.
Data entry requires an high level of concentration. Several technicians who work to the same project, can work simultaneously on local models stored on their computers, updating them periodically with an up - to - date information from the central model. This phenomenon is named cloud computing, in which data, and therefore the software, resides in a remote location. The technical staff access to the template and use cloud-based design software as a service (SaaS) to work on it.
The data detected in situ are important for the purpose of a structural model, to prepare a linear or nonlinear analysis, and to evaluate the influence of the confidence factors (related to knowledge levels LC1, LC2 and LC3 that reduce the average values of strength of materials construction).

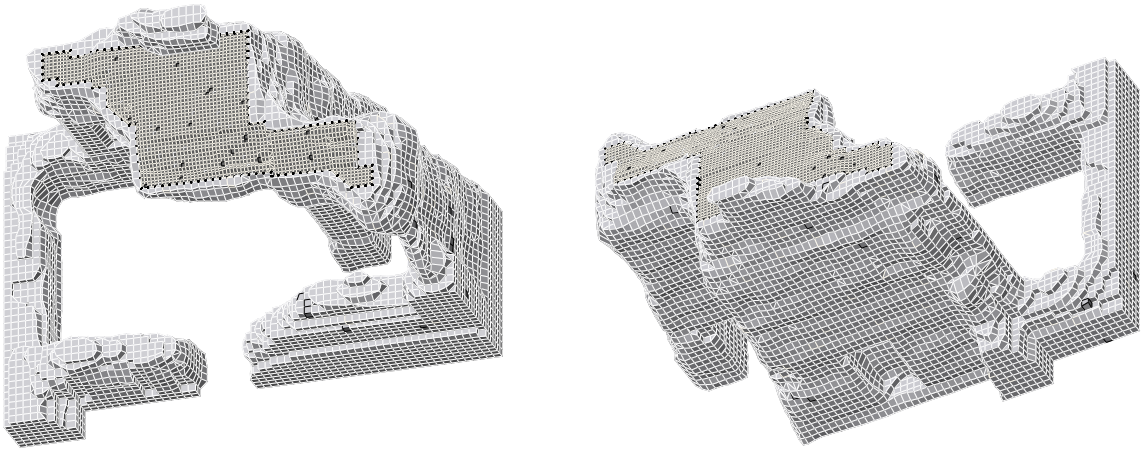

Fig. 3: Structural model – King Barbaro Palace in Porto Torres - Italy

To investigate the entire building and to store more data for 3D structural model, the laser scanner technique is not enough. It is necessary to implement the knowledge phase by using non-destructive equipment such as ground penetrating radar, the cover-meter, thermo-cam, endoscopic, sonic and ultrasonic penetration and if it is required and it is possible, undertake to destructive investigations.
It proceed with the input process definition to study structural system when the geometric data is ended.
The impact of the forces on the structure and the mechanical connection that describe the mechanical acting of the material are expressed by mathematical model.
In this step, the B.I.M. become very important because emerges over traditional CAD approach and give to each structural element a complex identity.

4. Structural modeling

To evaluate the performance of buildings and to harness a range of useful information for the purposes of architectural choices, man designer adopt the digital modeling technique.
The structural model of building allows to obtain feedback on various assumptions on the design and during different stages.
The parametric modeling allows the technician to make to enter modifies in order to make the result efficient.
The correct representation of the structural elements of building is important because on cultural heritage and on the high complexity buildings is not sufficient to draw up a linear analysis but it is required non-linear procedures based on the comparison between the seismic demand and the capacity of building in terms of displacement.
The knowledge phase is the first step on which is based the process of structural modeling.
When the overview of results of all investigation are compare, the project coordinator choices the best design solution that has the benefits of all the disciplinary approach.
Before to realize the construction, it is fundamental to schematize and to analyze the structural model (Figure 4) by using B.I.M. methodology [5].
Traditionally, the structures of architectural and interior design objects were digitally represented by the CAD in two and three dimensions by lines and curves subsequently extruded.
These systems represent the structure as a geometry independent of the reference environment. Today, with the data models "object based", structures modeled also describe entities that are intangible with CAD; for example, the costs, the concept of a gap in the area and, such as accident or acoustic insulation, energy loss of the building [6].
The survey as geometric representation is only a feature of many others contained within a structural model. If the use of traditional CAD geometry data is considered, anyone realizes that the information is insufficient to define geometrically a structural model. All phases, thanks to the B.I.M. system are accompanied by various and consistent documentation and which also fit in the economic field, in terms of calculating the actual costs, spending on the construction of the work and the amount of financial resources for the maintenance of the same.

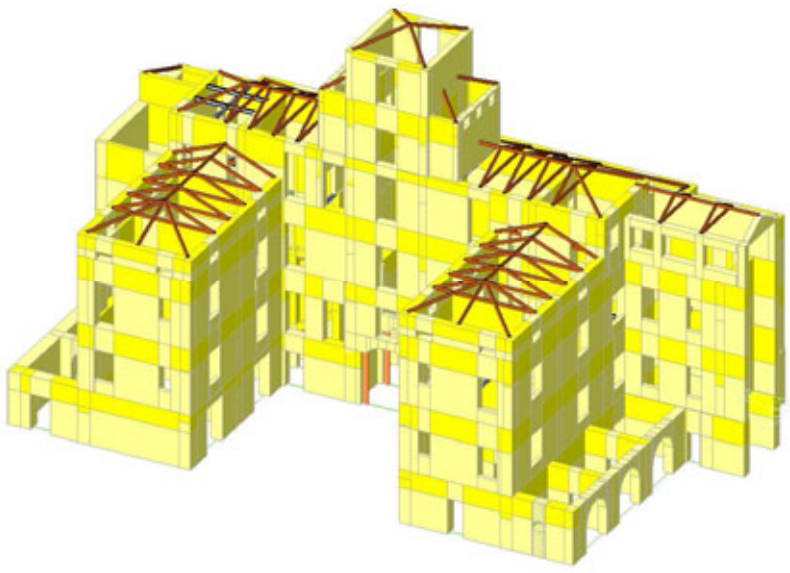

Fig. 4: Structural model – Teti Maffuccini Palace in Santa Maria Capua Vetere - Italy

The Building Information model is able to represent a such quantity of information of building targeted to one specific purpose (structural analysis, environmental impact analysis or energy, acoustic analysis, cost analysis, a.s.o....).
The B.I.M. technology which facilitates the involvement of more professionals on the same project by associating these various stages of the modeling work process.
The model geometrically generated in 3 dimensions by AutoCAD, can be read by Midas/GEN, and can be taken back by AutoCAD after making changes or implementations. Without the necessary conditions to frame the B.I.M. system and when the process of structural modeling of an architectural work or a design object is started, it needs to generate a mathematical model that represents the artifact.
By the complexity of cultural heritage and modern buildings it is necessary to reduce the structural model of the architecture to the essential and thanks to the variety of the B.I.M. process, models of accuracy at different levels even to define different levels of analysis and investigation can be created.
There is no single structural model but as many as are the aspects to be evaluated and for which a structural analysis, therefore, should be performed.
Generally, the structural model includes steps and data from other 3 types of models: the geometric, the loads/actions and the material/mechanical ones.
The latter is the most important because it associates the material to each structural element, and characterizes their structural behavior under loading.

5. Conclusions

The B.I.M. model presents clear advantages comparing to the Computer Aided Design method: saving money previously invested to create a prototypes, and decreasing building mistakes, as a consequence, corporate profits has risen.
Design approach is flexible, modifiable and applicable in each single stage.
The analysis of an architectural project involve many disciplines, for this reason, there are more information to manage and store. This is the input to invest in more powerful and complete equipment.
3D CAD models are viewers software and they can still be used for detailing some phases of the project, despite the central role is done by B.I.M. technology. However, this mode, must immediately be the starting point of the basic model.
Physical characteristics of a digital project are analyzed by simulations, this, helps professionals and entrepreneurs to display different and future scenarios for free. Each technician involved, can make decisions and change some characteristics of the project.

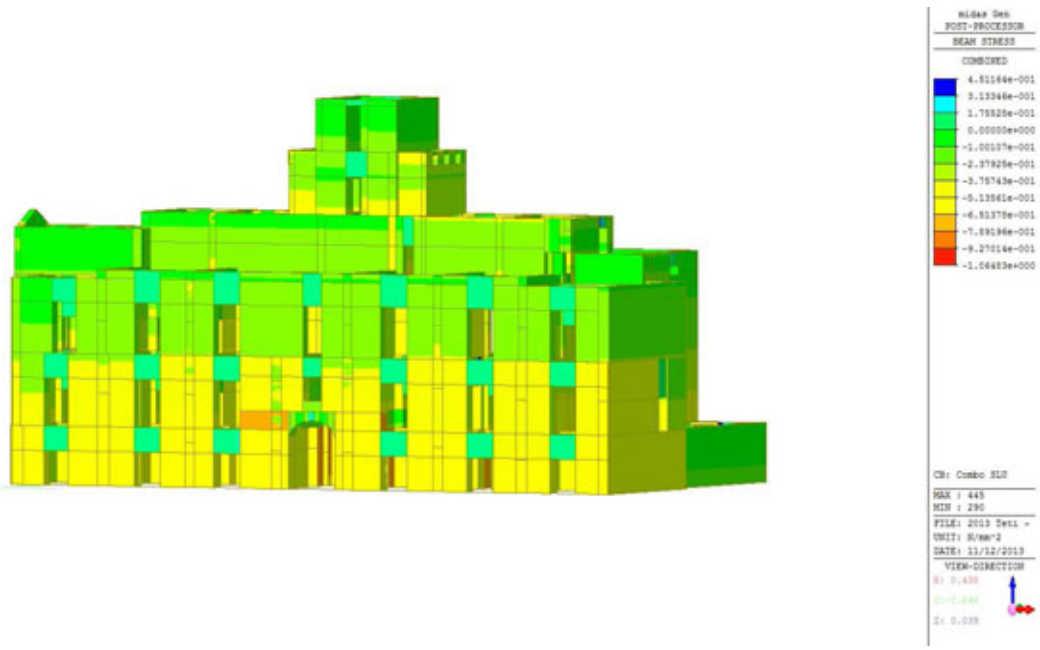

Fig. 5: Structural analysis– Teti Maffuccini Palace in Santa Maria Capua Vetere - Italy

Bibliographical References

[1] Azhar, Salman; Nadeem, Abid; Mok, Johnny Y. N.; Leung, Brian H. Y., Building Information Modeling (BIM): A New Paradigm for Visual Interactive Modeling and Simulation for Construction Projects First, International Conference on Construction in Developing Countries (ICCIDC–I) Advancing and Integrating Construction Education, Research & Practice, Karachi, Pakistan, August 4-5, 2008.

[2] Prasad, Biren; Morenc, Roger S.; Rangan, Ravi M., Information Management for Concurrent Engineering: Research Issues, SAGE Journals, Concurrent Engineering, March 1993.

[3] Nomaguchi, Yutaka; Taguchi, Tomohiro; Fujita, Kikuo, A Framework of Describing and Managing Engineering, Analysis Modeling Knowledge for Design Validation, SAGE Journals, Concurrent Engineering, , first published on August 11, 2010.

[4] Eastman, Chuck; Teicholz, Paul; Sacks, Rafael; & Liston, Kathleen, BIM handbook : a guide to building information modeling for owners, managers, designers, engineers, and contractors, ed. Wiley, Hoboken, N.J, 2008.

[5] Green, Robert, Expert CAD management: the complete guide, ed. Wiley Pub., Indianapolis, Ind, 2007.

[6] Rundell, Rick, Ensure Success in your transition to BIM, ed. Cadalyst. 23 November 2004. Available at: http://www.cadalyst.com/aec/ensure-success-your-transition-bim-2890.

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B.I.M. and Structural Modeling: Application on Cultural Heritage

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Abstract

The seismic safety of cultural heritage cannot be managed through the structural analysis only. First of all, the knowledge phase concerning construction technique and materials properties becomes strictly necessary. The Building Information Modeling (B.I.M.) is the concrete method allowing the peculiarities of the architectural/restoration design and the structural counterpart to be simultaneously contemplated. In fact, in the B.I.M. methodology for structures all the features of the virtual model are suitably contemplated.
In this paper, the B.I.M. for cultural heritage is dealt with, outlining its main steps (inspections, measurements and surveys, non-destructive investigations, integrated structural modeling and s.o.) and configuring the new B.I.M.4S&D methodology. The latter is shown through the application to a historic masonry building.
The numerical structural analysis of the existing masonry building is a relevant key since it must simulate what already exists and what arises from in-site testing and evaluation, avoiding falling into contradiction and trivial errors. Finite element method (FEM) is then used in the structural analysis for evaluating the safety of buildings subjected to static and seismic loads. The FEM method, in fact, is flexible and takes into account anisotropy and lack of homogeneity of masonry material. Furthermore, the finite element method lends itself to a more or less complex computerization, and it intrinsically has all the features interfaced with the digital geometric survey.

Keywords: Building Information Modeling, Structures, Cultural heritage, Structural analysis

1. Introduction

The analysis methodology of cultural heritage proposed in this paper combines the architectural representation of buildings with its structural behavior. Initially, in fact, the engineering history differently marked "skeleton" and "musculature" of building. This meant to divide the representation and the structural fields.
Today, the B.I.M. methodology allows creating a very refined and reliable structural model, which is the common pattern among building representation and structure. The technology can be applied to different types of buildings and design furniture. It manages several parameters and reduces graphic processing time [1].
Before analyzing the application to a representative existing historical building, it is necessary to introduce the needed pre-cognitive phase and highlight the support provided by survey through laser scanner in this pre-processing phase. And it must also be emphasized that not all the needed information for creating the three-dimensional structural model rises from the laser scanner survey. The level of knowledge of the geometric structure must be in fact achieved by using non-destructive testing, too. Only after these steps, the structure can be modeled and loaded, and its behavior and safety can be assessed. However, many historic structures need a most multidisciplinary approach and intervention for their retrofit, in order to prevent further damage or their loss.
This paper highlights how important is to overcome the mutual segregation between the various specialized fields, emphasizing the true concept of multidisciplinary restoration, and focusing primarily

on the relationship between representation and structure: the proposed B.I.M. 4S&D methodology acts with an inter-disciplinary approach between very different skills; and one of this is the preservation and the reuse of the building. For this aim, different professional archaeologists, historians, structural and geotechnical restorers must consequently be involved.
The use of the B.I.M.4S&D methodology in structural modeling of cultural heritage for assessing the seismic safety of masonry buildings is illustrated with reference to the Teti-Maffuccini Palace (Figure 1) in Santa Maria Capua Vetere (Italy): the details of the needed and performed analysis are presented in the following paragraphs.

2. Seismic safety and Cultural Heritage

The configuration/conservation design process currently describes the representation–structure binomial, since the information communication technology (ICT) has been introduced in the field of cultural heritage as digital form of communication. In the architectural field, the same digital representation phase is usually carried out to achieve the three-dimensional model, derived from the cloud of points generated by laser scanners [2].
The conservation is not, anyway, an action aimed only to the slowdown of the degradation, but also the act of valuing, guaranteeing the assurance of the resources needed. And a multidisciplinary approach now allows unifying the professional competences that formerly did not talk to each other, typical of a professional Taylorism, introducing the relationships between professionals who interact and become guarantors of knowledge. In this context, the border point between representation and structure comes out from the cloud of points and the FEM modeling, and it is caught by using the Building Information Modeling. The preservation of cultural heritage depends, first, on the nature of the materials of which the buildings are made: for example, bricks have a different behavior from volcanic rocks. But, even if in a different form, on the surface, all the rocks are vulnerable to atmospheric agents (humidity, wind, rain) which accelerates the building decay (Figure 1). With regard to the static safety issue, and specifically materials and techniques to use, it should be noted that today there is a revival of traditional materials and techniques.
A naive use of modern materials, giving the illusion of stability to the architectural and archeological heritage without compromising the aesthetic appearance, was the origin of the diffusion of materials for decades considered "modern", such as concrete, which are instead characterized by a high incompatibility. Modern materials, in fact, have been often the cause of a greater damage, not only to the values of the historicity of buildings, but also to their survival and, paradoxically, their stability, thus worsening the overall static performance. Their use seems to have failed right where it should be strong, that is, effectiveness and durability [3].



Fig. 1: Teti Maffuccini Palace in Santa Maria Capua Vetere

The more and more recurrent need to analyze and restrict the seismic risk accelerated the research and the use of valid solutions for improved performance of buildings under earthquakes. Today the choice of materials and techniques, once more modern, is significantly wider, because many new materials have been introduced in the restoration, such as composite materials, whose technology is more or less widespread and established. The choice of material and technique should not be obtained from an ideological vision, based on fundamentalist foreclosure for materials and contemporary techniques, but rather by a careful examination of the characteristics and properties of the building to be restored, its materials, its problems and its structural types. A choice that allows to design the retrofit with moderation, using compatible materials and techniques, to achieve a balanced outcome, in compliance with all the requirements of restoration, not least compatibility, reversibility and recognition of the interventions, and to keep the architectural unity and the meaning of the restored building.
The question, at this point, is whether the characteristics of new materials and new techniques are able to ensure compliance with the above requirements, also in reference to the demand of seismic safety. It is also wonder how a proper restoration can achieve the objective of maximum conservation of tangible and intangible information of buildings in accordance with the preservation of the original static behavior, minimum intervention and maximum reversibility; and then as the use of these materials may help to avoid repeating the error made by the indiscriminate use of reinforced concrete: it was not able to ensure the historical continuity and the expected increase in performance, especially during seismic events, because of its chemical and behavioral (static and mechanical) incompatibility.
To provide a comprehensive answer to these questions, it is increasingly evident the need for an evaluation computer tool that is able to reproduce in detail all the available (multidisciplinary) information and allows users to make multiple comparative evaluations between the different possible solutions. In this context, there is the proposed B.I.M.4S&D methodology.

3. Structural modeling by B.I.M. in four dimensions

As demonstrated by the analysis of the historical evolution of design techniques, the avant-garde era is moving forward very quickly. For this reason, it has been tried to improve the research in the weak point of the chain, i.e. the point from which the graphic representation of the building goes to its structural modeling. Thanks to B.I.M.4S&D methodology, the weakness becomes strength and acquires the characteristics of a patent.
The benefit of using this methodology, in addition to the huge savings in time and cost and strong containment of possible errors in the design and construction stages, it is certainly the easier management of a single model.
B.I.M.4S&D is an active process of structural modeling, consisting of a connection between multiple disciplines. Any decision taken in a topic area is evaluated on the common model to all disciplines and interfaced with all the structural, engineering plants, environmental and restoration solutions.
Exchanges of information and communication on project planning become simpler on a single shared platform, on which the design pattern can be updated independently by different designers who use different computer machines. With the proposed approach, every decision about the design is more immediate, because the model works in a very similar way to the reality, even though it is a virtual model. Each element is associated with all the information needed to describe its behavior in the structural model and the constraints of the neighboring nodes [4].
The modeling of structures is well managed by the new software B.I.M. in four dimensions, which also works in the numerical simulation phase, allows to import any changes (concerning any planned intervention), following the results verification. The B.I.M. model also allows a rather fast definition of the forces acting on the structural model. Once the information is imported into the structural software, geometry and forces will ultimately set automatically. The aforementioned connection for the realization of three-dimensional FEM model and for the structural analysis has been developed at the time, with the software MidasGen of MIDAS Information Technology Co.Ltd.

4. Structural modeling by using new B.I.M. methodology: application to Teti Maffuccini Palace in Santa Maria Capua Vetere (CE) - Italy

Teti Maffuccini Palace (Figure 1) is located in Santa Maria Capua Vetere. The town center occupies the area of ancient Capua, a territory made of volcanic ash, called "felix" by Romans because of its fecundity. The Palace dates back to the nineteenth century and is subject to both archeological restrictions and architectural constraints because of its location and architectural qualities.
The building, built in 1839, initially belonged to the family of the lawyer Filippo Teti, as shown by the plaque on the arch of the main entrance, and subsequently to the Maffuccini family. The Palace was initially composed by three adjacent buildings: actually, the Municipality of Santa Maria Capua Vetere

has the desire to reuse the building as Culture and Legality Pole.
The Palace is a 4-story masonry building and has a C-shaped plan. The second floor is the "noble" one, all the rooms are decorated with paintings both on plaster and paper which adorn the Sicilian vaults and the walls. On the main building there is, in the central part, one further small story which consists of a single room used as lookout; over this small room there is a further panoramic room, accessible by a timber staircase. The roof of the entire building is realized through different pitches that intersect and engage each other, creating a network of ridges.
The in situ survey features that the portal with a depressed arch, located at the center of the façade, has two ribbed ionic columns on its lateral sides, that at the moment "are anchored to the rear wall by plates with wooden planks secured by plugs". On the ashlar arch of the entrance there are two effigies, while on the keystone there is a plaque indicating the construction year. The ground and first floor façade presents a ribbed union of horizontal stripes and simple cornices around the openings. The ones of the second floor present several ionic columns surrounding each opening, decorated with molded cornices, surmounted by triangular gables; on the central opening, above the portal, there is a fanlight. At the top of the main façade there is a jagged ledge which forms the eaves of the pitched roof on D'Angiò Street.
The entire structure of a building is usually graphically represented by a drawing in three dimensions. Figures 2 show how the Teti Maffuccini Palace was decomposed in structural parts and then modeled by FEM for performing an structural analysis. The digital survey and the cloud point generated by the laser scanner allowed achieving a refined integral 3D modeling of the masonry structure of the building, in which all the main structural components were included: the model reproduces the actual geometry and peculiarities of the structure, considering the various irregularities that characterize it.
The integration provided by non-destructive instruments, such as pulse (ultrasonic or sonic) velocity testing, surface penetrating radar, infrared thermography, cover meter testing and endoscopy technique, allowed to define and characterize the parts of the building that were not visible to the naked eye. The thicknesses of the walls, for example, were detected with the laser scanner but they were diminished of the thickness of the plaster from both sides. So, thanks to the interaction of the multi-functional instrumentation, the B.I.M. model of the structure was realized.

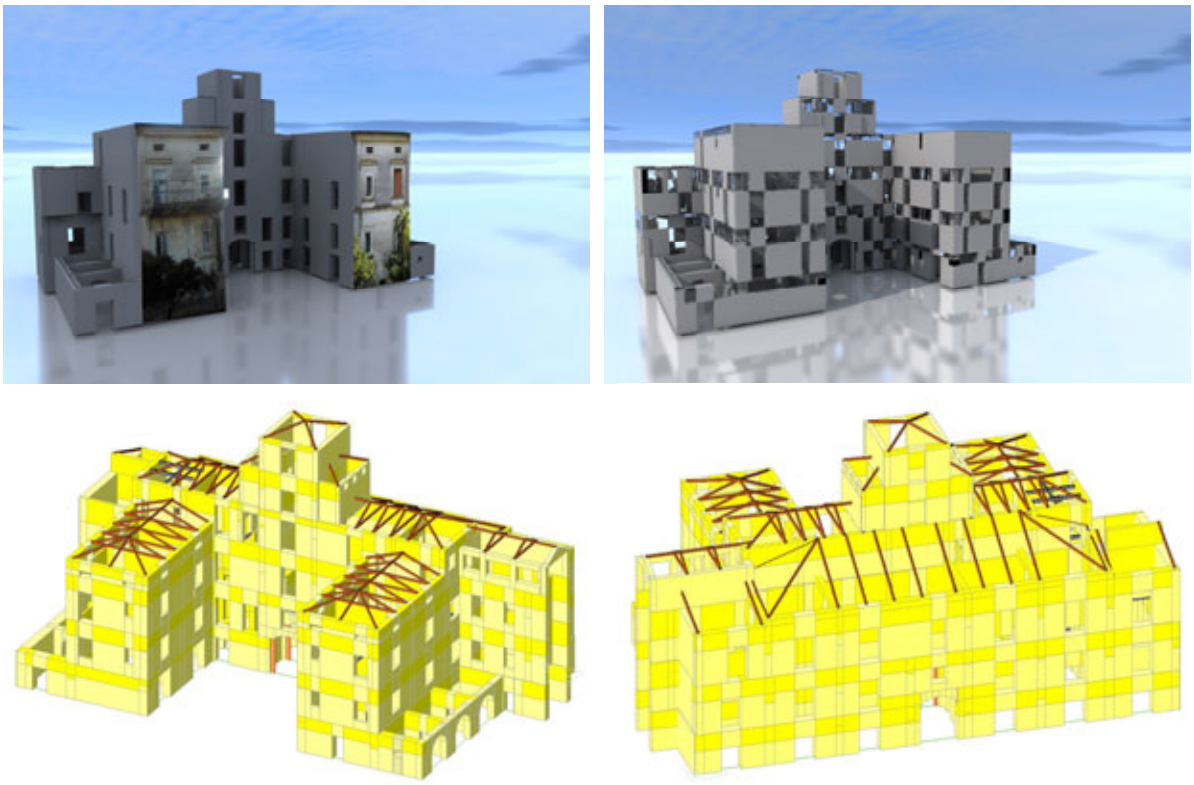

Fig. 2: Teti Maffuccini Palace: B.I.M. model and structural model



Fig. 3: Teti Maffuccini Palace: first three modes of vibration

The masonry walls were modeled by using the “equivalent frame method”, identifying three types of elements: masonry pier elements, spandrel beam elements and rigid beam elements. The masonry piers and the spandrel beams were modeled through one-dimensional elements with bilinear elastic perfectly plastic behavior (as required by NTC 2008). The pier-spandrel intersection panels were modeled as infinitely rigid beams.
A lumped plasticity model was used in the pushover analysis: the pier elements and the spandrel elements were represented by beams with plastic hinges at the ends. The properties of these hinges were assigned according to the code requirements and were different for piers and spandrels. The shear strength (dependent on axial force and bending moment) and the bending strength (dependent on the normal stress) of each element is maintained constant up to the limit values of the relative displacement between the ends of the deformable part of the element itself. The achievement of the maximum displacement determines the loss of the element capacity to endure shear forces or bending moments but not the axial forces.
The other structural elements were modeled by beam elements (with all the member forces N, M, V activated) or truss type (reacting only to the axial force N).
The floors were treated mainly as a load. Therefore the analyses were carried out without imposing the floor constraint by rigid diaphragm, with the exception of the first three levels.
For the purposes of the pushover analysis, the soil-structure interaction was not taken into account so neither the ground nor the foundations were modeled and the structure was considered as fixed at the base. In order to simulate the structural behavior after the strengthening, in addition to the retrofit interventions, the vaults thrusts were removed since absorbed by the designed tie-rods.
Figure 3 synthesized the first three modes of vibration of the Palace, with reference to the structure after retrofitting: all the modes show a moderate tendency of the structure to activate torsional response under seismic input [5,6].
In the pushover analysis, according to the NTC 2008, two different distributions of the horizontal forces were increased for both the main direction of the seismic input. Specifically, a distribution with forces proportional to the static ones and a uniform distribution of forces (to be understood as derived from a uniform distribution of accelerations along the height of the building) were considered.
The pushover analysis were performed in displacement control, increasing the displacement of a control point, chosen at the height of 18.25 m (upper level where the palace has a significant planimetric extension), until reaching the ultimate conditions.
According to the Italian National Seismic Code, the maximum capacity in displacement of the building structure at the ultimate limit state (SLV) was identified on the capacity curves in correspondence of a reduction in base shear equal to the 20% of the maximum one. The capacity at the operative (SLO) and the damage (SLD) limit states was computed at the achievement of a pre-fixed inter-story drift.
The seismic analysis confirmed what already foreseeable examining the main characteristics of the building, namely the configuration somewhat irregular both in plan and in elevation, the discontinuity of masonry walls along the elevation, the presence of numerous vaulted structures whose thrusting forces are not always well contrasted, the poor quality of the building structures and their state of preservation. Based on the above, it was possible to establish the type of intervention to be performed and its location for achieving seismic improvement of the building. In respect of requirements for cultural heritage, the strengthening solution, which was assumed for increasing the seismic capacity, tried to make the most of all the resources of the building [7].
The following Figure 4 shows, as an example, the capacity curve of the strengthened structure subjected to a uniform distribution of forces and the graph in ADRS format corresponding to the main limit state checks in terms of displacement, as required by the Italian National Seismic Code: the verification at the ultimate limit state shows that the structure capacity is equal to 21.9 mm while the demand is equal to 18.3 mm, which corresponds a safety index equal to 1.19 [8].

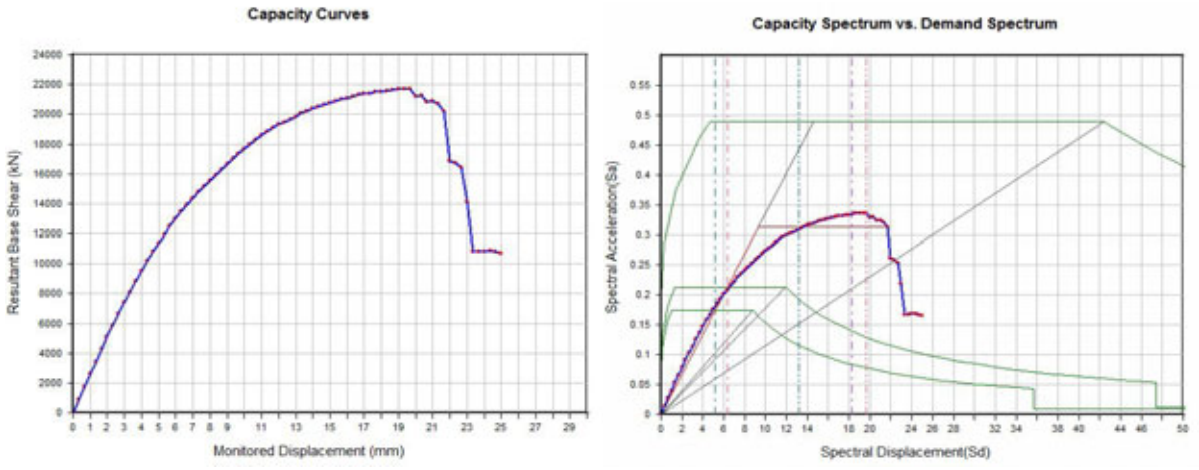

Fig. 4: Teti Maffuccini Palace: verification by the capacity spectrum method

5. Conclusions

The geometric-architectural configuration largely determines the way through which the seismic forces are distributed within a building and influence the relative magnitude of these forces. Masonry buildings allow to place greater emphasis on such a complex and fascinating study from a scientific point of view, because they are not made by standard procedures, as the steel and RC structures.
The Italian cultural heritage has a wide range of construction techniques, well diversified and not completely deciphered. Often, even mistakenly, the seismic damage suffered by masonry buildings has been associated only with faulty construction techniques. But the damage is often related to improper morphological conception of the structure, to the poor quality of materials and the superfetations that have modified the original arrangement of the structure without any type of retrofitting.
Many masonry buildings have shown, however, how many years it is possible to maintain the structural integrity despite the ravages of time and of natural events. This shows that the ancient building techniques, combined with practical experience, have resulted in good rules of construction.
All this implies that the structural restoration or consolidation design should cover many issues and that everyone should be lumped together in the structural model. The applications of the technology B.I.M.4S&D in several existing building structures, such as the one presented in this paper, showed the actual effectiveness of the methodology: all geometrical investigations carried out by sophisticated tools have enabled the verification of the survey archive data and the reliability of the in-situ measurements. The non-destructive tests have allowed to better characterize the individual component parts of the structure. All this has led to a high accuracy of the structural model, in a sophisticated and comprehensive process generated in four dimensions. In short, the participation of different professionals has resulted in an integrated B.I.M. model in which each element has been fully characterized by geometric, material and mechanical properties.
The proposed methodology in research has led to strongly combine two fields of architecture: representation and structures. The development of an integrated multimedia platform that includes all the needed structural information, analyzed from different disciplinary and scientific points of view, is part of a broader research that is in progress at the Department of Architecture and Industrial Design of the Second University of Naples.

Bibliographical References

[1] Azhar, Salman; Hein, Michael; Sketo, Blake, Building Information Modeling: Benefits, Risks and Challenges, Proceedings of the 44th ASC National Conference, Auburn, Alabama, USA, 2008. Available at: http://ascpro0.ascweb.org/archives/cd/2008/paper/CPGT182002008.pdf.

[2] Williams, Trefor, Information technology for construction managers, architects and engineers, ed. Thomson Delmar Learning, Pennsylvania State University, 2007

[3] Techel, Florian, Future of Communicating Digital Design in Architecture / Overcoming the Divisive Power of Computer Aided, Computing in Architecture / Re-Thinking the Discourse: The Second International Conference of the Arab Society for Computer Aided Architectural Design (ASCAAD 2006), 25-27 April 2006, Sharjah, United Arab Emirates, Paper ascaad2006_paper14, Cumincad, 2006.

[4] Design, The American University of Sharjah, Second International Conference on Computer Aided Architectural Design ASCAAD Conference 25-27 April, 2006 - School of Architecture and Design, American University of Sharjah, UAE.
Available at http://www.ascaad.org/conference/2006/Accepted_Papers.php

[5] Cooksey, Jason, The Integration of Building Information Modeling (B.I.M.) into Civil Engineering Curricula, Masters thesis, Clemson University, 2011 .

[6] Sacks, Rafael; Kaner, Israel; Eastman, Charls M.; Jeong, Yeon-Suk,The Rosewood Experiment – Building Information Modeling and Interoperability for Architectural Precast Facades, Automation in Construction, Volume 19, Issue 4, July 2010, Pages 419–432, Building information modeling and interoperability, ed. Elsevier, 2010

[7] Ettouney, Mohammed, Building Integration Solutions, in proceedings of the 2008 Architectural engineering national conference, ed. American Society of Civil Engineers, 2006.

[8] Mazairac, Ludovicus, Beetz, Jakob, Towards a Framework for a Domain Specific Open Query Language for Building Information Modes, in P. Geyer, A. Borrmann, Y. Rafiq & P. de Wilde (Eds.), Conference Paper: International Workshop: Intelligent Computing in Engineering, München: Technische Universität München, 2012.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Urban forms and architecture in the hydrographic landscape of the Sarno's valley

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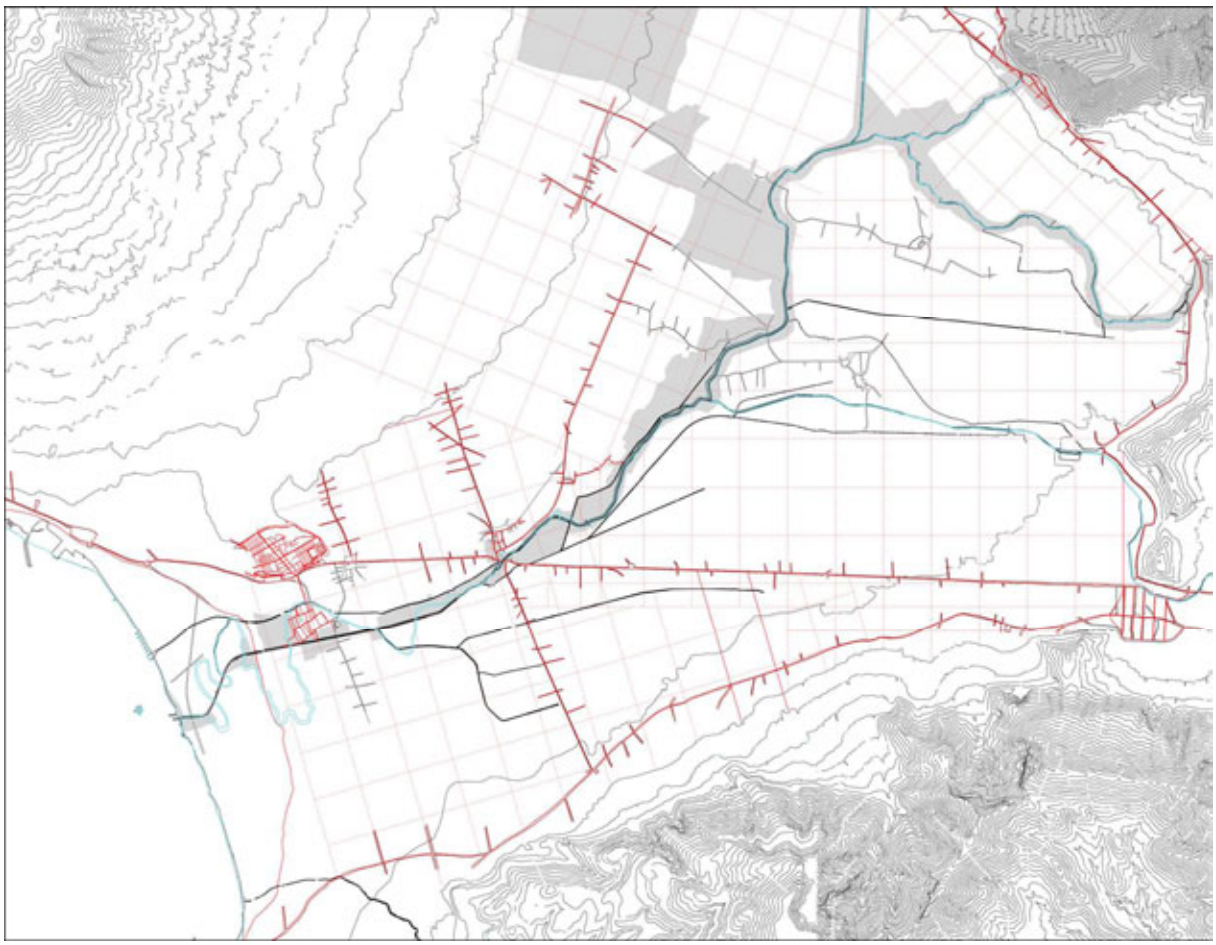
Abstract
The nocerino-sarnese's plane is marked by the river course and by a complex and intricate hydrographic network of smaller canals, ditches and brooks. From the protohistoric period, this hydrographic network has been an critical environment factor to govern and regulate. During the last few years I have been interested in the urban and topographic development of Pompei's area, among Moreggine, Castagnaro and Messigne hamlets.
This urban structure has radically changed through the modification of the river Sarno's track and the Bottaro creek. It can be read as an lengthened territorial system, a strip that comes from the construction of the large walled enclosure of Bourbon's powder keg, marked recently by the beams of the railroad tracks and the motorway.
We redesigned the River Park system starting from the changes of the shape, trend and design of the Sarno's massive water infrastructure. The topics are suggested by the surveys and studies made by the Basin Authority and the Regional Park of the River Sarno, and they are bound by regimentation and recovery of riverbeds and to enhancing green interstitial spaces between the existing urban areas. So we try to bring back into the architecture domain the solutions connected with hydraulic engineering, turning defenses and safeguards against the flooding, into form factors of the landscape, into redesign systems of green spaces, which also define the shape of the new Park architectures.

Keywords: river, urban, topography, landscape

1. A theoretical position about the landscape
This essay aims to study the Sarno river system as a great work of hydraulic architecture and as natural element generator of urban forms that have settled over time in these places. The landscape and the settlement of the Sarno's valley have always been influenced by the relationship strictly dependent on the river. The birth and the development of urban centers is derived from the symbiosis between the structure of the land and construction of artifacts, the same for the main architecture type of this valley. The landscape is conceived as an essential component of the architecture. It 'true that all disciplines who have studied the city and the region have exacerbated the use of this term in an indiscriminate and generic way. In architecture, this hypertrophy can be stopped by following the construction. We do not care about landscaping as decoration, arboreal furnishing, or ephemeral element, very fashionable lately. We study what allows the landscape outside and inside the town to be an infrastructural system. There is an Italian attitude to relate the architecture to the landscape, that binds to the own idea of landscape transformation. There are some topics on which the change of scenery involves specific problems of architectural type. This occurs when the landscape, which is the background or scene, comes into the architecture, when the landscape solves an specific problem becoming the material of the architectural design. The dry stone walls that surround the property in the

south countryside, the terracing and the *prevoli* of the Sorrento coast, basements, flooring, stone embankments of the rivers in historic cities, the tree-lined and suburban country walks, are all those infrastructure that interact directly with the architecture and characterize the landscape. In an essay on the relationship between nature and the city titled “The four architecture elements of the territory”, Carlos Martì Aris rises the question of gradual countryside conurbation around the city. He says*: “The transformation of our environment is determined with a rapidity and intensity increasing, and, at the same time, dramatically accelerate the phenomena of occupation and use of land. The metropolitan structures grows and expand while nature is moving away from us and becomes inaccessible. It takes a inexorable fate, the gradual move towards a complete artificiality of the territory.”*[1]

The River Basin landscape of the Sarno’s valley has changed over time through successive transformations of its course and of the infrastructure architecture type. The mills, tanks, ditches, dams were an articulated and complex built to harness water power; but also the crosses, the bridges, the adjustment of the banks, the riverside, the rows of trees provide use both infrastructural and public pleasure. The system that grew up around the river Sarno has always been based on the relationship between single natural element to the territorial scale and multiple architectural elements to the urban scale. We act on the structure of the landscape through the settlement principles. The different steps of the landscape project produce chain reactions: the relationship that develops between the farms, the boundaries and the plowed fields in Puglia, or between the docks and the buildings of tuna traps with the coastline in Sicily and, in general, between an infrastructure system in a large scale and its intersections. The study of this system wants to rediscover the potential of these places and a working method to be applied in a possible redevelopment of the river Sarno, starting from the possibility of reconnecting the river to the city subway. In recent years the city has built denying the presence of natural elements so that the hydrographic nature of the sites come into contact with the urban places, both residence and public spaces. So the river becomes the place where the architecture takes ownership of the nature and defines a specific water character, a landscape built on the water.



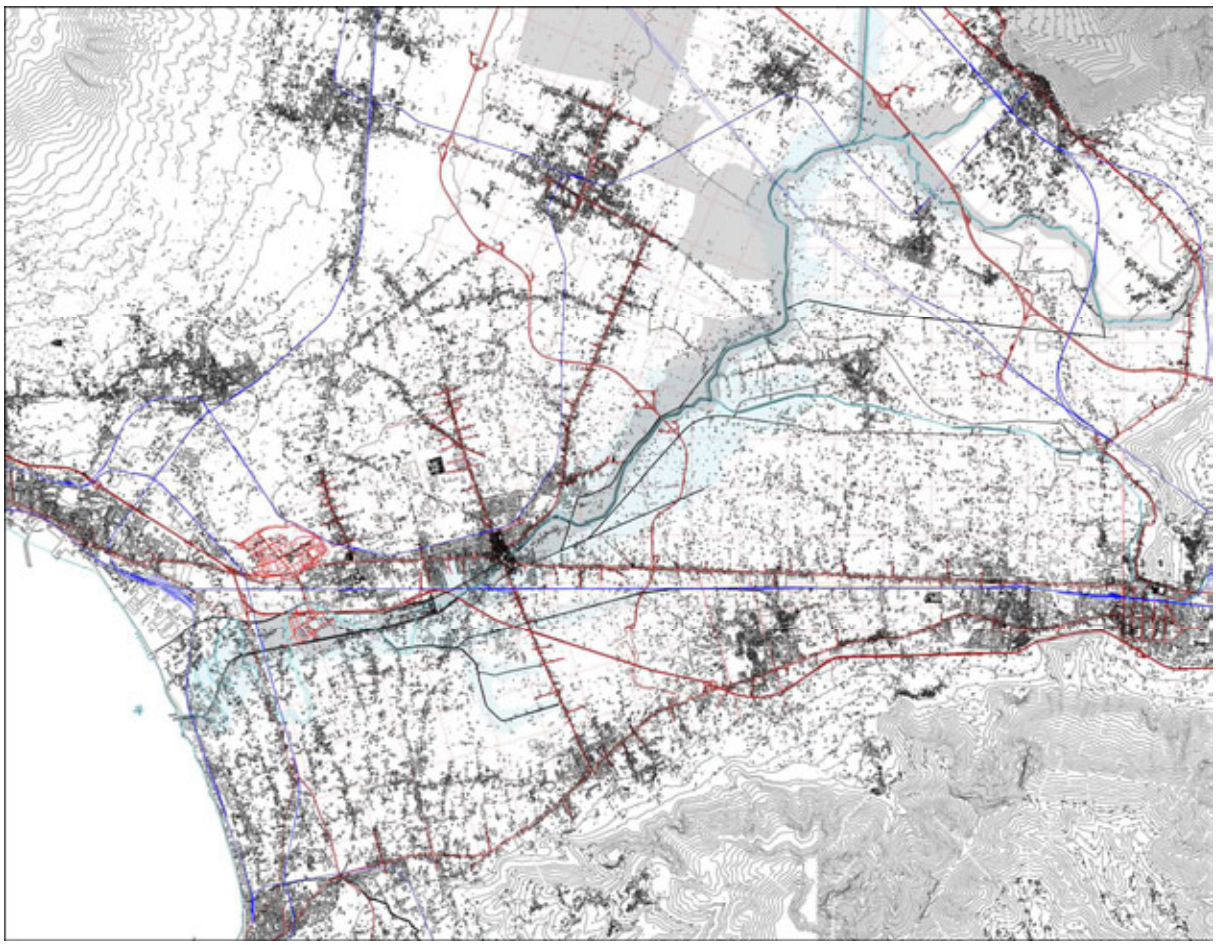
Imm. 1: Hydrographic and archeology structure: red for Pompei, Moreggine (the Roman port) and Nucera with connecting roads; blue for the winding route of the old river; black for the current route of canals and rivers

Then, as Carlo Alessandro Manzo says, in an open, discontinuous, polycentric and disjointed system, as the Sarno valley becomes important the set of open spaces and natural elements that participate in the design of new settlements with a role not accessory, but structural the project. *'Landscapes built and landscapes natural, built silhouettes and blank spaces, are antinomies of the same compositional problem, effectively summarized in the successful expression of the relationship between figure and ground.'*[2]

2. The urban form

The idea of the historic city, compact, monocentric, made of parts defined, is now outdated. The urban areas have merged with the territory and because they extend to the countryside, and for the re-naturalization of the internal parts. This new identity, which I call the **' landscape city '**, is a city that has branched out in the territory completely merging with the landscape. It is characterized by discontinuous and open parts, moreover, it has not more geometric figures able to describe it but elements of different scales that are interwoven between them: neighborhoods, green wedges, infrastructure, residential areas, historic towns held together by agricultural plots, in our case by centuria, by orographic system and the historical axes. As in most of the suburbs of Italian cities, even the urban form of the Sarno Valley has vanished in a conurbation widespread among industrial buildings, residential buildings, countryside and infrastructure and it is impossible to define the limits of the contemporary city

The valley, until the beginning of the postwar period, was shaped by a system of urban centers that revolved around the river Sarno connected by two historic streets the *'Consolare'* and '*Poupilia'*. The rapid and uncontrolled urban expansion since the war resulted the almost complete sealing of urban centers through the draft and filamentous road network connection.



Imm. 2: Urban structure , infrastructure, the Sarno river park (gray), the areas of constraint flooding (blue)

This large part of the Campania region between Vesuvius, Lattari Mountains, the Sarno Mountains and the coast is crossed by the river that cuts off the Sarno valley into two subsystems, the first that revolves about the province of Naples, the other on the Salerno's one. Despite this administrative division, agro Nocerino / sarnese has a landscape, architectural and urban design unique due to the presence of dense hydrographic network, which has no comparison with other sites, both for the strong relationship with the primary crops as a productive resource. The architecture and the rural residences undergo a change in the relationship they establish with the ground due to the depth of the water table. That's why next to the river, historic houses do not have basements and have two floors, on the slopes of the mountains tall houses have basements dug into the layers of gray silt and one floor above ground. The complex network infrastructure, local and regional one, crosses over that territory, overlapping indiscriminately to urban presences, to paths and natural emergencies. Foremost the highways Naples - Reggio Calabria and Caserta - Salerno, which join near Nola, and the State Railway which runs along the old consular road: they accentuate the division into separate bands and parallel to the trend of the river. The historic territorial system, made of poly balanced by river line, is now virtually unrecognizable. The offshoots of urban centers exploded in a pulviscular system of residences and warehouses, and the system of linking roads is a filamentous network that urbanize the campaign.

3. Hydrographic structure and architecture

The urban and topographic evolution of the valley is inextricably linked to the shape and pattern that, over the centuries the imposing structure of the river Sarno took over, in spite of man's will to govern it. The plain is marked by the river and by an intricate network of hydrographic minor canals, ditches and streams, which has represented since the protohistoric period, a critical environmental factor to govern and regulatory. That is why since 1998 this territory, which extends over an area of about 715 square kilometers, with a population of 1,300,635 inhabitants (ISTAT 2000), has established the Sarno Basin Authority; in 2003 the Campania Region has recognized institutionally the Regional Park of the Basin and River Sarno, which is an institution that has a policy of development and land conservation through the enhancement of environmental river route of the historical, cultural, archaeological. The main course of the river is approximately 24 km long and originates from three sources at the base of the mountain range of Pizzo d'Alvano (named Palazzo, Marino and Foce) and flows into in Castellammare di Stabia.

The Sarno, in the Middle Ages called Dragon because of the unfolding of its sinuous course, today is almost entirely artificial for the reclamation works that have rectified its natural course. Originally, the paleolithic village of Longola, near Poggiomarino, was made from wooden huts on stilts to elevate themselves on the waters of the river and on swamp. In the Roman period, the city of Pompeii owes its development to its own strategic position about the Sarno. The presence of a River Port in the locality Moreggine, makes the city a great emporium for the Nocerino, Acerrano and Nolano hinterland, and constituting the center element on the economy of the whole area[3].

The oldest representation of the river, appears in the Tabula Peutigeriana, dating roughly between the twelfth and thirteenth centuries, represented his tortuous path that runs alongside Pompeii and flows into the sea near Castellammare[4]. To analyze the structure of the territory before the upheavals of nineteenth century, one can study a design in 1789 entitled *'Pianta Topografica per dimostrare tutte le acque che compongono il fiume Sarno'* (Imm.3) and a notarized document with a map of 1828 entitled *'Cenno sull'origine delle acque del Sarno'* (Imm. 4). In both the maps we can see information about the arrangement of the villages, the path of the river, the roads, the type and the cultivated areas, some significant points such as bridges, mills, canals. In particular, in the second historical paper, it is emphasized Scafati's village with the Mother church and the old bridge.





Imm. 3 e 4 : *'Pianta Topografica del Sarno',* 1789 and *'Cenno sull'origine delle acque del Sarno',* 1828

It is the only urban center of the plain which has its historical roots on river water, developing a direct relationship with it. The bridge, the system of locks and channeling of water, the Palace Meyer, the profile of the Cathedral, the gardens of the Villa Comunale, the island of the mills form the urban system that characterizes the city, and it is also the most significant point to cross the river Sarno in the plain. Here you can feel the direct relationship between the city and the water, through the bulkheads and mechanical systems that were actuated for the overfill, the design of the fine edge of the channel walls of lava stone, the remains of old mills, part integral to the design of retaining walls, houses built on the edge of the river. In the Middle Ages, right in this area were built some Religious Architecture significant for our study because it placed in close relationship with the river: the church and the cloister of the Cistercian Abbey of Realvalle, were built by Charles I of Anjou in the village of St. Peter north of Scafati to celebrate the victory at the Battle of Benevento in 1270, and the church of the Virgins of Santa Maria, built in 1524 right next to the 'Pons Sarni', is defined by historian Gaetano Pesce a 'church on the river'.



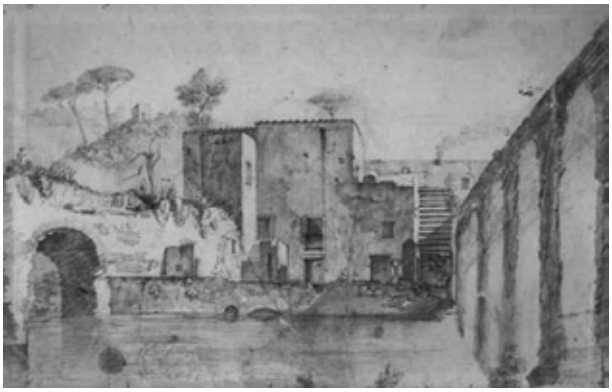


Imm. 5 e 6 : 'Guaches' of 1686 and painting by Jacob Philipp Hackert from the '700

This urban system is represented in an 'gouache' of 1686 and in a painting by Jacob Philipp Hackert from the 700, in wich also highlights the relationship that is established between the Roman bridge, the Scafati Cathedral and the river. There is a rich iconography of the nineteenth century that depicts some urban aspects of the Sarno's river landscape. During this time, the baroness Nathaniel de Rothschild with Leon Vernier (Imm. 7) paint the views of the Scafati houses to the Paris Salon: you can see how the residences live in close relationship with the river and the houses are built on rampant arches in order to raising the floor on the river level, the accesses are directly connected to the river, used for the transport of goods and quick shifts. In a faceless design of the first half of the

900 (Imm. 8) is drawn a charming glimpse of a house, in a place not well defined, between two bridges. The house is set on two levels, such as rural houses, with the lower floor used as storage and in closely with the river and the upper floor used as a residence. It is thus to form a hybrid space between the house and the river that looks like a transposition of a rural court on the River, a riverine courtyard , probably used as a landing place and working.





Imm. 7 e 8: Lithography by Nathaniel de Rothschild, 1886, and the anonymous design of the first half of the' 900

The plain slopes gently toward the sea with an average slope of 0.1%, by drawing a trend of the river slow , winding and invasive. Such a environment system has favored the development of industrial sites that used the water driving force. The mills, textile mills, paper mills, cotton mills, textile industry, structure themselves in relation to the wide availability of water resources and the unique topography of the area. The section that comes from the mountain to the sea, with a little difference in height, the numerous hydraulic interventions along watercourses that took place over the centuries, have changed the regime of river beds causing frequent flooding. The Mills of Scafati (Abenante, Piscitelli, De Sio), Mills on Bottaro to Moreggine (Imm. 6) and the Persian Bridge (Imm. 7), until the nineteenth century, were the engine of the valley's economy. They were managed by the lords of the estates and allowed for the production wheat barley and maize as real industrial structures that used the water power of the river arranging themselves on its banks.





Imm. 10 e 11: Two anonymous paintings from the collection of the Duke of Guevara in the first half of the 900: Mills Bottaro and Bridge Persica

From nineteenth century, the structure of the hydrographic basin is related to the navigability of the river, to the activities of new industries and canalization works and drainage made by Borbone. So the wide area near the city center of Scafati, at the old bridge and the nearby railway station, was used for the creation of a remarkable factory for spinning, destroyed at the beginning of 900. From the entire structure remains only the residence of John James Meyer, industry's founder, which now houses the Town Hall. At the beginning of the nineteenth century Ferdinand II decided to build between Scafati and Pompei, a new powder factory to replace the existing one in Torre Annunziata. The great enclosure of the Royal Powder Magazine[5] becomes a strategic intervention and of fundamental importance for the redesign and reconfiguration of the channel Bottaro and of the river main course. These works by grinding and channeling for navigation, permanently altering the original directions of development of Scafati's city towards the sea.

4. Study Area and methodological approach

In 1980 J.N. Baldeweg, in the PhD in design at the ETSAM Madrid, studies and detects the Canal of Castile since its conception in 1753 by King Ferdinand IV to the restructuring plans of some mills. He supports that it is necessary the rebirth of the life of the channel, even if partial, first of all for the restoration of its landscape value, although it should strengthen functions other than those which once were the priority.

'The rows of trees are one of these. The Trees planted along the banks of the canal are important, not only because they can be expoloited as a source of timber, but because they are a significant feature of the landscape. The lines of trees that follow the course of the canal have a visual and emotional function. They form part of the identity of the landscape and are the visible mark left on the land by an old ambition.'[6]

In 1991 Francesco Venezia, within a broader pilot initiative of the Region of Valencia for the recovery of the old town of Alcoy, works the arrangement of the riverbed of the canals Barxell and Molinar. He starts from the idea to bring the theme of hydraulic arrangement in the architecture domain, of turning defenses and safeguards against floods and flooding in form factors of the landscape. *'The project studied a series of sections of controlled flooding, with the aim of keeping intact the natural course of the meanders. '*[7]

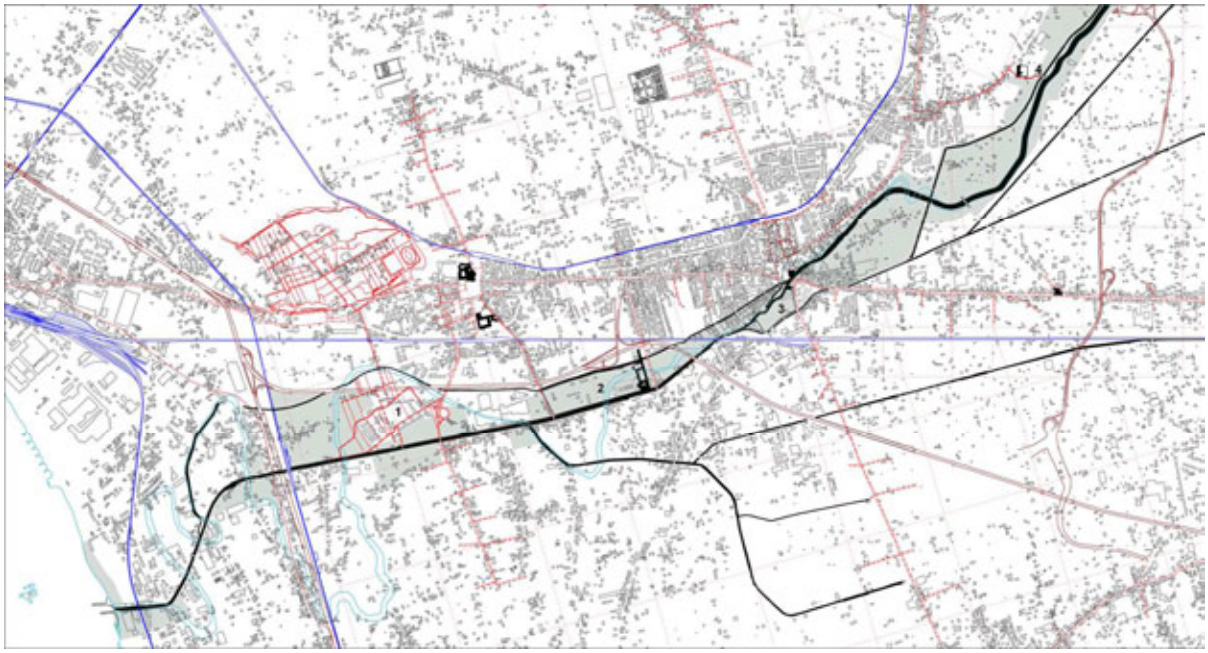


Fig. 12: Identification of areas study: 1 Moreggine, 2 Gunpowder, 3 Center of Scafati, 4 Abbey of Realvalle

Our research, based on these considerations, proposed the structural and identity reconnection of the territories crossed by the Sarno. It articulates with a large-scale project, addressed in the 2009's Prin coordinated by Carlo Alessandro Manzo, that uses the river Sarno as a territorial hinge; he proposes a hypothesis of urban expansion of the centers of the valley concentrated over strings that cross the river and some specific hypotheses developed for Seminars, Workshops, and recent studies carried out in close relation with the water system. We designed a map of this last system (Fig. 12) are shown where the study areas of strategic interest. Among these is the area of Moreggine (1) has already been studied for the workshop "Cross Pompeii"[8] edited by Emanuele Carreri.

Moreggine's area is located in one of these systems, complex urban groups formed through the interweaving of elements of various kinds over time. A convoluted tangle of filamentous infrastructure strings as rail and highway, a system of overpasses and underpasses crossing point of the underlying soil, the extent of the land drawn by creeks (Bottaro), from the river Sarno, from farm trails, from cultivated fields. Balance the weight of residential buildings superimposed on a new system of connections, host a network of paths, propose new relationships between urban areas and redefine the plot of agricultural park: a system of subways which crosses the A1 allows a higher permeability north and the excavation area and a system of bridges, of which only one driveway, allows the crossing of the Sarno, linking the market area with the band south of the River.

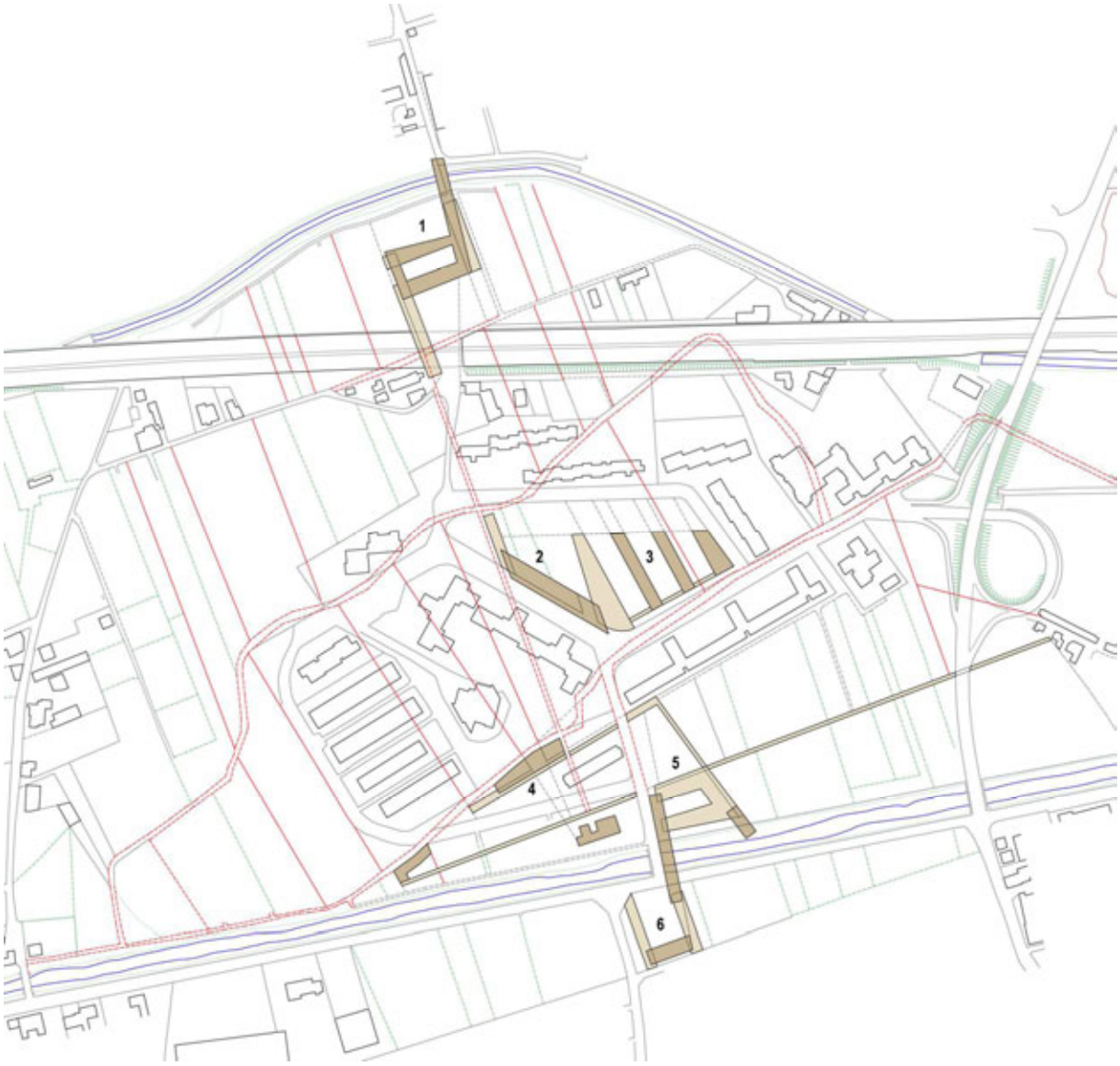


Fig. 13: Master Plan of Moreggine's area: 1 archaeological museum, 2 civic center, 3 school campus, 4 library, 5 market area, 6 environmental research center

The project of redesigning the area of *"Real polverificio Borbonico"* (2) rests on these same principles and starts from a feasibility study in 2009 which provided for the transformation of the site into 'Polo of culture and applied research, of hospitality and wellness , trade and terziaro advanced. ' The project aims to create a cultural link with Pompeii, in order to attract tourist flows of archeology enthusiasts and devotees of the cult of Mary, as well as those coming from the Sorrento Peninsula and the Amalfi Coast.
The years of the Royal Gunpowder in Scafati were characterized by severely damaging events, such as to cause the suppression of the activity and the conversion of the building, in 1930, into the Institute of Experimental Tobacco. Now we have only the representative part from of the original building, recently restored. Today, the cultural center is composed of a main building made as C on three levels with a courtyard and a small pavilion, the church and the exedra of access to the gardens. The new urban system, that revolves around the historic precinct of gunpowder, is like a pivot for the systems that, from Pompei to Scafati, connect to the banks of the river Sarno. For Moreggine the two axes that cut from north across the infrastructure systems, and the Waterways have the task of repairing the degraded portions of the city to the south. The project addresses some urban issues starting from the directions of the Plan. The areas identified are inserted in a complex system and try to give a new strategic strength to the gunpowder large enclosure. The draft plan is organized through a few operations: it marks the roadsides with new vegetation (green wedges), introduces a system of special residences for students, researchers and young couples; it reorganizes the research activities of the Institute of Experimental Tobacco; proposes new green areas which relate with the system of the Sarno River Park.

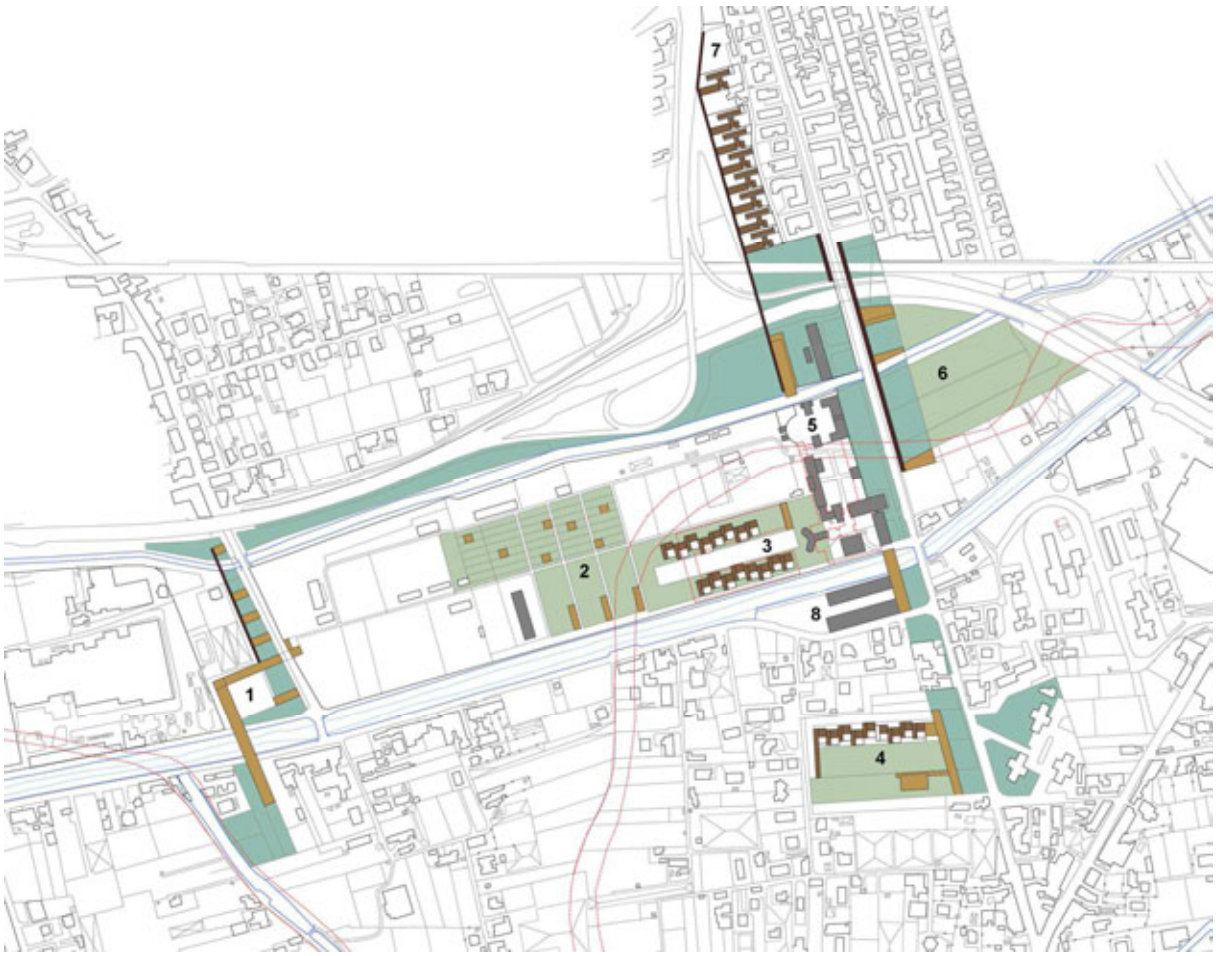


Fig. 14: Master Plan of *Polverificio Borbonico*: 1 craft manufacturing center, 2 research center on crops, 3 residences for researchers, 4 university center, 5 historic core, 6 park facilities, 7 special residences, 8 school of art (theater, music and dance)

Bibliographical References

[1] ARIS, Carlos Martìs. *La cèntina e l'arco.* 1ª ed. Christian Marinotti, Milano, 2007. Translation of original book title 'La cimbra y el arco'. ISBN 978-88-8273-079-6

[2] MANZO, Carlo Alessandro. Natura e valore nel progetto architettonico. In MACAIONE, Ina (edited by). *Città – Natura, allegato a Siti 04 .* City: Matera, 2005, p. 54.

[3] CONTICELLO DE' SPAGNOLIS, Marisa. *Pompei e la valle del Sarno in epoca preromana: la cultura delle tombe a Fossa.* Ed. ISD, 2001. ISSN 0081-6299

[4] PRONTERA, Francesco. *Vie e luoghi dell'Etruria nella Tabula Peutingeriana.* Ed. Olschki, 2003. ISBN 8822252748

[5] PESCE, Angelo. *Il Polverificio borbonico di Scafati e la rettifica del basso corso del Sarno.* Ed. Giglio, Pompei 1996.

[6] NAVARRO BALDEWEG, Juan. *Lungo il canale di castuglia.* In Lotus International n° 52, Ed. Electa, Milano 1987. ISBN 88-289-0246-9.

[7] VENEZIA, Francesco. *Progetti recenti di Farncesco Venezia.* In Casabella n°566, Ed. Electa, Milano 1990. ISBN 88-289-0442-9.

[8] SANTACROCE, Andrea. *Complessità urbana e misura del suolo. Una ipotesi per il Quartiere Moreggine.* In GAMBARDELLA Carmine. Atlante di Pompei. p. 389-392, Napoli:La scuola di Pitagora editrice, 2012. ISBN 978-88-6542-171-0.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Save what we can: experimentally validated design of stengthening interventions to reduce the seismic vulnerability of a bell-tower

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Abstract
The design of strengthening interventions on historical buildings is complex due to the numerous uncertainties in terms of geometric and mechanical properties. In addition to this, interventions must be critically examined in relation to their effectiveness and to their impact on the conservation of the assets. Accordingly, also in consideration of collapse mechanisms typically observed in historic buildings, a cognitive research must focus primarily on the history of the building, the geometry of various structural elements, construction techniques, as well as material degradation.
Difficulties typically connected to knowledge are often in relation to available resources and the invasiveness of the research to be performed, this making necessary to compare by means of posterior models based on the observations and experimental verification of the mechanical behavior of the building. Accordingly, in the field of seismic strengthening interventions, dynamic tests, experimental modal analysis techniques and FE modeling may play an important role. The first two contribute to knowing the actual health state of the historical buildings, while the last is useful to evaluate, since a preliminary design stage, the effectiveness of the interventions.
The present paper proposes a rationale for optimizing seismic safety measures and interventions, along with the description of the interesting case study of the bell-tower of the Fossano.

Keywords: masonry structures, dynamic tests, pushover analysis, FE modeling, safety measures.

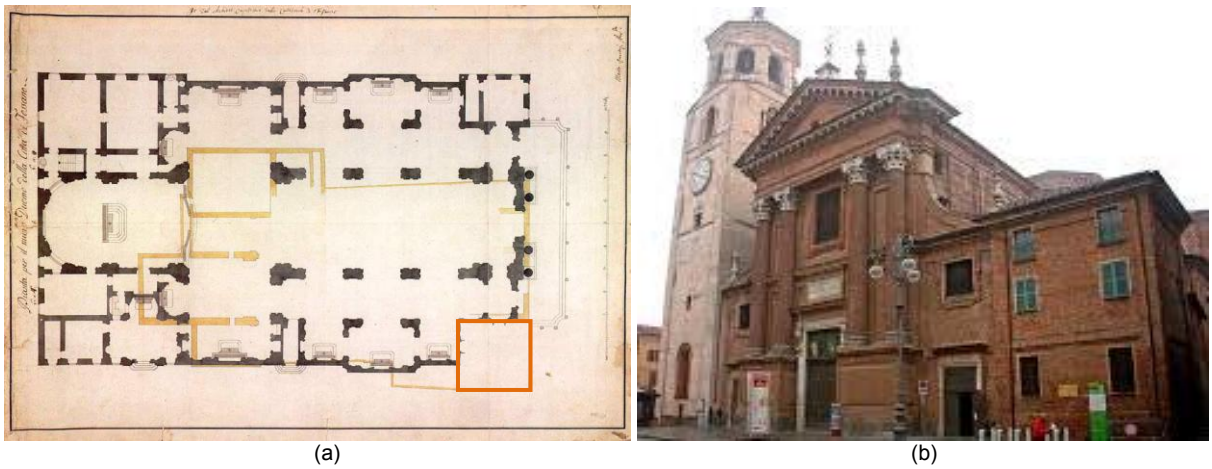
1. Introduction
Masonry bell-towers are very diffused in Italy and represent an important portion of the built Heritage to be preserved. For this reason their seismic assessment against earthquake appears to be of relevant importance for historical, social and artistic reasons. A main issue in the seismic behavior of these structures is the influence of the axial stresses induced by gravity loads, whose value is often of the same order of magnitude as the ultimate compression of the masonry. Hence, structural failure can be driven even by a moderate increase in stress level, which can occur also during low magnitude seismic events.
Several studies have been conducted in the past to investigate the invasiveness, the long-lasting quality and the efficiency of different strengthening interventions [1-2]. In this field, an important role is played not only by analytical aspects, but also by the development and validation of innovative materials and systems for conservation and strengthening. The optimal design of a strengthening intervention becomes particularly difficult when operating in urgency regime and when some temporary safety measures and interventions must be done. In spite of their being fundamental for the safety of the structures, provisional interventions can have a different impact on the quality of the structure.

The distinctiveness of each bell-tower, due to masonry chemical and mechanical characteristics, stress concentration and existing cracks, makes its strengthening as unique and specific case study. Therefore the assessment of the static and dynamic behavior and the choice of the best intervention require a validated numerical model [3-7]. On this model the possible interventions can be modeled and the different effects on the structural behavior can be investigated. The availability of a validated and verified model of the structure complies also with the need to evaluate in advance the effectiveness of an intervention, so avoiding unnecessary ones.
The present paper proposes a rationale for optimizing seismic safety measures and interventions, along with the description of the interesting case study of the bell-tower of Fossano (Cuneo, Italy). Four possible strengthening interventions have been investigated and evaluated.

2. The structure

2.1 History of events

The bell-tower of Fossano Cathedral, placed in Manfredi square, was built in XIV century for want of the family Acaja. The family Acaja, established their domination on the city of Fossano, added an symbol of their authority in the square that accommodated all the emblems of the power, providing the church of Santa Maria and Giovenale of a bell-tower [8]. This church was demolished in the later centuries and in the same place the present church was built. The Cathedral is bigger than the previous church consequently the bell-tower nowadays appear less majestic than it was at the beginning (Fig. 1).
The bell-tower, conceived originally as a fortress with embrasures oriented in the direction of the doors of the fortified city, underwent important changes in the centuries reaching the current features. An important modification was imposed in the XVI century when the spire was substituted with the octagonal crowing designed by Giovenale Boetto. Now the bell-tower with an overall height of 46 meters has a square cross section and a octagonal belfry. The thickness of the walls is 1.5 meters constant up to 35 meters and decreases at 0.5 meters at the belfry.



(a) (b)

Fig. 1: Plants (a) the old church (ochre); the present Cathedral (black); the bell-tower (orange) (b) The bell-tower and the Cathedral nowadays.

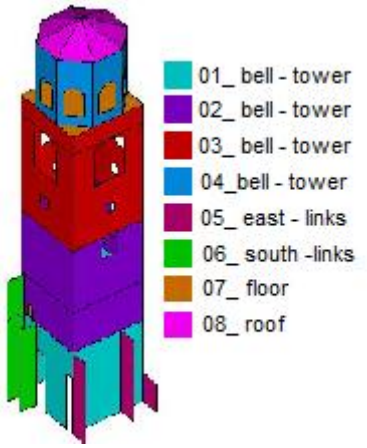
The spatial organization has changed over time, as reported by the chronicle and by the historical analysis. This organization, as shown hereinafter, does not find correspondence in the numerical model of the structure. It is reasonable to assume that the first strengthening interventions of bell-tower, as reported by the documents, occurred after the earthquake that struck the territory of Fossano in the 1887. The seismic event caused important vertical cracks, still visible, therefore interventions of consolidations became necessary. The interventions consisted in the filling up of the staircases “intra muros” with masonry having good mechanical properties and the introduction of three levels of steel ties-rod at the heights of 14, 24 and 32 meters, respectively. The first intervention was a preventive measure: indeed the new masonry wall would have acted as a prop if the external walls were failed. The ties-road instead have the aim to avoid further crack opening so giving rise to a box behavior to the structure. No other interventions are reported by the consulted sources until the 2012 when provisional additional ties-rod were placed inside and outside of the bell-tower to avoid the further crack opening. The visual impact of this temporary safety measure on the bell-tower is important, as shown in Fig. 2. This notwithstanding, ties represent an effective safety measure in view of permanent interventions.



Fig. 2: The bell-tower after the provisional safety measure (2012).

2.2 The mechanical property of the masonry

The mechanical properties of the masonry at the different levels of the bell-tower were assigned an estimate based on the updated numerical model and were then confirmed by core drilling tests. The updating of the FE model was carried out from ambient vibration data [9]. Data were acquired using accelerometers conveniently placed on the bell-tower. The core drillings has shown a unequal masonry at the different levels of the bell-tower. Starting by the examination of the samples and utilizing the precedent experimental results on other structures, similar for geography, materials and age of construction, the strength of the masonry at the different levels was fixed. Based on the results of core-drilling tests and visual inspection by means of an endoscope, the characteristic value of shear strength was assumed equal to 60000 N/m^2 for all the masonry. The compressive strength, instead, was assumed to be 2000000 N/m^2 at the lower level and at the belfry, while for the other parts of the bell-tower the poor quality masonry resulted in an estimate of ca. 90E04 N/m^2. The elastic properties of the masonry, Young modulus and Poisson coefficient, were taken equal to the "parametric values" obtained by the updating of the FE model. The values for each homogeneous masonry portions (Fig.3) are reported in Table 1.



Masonry portions	w (kN/m^3)	E (MPa)	ν (-)
01_bell-tower	20	2.69E03	0.3
02_bell-tower	20	1.32E03	0.3
03_bell-tower	20	1.25E03	0.3
04_bell-tower	20	2.47E03	0.3
05_est-link	20	5.00E02	0.3
06_south-link	20	5.00E02	0.3
07_floor	22	1.80E06	0.3
08_roof	26	1.00E04	0.3

Fig. 3: Discretisation in Homogeneous portions.
Table 1: Density, Young modulus and Poisson coefficient of different masonry portions.

2.3 Seismic assessment of the bell-tower in its original state

The choice of the best intervention for the seismic protection of the bell-tower requires a knowledge on the present condition of the structure, whose current state was investigated by linear and nonlinear analysis carried on the validated FE model [10]. In the linear analysis the seismic action, combined with the gravity loads, was applied at the numerical model in order to evaluate safety levels with respect to in-plane bending, out-of-plane bending, and in-plane shear failure modes. Safety assessment carried out on the tower has shown that the lower safety factor is at the middle height of the bell-tower where the mechanical characteristics of the masonry are worse. The linear analysis was followed by a pushover analysis to determine the ultimate seismic acceleration of the bell-tower. The pushover analysis is carried up to the collapse, in correspondence of which the structure shows an expended cracking and crushing. The pushover control point was placed at the highest floor of the structure as shown in the Fig.4. The displacement-acceleration curves depend on the direction of the seismic action as shown in Fig. 5. This asymmetric behavior is due to the connection of the bell-tower to the Cathedral along two consecutive orthogonal walls and to the asymmetry of the structure caused by the presence of the old staircases “intra muros” filled up by good masonry in the 1887 (Fig. 6).

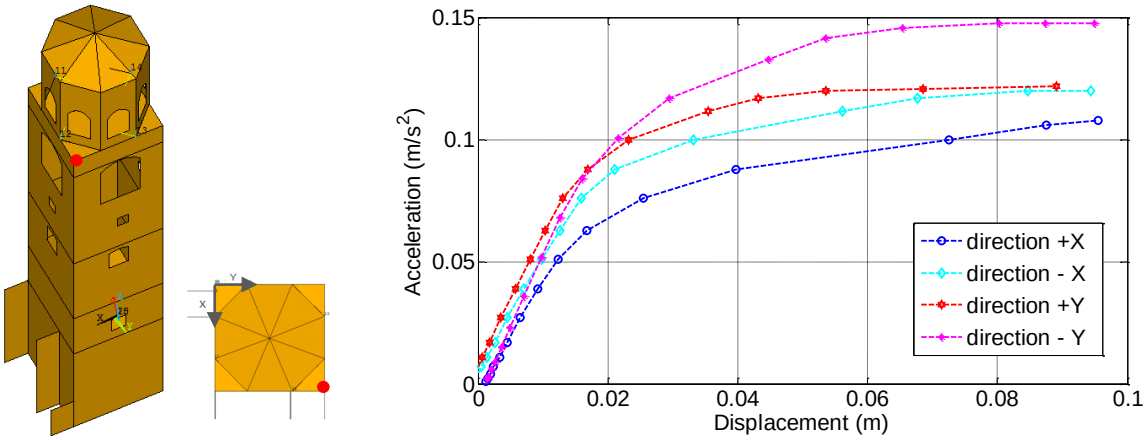


Fig. 4: Position of the pushover control point.
Fig. 5: Acceleration-displacement curves of the bell-tower at the present condition for four orthogonal direction of the seismic action.

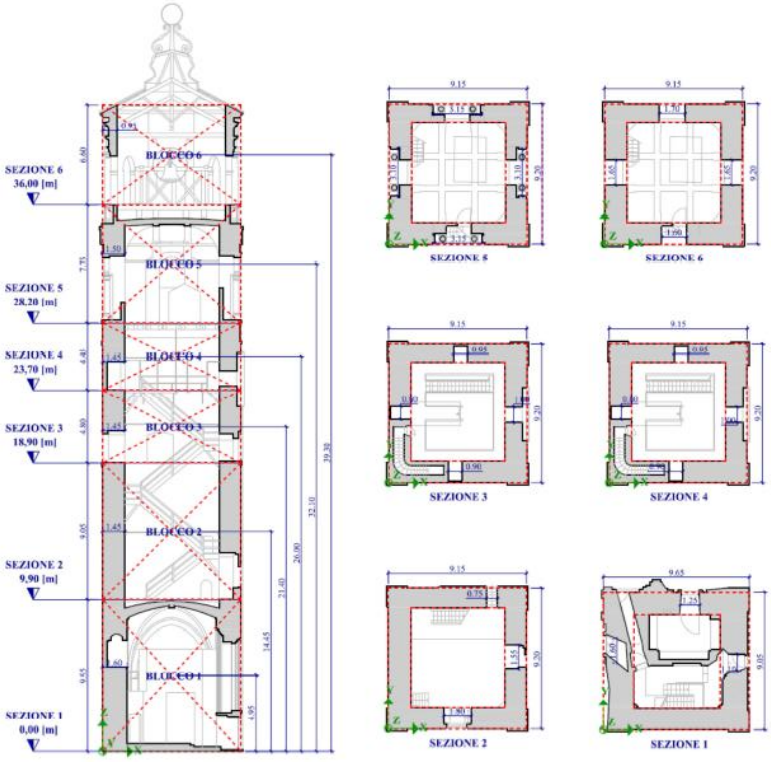


Fig. 6: Cross and horizontal sections of the bell-tower.

3. The interventions

3.1 Description and modeling

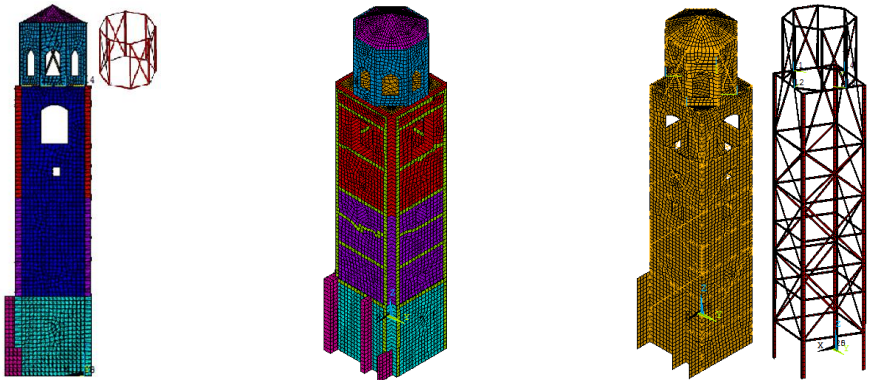
Four different solutions were considered: reinforced concrete liners, a reticular system made of vertical and horizontal FRP fibers, an auxiliary steel structure and grout injections.

The reinforced concrete liner is a common technique used for the reinforcement of ordinary structures. Its use for the seismic protection of the cultural heritage is limited due to its invasive nature. Such an intervention, in its current version, would wraps the original masonry walls with two thin layers, internally and externally, covering the architectural characters of the structure. To limit the invasiveness of this strengthening intervention, the reinforced concrete layers have been confined to the most vulnerable parts of the bell-tower, and an auxiliary steel structure has been designed for the belfry protection. The reinforced concrete liners have been modeled as shell elements with homogenized mechanical properties. The auxiliary steel structure, instead, was modelled in the FE model as an additional frame (Fig. 7).

Strenghtening and retrofitting of existing masonry buildings with externally bonded FRB fibers is a technique that has been used extensively in the last years. The large interest in using these materials for seismic protection is related to some favourable properties: no mass and stiffness increase, low impact, reversibility and durability. The strips of FRP can be easily removed by a thermal treatment. Many researchers studied the behavior of strengthened masonry elements for in-plane and out-of-plane failure mechanisms [11-12]. The effectiveness of the intervention is related to the quality of bonding of the FRP reinforcement to the masonry [13]. Furthermore the de-bonding failure is extremely serious because it is a brittle failure. Due to its negligible stiffness of FRP fibers compared to that of the bell-tower, this intervention does not affect the seismic response in case of low magnitude earthquakes. Among the numerous types of FRP, carbon fibers were chosen (thickness of 1 millimeter, density 1780 Kg/m^3, Young modulus 300000 MPa). In the FE model the carbon fibers are introduced as additional vertical and horizontal elements (Fig. 7) with linear constitutive law.

The intervention with an auxiliary metal frame, placed inside the buildings, reduces the tower's seismic vulnerability because the connections between orthogonal walls warrant a box behavior of the structure, increase the stiffness and the dissipative capacity. In more detail, a steel auxiliary spatial frame was considered as a viable strengthening measure for the bell-tower, and the FE model was modified accordingly (Fig. 7).

The injections of grout is widely used nowadays to reinforce damaged masonry. This technique basically consists of the filling the voids and/or the cracks inside the walls by injections of new mortar, in order to restore their continuity. The saturation of the cavity therefore permits to homogenize the masonry behavior. The injections must be preceded by some investigations. The dimension and the distribution of the voids, as the correct choice of the grout, according to the typology of the wall texture [14-15], assume particular importance since they can determine whether or not the reinforcement is effective. However, the effectiveness of this strengthening technique can be evaluated precisely only after its execution by means of ultrasonic tests. In case of uniform distribution of the masonry voids this technique does not affect stiffness distribution, hence the relative contribution of each member to seismic resistance remains unchanged. Furthermore, this type of intervention has a limited impact on a structure's architectural characters and features. In our case, injections would be reasonably designed so as to produce an increase of mechanical properties in poor quality masonry of the intermediate level of the bell-tower. Accordingly, the FE model was modified by setting a uniform value for all mechanical characteristics to the values assumed for the belfry, also in order to simplify the analysis. In real practice, these assumptions should be confirmed by ultrasonic tests performed after the intervention.



(a) (b) (c)

Fig. 7: Modified FE models: (a) reinforced concrete liners ; (b) FRP reinforcement ; (c) auxiliary steel structure

3.1 Multi-modal and pushover analysis

Multi-modal analyses were performed on FE models of the bell-tower after introducing modifications to take into account strengthening interventions. A comparison of the main modal quantities, before and after the interventions, is reported in Table 2 and Fig.8.

	1° Modal frequency		2° Modal frequency		3° Modal frequency	
	Absolute increase	**Relative increase**	**Absolute increase**	**Relative increase**	**Absolute increase**	**Relative increase**
Reinforced concrete liners	0.355	27.5%	0.410	29.7%	1.375	39.5%
FRP fiber	0.039	3.0%	0.042	3.0%	0.099	2.8%
Auxiliary steel structure	0.175	13.5%	0.158	11.4%	0.198	5.7%
Grout injections	0.277	21.4%	0.315	22.8%	0.968	27.8%

Table 2: Absolute and relative increase of the first three modal frequencies after the interventions. (The values before the interventions are 1.292 Hz; 1.382 Hz; 3.481Hz).

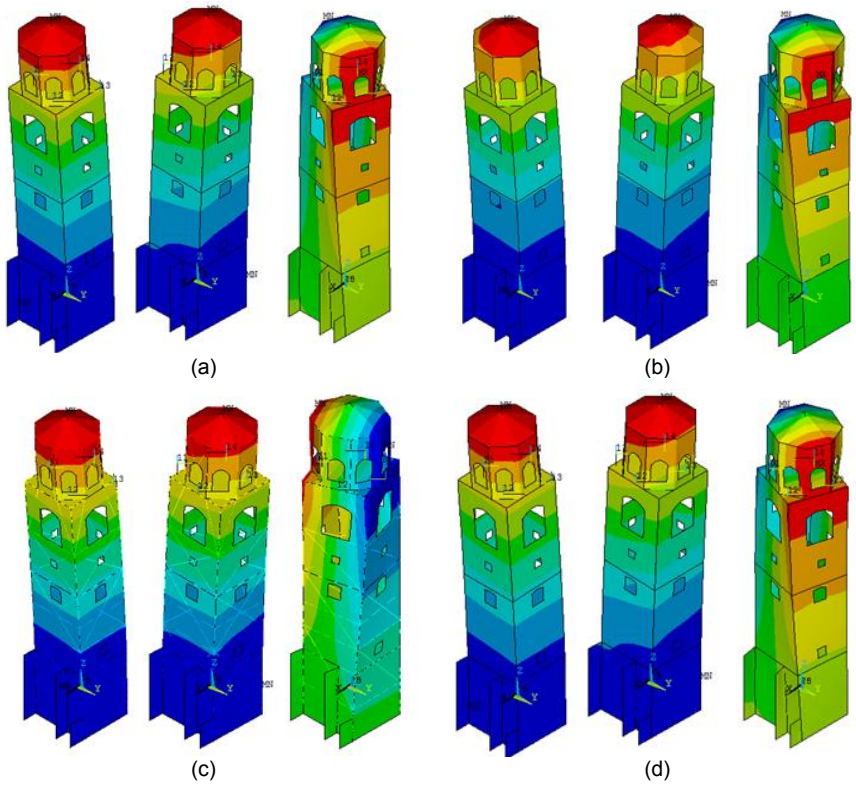


Fig. 8: Modal shapes for different strengthening interventions: (a) reinforced concrete liners; (b) FRP fiber ; (c) auxiliary steel structure; (d) mortar injections.

The multi-modal analysis was followed by a nonlinear seismic (pushover) analysis. The displacement-acceleration curves obtained by the pushover analysis are reported in Fig. 9**.**

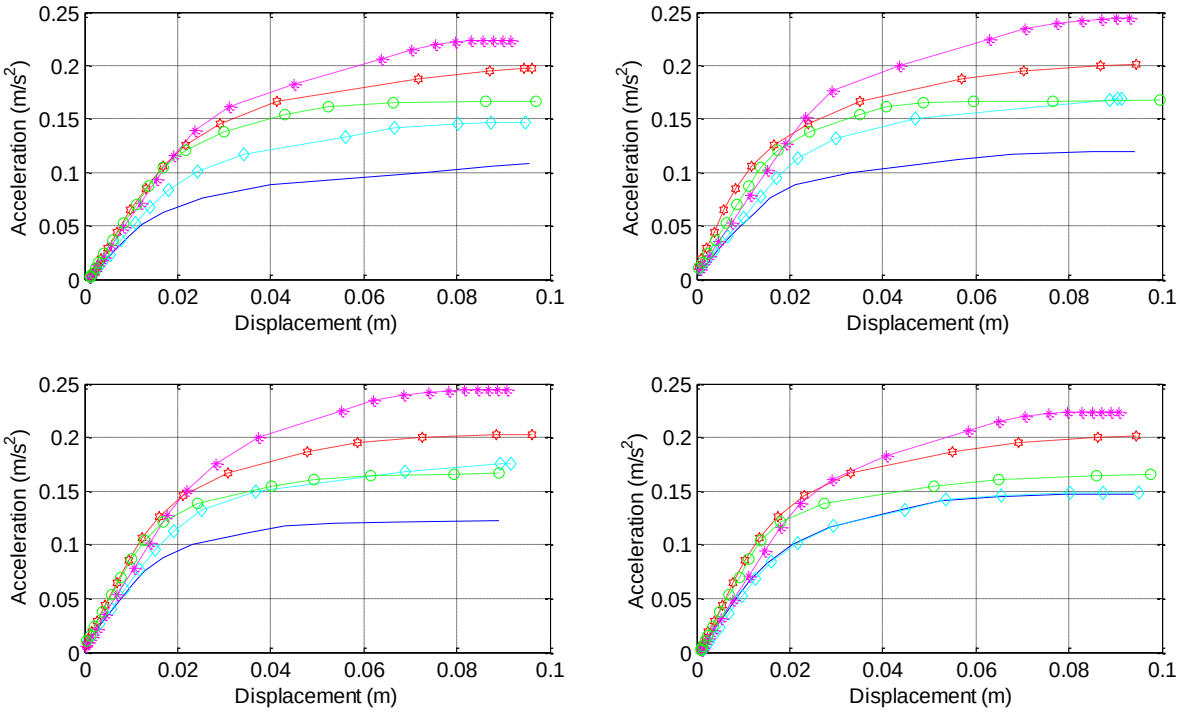


Fig. 9: Comparison of acceleration-displacement curves of the strengthening intervention — present condition; reinforced concrete liners FRP fiber auxiliary steel structure grout injection for different directions of the seismic action (a) + X direction; (b) - X direction; (c) + Y direction; (d) - Y direction.

The pushover analysis shows how all the considered interventions bring to an increase of the ultimate limit acceleration of the bell-tower. This result is confirmed for all combinations of the horizontal seismic actions. The relative resistance increase is generally equal in the two directions, except for the intervention with concrete liners. In fact, the design of liners was not able to correct the asymmetric behavior of the structure. The average increase of the horizontal ultimate limit acceleration of the bell-tower for the different strengthening interventions is reported in Table 3 together with the average increase of the stiffness, as obtained from the FE model.

	Increase in resistance (%)	**Increase in stiffness (%)**
Reinforced concrete liners	+ 61 %	+ 27 %
FRP fiber	+ 40 %	+ 3 %
Auxiliary steel structure	+102 %	+ 13 %
Grout injections	+ 39%	+ 20 %

Table 3: Average increase in resistance (in terms of ultimate limit PGA) and in stiffness (from FE model).

Assuming to select grout injections as strengthening intervention, which is a typical choice in low seismicity areas, safety levels with respect to in-plane bending and shear, and out-of-plane bending of single masonry panels (e.g. see Fig. 10 for the lower level). The seismic assessment, which was based on the experimentally validated model, showed that safety factor decreases of 6.04% relative to diagonal failure, increases of 13.82% relative to in-plane bending and decreases of 31.85% relative to bending out-of-plane. The lower level of safety, compared with the original state, is to be ascribed to the increase in seismic loads. In other words, the greater mass due to grout injections involves an increase in seismic loads that is higher than the corresponding increase in seismic resistance.

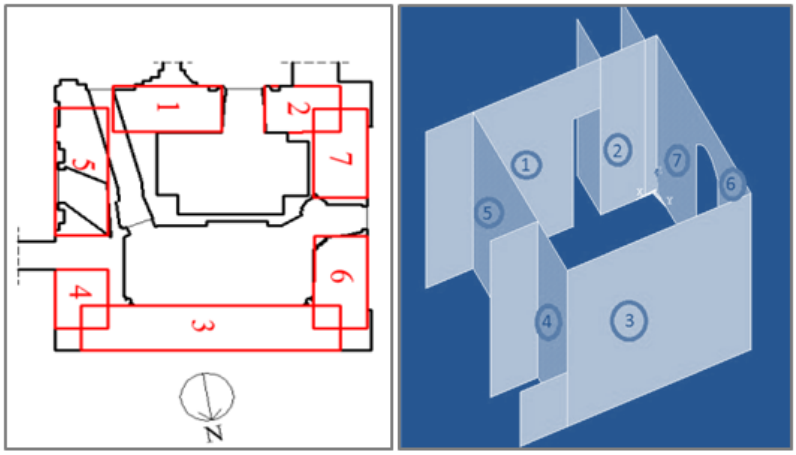


Fig. 10: Single masonry panels for the lower level

4. Conclusions

The seismic strengthening of Heritage buildings calls for the integration of structural requirements with other aspects related to their historical and artistic quality. This work has presented a procedure to investigate the effect of different seismic retrofitting interventions (reinforced concrete layer, FRP fiber, auxiliary steel structure, grout injections) on the bell-tower of Fossano Cathedral (Cuneo province, Italy). The seismic performance of the interventions has been evaluated based on an experimentally validated model. The experimental validation was realized by assimilating into a FE model data acquired during a modal testing campaign, as well as results of core-drilling tests and visual inspection by means of an endoscope. Information acquired on vibration modes and material properties allowed for using the model both in a linear and in a nonlinear field. The model was then modified so as to consider the different interventions. The seismic assessment, conducted in the assumption of grout injections, showed that some safety factors may decrease after the intervention, this being ascribed to mass addition due to grout injections. In this connection, it is important to stress how the provisional nature of safety measures realised in 2012, despite their temporary unpleasant effect, were appropriate as they potentially allow for a more accurate and cautious selection of the optimal intervention.

Bibliographical References

[1] COSENZA, Edoardo; IERVOLINO, Iunio; GUGLIELMO, Enrico. Seismic Performance improvement of the Bell-Tower in Serra S. Quirico by Composites. In AA.VV. *Proceedings of FRPRCS-6 Int. Symposium*, Singapore: TIB, 2003, p. 1361-1370.

[2] QUIROZ, Adolfo Preciado; SPERBECK, Silvio T.; BUDELMANN, Harald; BARTOLI, Gianni; BAZRAFSHAN, Elham. Seismic Risk Mitigation of Historical Masonry Tower by Means of Prestressing Devices. Advanced Materials Research, 2010, 133-134, p. 843-848.

[3] ROTS, Jan G.; BLAAUWENDRAAD, Johan. Two approaches for the analysis of masonry structures: micro and macro-modeling. Heron Journal,1995, 40(4), p. 313-340.

[4] IVORRA, Salvador; PALLARÉS, Francisco J. Dynamic investigations on a masonry bell-tower. Engineering Structures, 28(5), 2006, p.660-667.

[5] CHIORINO, Mario Alberto; CERAVOLO, Rosario; SPADAFORA, Alberto; ZANOTTI FRAGONARA, Luca; ABBIATI, Giuseppe. Dynamic characterization of complex masonry structures: the Sanctuary of Vicoforte. International Journal of Architectural Heritage, 2011, 5(3), p. 296-314.

[6] BONATO, Paolo; CERAVOLO, Rosario; DE STEFANO, Alessandro; MOLINARI, Filippo. Cross-time frequency techniques for the identification of masonry buildings. *Mechanical Systems and Signal Processing*, 2000, 14(1), p. 91-109.

[7] BOSCATO, Giosuè; CERAVOLO, Rosario; PECORELLI, Marica Leonarda; PONZALINO Stefano. Sensitivity analysis of damaged monumental structures: the example of S. Maria del Suffragio in L'Aquila. In AA.VV. *Proceedings of 11° conference AIMETA.* Torino: Edizioni libreria Cortina, 2013, p. 127.

[8] MAZZUCCO, Monica. Fossano: il campanile del Duomo come centro di un progetto per la città. Tesi di laurea,1999.

[9] DAQUARTI, Fausto. Identificazione dinamica e model updating di torri campanare in muratura. Tesi di laurea, 2012.

[10] MANNO, Antonello. Miglioramento sismico di torri campanarie sulla base di modello sperimentali verificati. Tesi di laurea, 2013.

[11] TAN, Kiang Hwee; HOSSAIN PATOARY, Kabir Md. Strengthening of masonry walls against out-of-plane loads using fiber-reinforced polymer reinforcement. Journal of Composites for Construction, 2004, 8(1), p. 79-87.

[12] VASCONCELOS, Graça.; LOURENÇO, Paulo B. In-plane experimental behavior of stone masonry walls under cyclic loading. Journal of structural engineering, 2009, 135(10), p. 1269-1277.

[13] CERVONI, Francesca; FERRACUTI, Barbara; PECCE, Marisa; SAVOIA, Marco. Assessment of a bond strength model for FRP reinforcement externally bonded over masonry blocks. Composites Part B: Engineering, 2014, 61, p. 147-161.

[14] ASSAAD, Joseph J.; DAOU, Yehia. Cementitious grouts with adapted rheological properties for injection by vacuum techniques. Cement and Concrete Research, 2014, 59, p. 43-54.

[15] BRAS, Ana; HENRIQUES, Fernando. Natural hydraulic lime based grouts - The selection of grout injection parameters for masonry consolidation. Construction and Building Materials, 2012, 26(1), p. 135-144.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

CULTIVARS: cultivating culture in art

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Abstract
Cultivars: cultivating culture in art, third prize in the Competition " ARS - Art that creates social employment", sponsored by Accenture Foundation with a special mention from the Italian Ministry of Heritage and Cultural Activities and Tourism, is aimed at the development of a system to build places of the heritage of Campania with agricultural activities and food, generate employment for long-term social, in the Abbey of San Lorenzo *ad septimum* at Aversa, in the Mostra d'Oltremare of Naples, in the ancient city of Pompei.
Children, citizens, tourists become "travelers" and are invited to participate in workshops in creative exploration. The workshops are divided into three phases: historically, the Architecture is lived - not seen with paths dramatized; naturally, the garden is explored through agricultural operations of planting, harvesting, creatively, *diaeta* the ingredients of the Mediterranean - Unesco heritage - are collected and processed in laboratories in the gardens of cooking in a convivial. The project is a response to EXPO 2015 which calls for a major emergency AAA Architecture, Agriculture, Food. CULTIVARS integrates three factors relying on food vector.
The project includes the implication of associations and third sector organizations in the activities of creation and management of green spaces and laboratories and the involvement of design students in the project of memorabilia that will be marketed.

Keywords: diaeta, cultivars, art, social, design

1. Introduction
The competition "ARS. Art that creates social employment", sponsored by the Italian Foundation Accenture, for project ideas, "is aimed to accept proposals for planning, implementation and management of services and products that, by using the Italian artistic heritage as asset, give as a result the creation of sustainable social employment.
This is a non-profit foundation which is only intended to promote the most important and significant experiences about innovation as a value of great advantage for society. The main subject of Foundation activities is innovation, both in its technological, scientific and managerial aspects, and in its positive role in promoting economic, social, and cultural development. The Foundation is able to achieve its institutional aims even through a strong commitment to search for a networking with other foundations, institutions, companies and organizations. In fact, this Foundation wants to act as a catalyst to collect not only economic but also intellectual efforts by third parties in order to obtain a real promotion of innovation and its applications.
Project ideas must be suitable to realize services and/or products to valorize built heritage with adequate utilizations, with the purpose of:

- To increase visitors of the chosen artistic heritage
- To make accessible parts of the artistic heritage which today are not
- To increase cultural services for visitors (guided tours, educational workshops, audiovisual tools, …)
- To provide web services
- To create services to integrate the artistic heritage with local marketing (accommodation, transports, events, cultural tourism, etc.)

The ideas will have to create employment, supporting the development of skills and know-how with positive results for production chain and for the Country. In particular, they must:

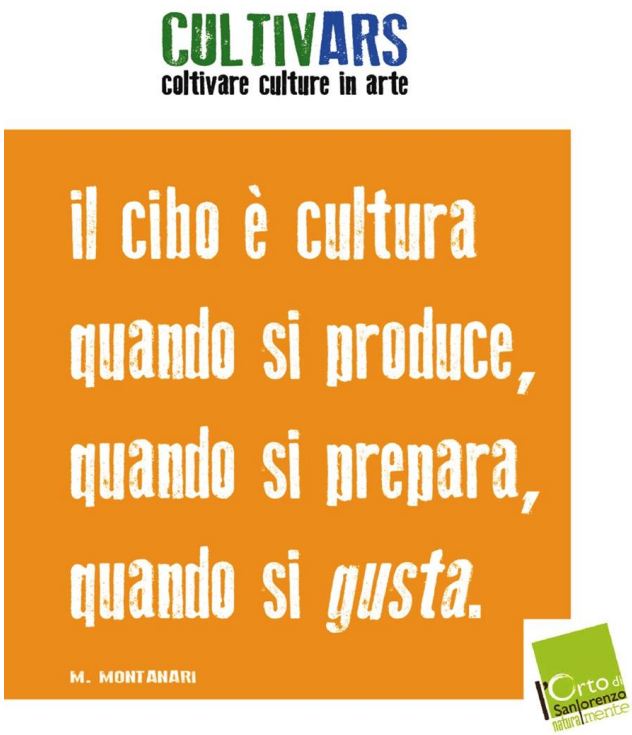



Fig. 1: Our agricultural and food culture is the cornerstone for the valorisation of the artistic heritage patrimonio.
Fig. 2: CULTIVARS, ARS to make with EXPERIENCE.





Fig. 3: Sense EXPERIENCES: of history, food, conviviality.
Fig. 4: The aim is to associate the value of the architectural heritage with experiences of urban agriculture to innovate the roles of the tourist and the work.



Fig. 5: The tourist turns from space and time consumer into traveller, and the work from contemplative to an active place interacting with persons and their region.
Fig. 6: Abazia S. Lorenzo ad Septimum.



Fig. 7: Mostra D'Oltremare in Naples.
Fig. 8: In both projects architecture was conceived together with green and work.

- be characterized by a strong innovation and originality and, at the same time, take into account the real feasibility and the economical aspects;
- be sustainable over time
- allow the gradual aggregation of new subjects (non-profit organizations or public and private organizations).

Our intention is to privilege the projects concerning monuments whose cultural and economic potential is today untapped and the ideas which provide a co-operation between institutions and different organizations.
The winner project must be realized and managed by a non-profit organization which already exists – and which has already given assent to the realization – or to be created with the following requirements:

1. To be economically sustainable
2. To adopt a scalable business model (which can give more services and/or to a larger number of users) and repeatable by leveraging on the investment that is the object of the present competition for project ideas
2. To be non-profit
3. To adopt high standards of Corporate Social Responsibility ("CSR") that is, for example, managerial and communicative transparency, sharing of the value with the
4. stakeholder, respect for environment, …
5. To include an assessment of the effects of externalities on the territory/country (accessibility, skill enrichment, improvement of the conditions of residents, infrastructures, economic activities, do not pollute, etc)
6. to contribute to the cultural growht of commuity" (www.ideatre60.it CONCORSO ARS ARTE CHE REALIZZA OCCUPAZIONE SOCIALE).

2. Cultivars design

Cultivars: cultivating culture in art, third prize in the Competition "ARS - Art that creates social employment", sponsored by Accenture Foundation with a special mention from the Italian Ministry of Heritage and Cultural Activities and Tourism, is aimed to valorize a system of places of build heritage in Campania territory.
For the participation in the competition we have chosen two monuments: the first one is the Abazia di San Lorenzo ad Septimun in Aversa and the second one is the Mostra d'Oltremare in Naples. Both places have been selected because they are a historical and architectural highly prestigious heritage not completely appreciated from a tourist point of view even though close to the main tourist flows (historic centre of Naples and Caserta Palace). The Borgo San Lorenzo is in Aversa. In addition to the late-gothic church, also the seventeenth-century building, which was the accommodation of Benedictines, is part of the monumental complex. This build has a large two-level cloister (one of the few examples in Campania) and today it hosts the Department of Architecture and Industrial Design of the Second University of Naples. The wide wall also surround San Lorenzo Garden, a garden of agriculture used for a long time as a parking and the turned again into garden orchard open to schools and managed by the association Orto di San Lorenzo.
The Mostra d'Oltemare was inaugurated in 1940 in 36 pavilions on 1.066.197 square meters. It is a large multifunctional park equipped with 720.000 square meters of a prestigious tree, architectural and artistic heritage, which merges precious architectural works and urban gree, The Mostra, with its urban scheme which is almost unchanged from its birth, has its international value. In both complexes, surrounded by walls, the green spaces and the land are structural elements within the architectural project: these characteristics allow the integration of the touristic and historical value of the buildings with the possibility to develop activities and services linked to culture and "cultivations" of the Mediterranean diet and of Campania wine and food panorama.
Cultivars has been preceded by actions concerning culture, nature and environment, the dissemination of products and projects and respectful initiatives that valorized cultural, rural and natural environment and propose to safeguard the rural, handicraft and wine and food local heritage, even through agreements and co-operations with public and private companies in the organization of training activities for a culture of a new rural and urban agriculture which improves the territory: from the realization of the garden/orchard in the Abazia di San Lorenzo in Aversa, to 2011 with the Oscar Green of Coldiretti Giovane Impresa, to the cultural and educational initiatives directed to all schools, through creative and sensorial multidisciplinary workshops that stimulated the knowledge of elements and processes of agriculture and healthy diet. Also SUN students and researchers also contributed to extramoenia initiatives to organize educational gardens in schools.
These are the results on May 2014:

- Involvement of 1000 students of the university course in Design and Communication for Fashion;
- Participation of 370 Campania schools;



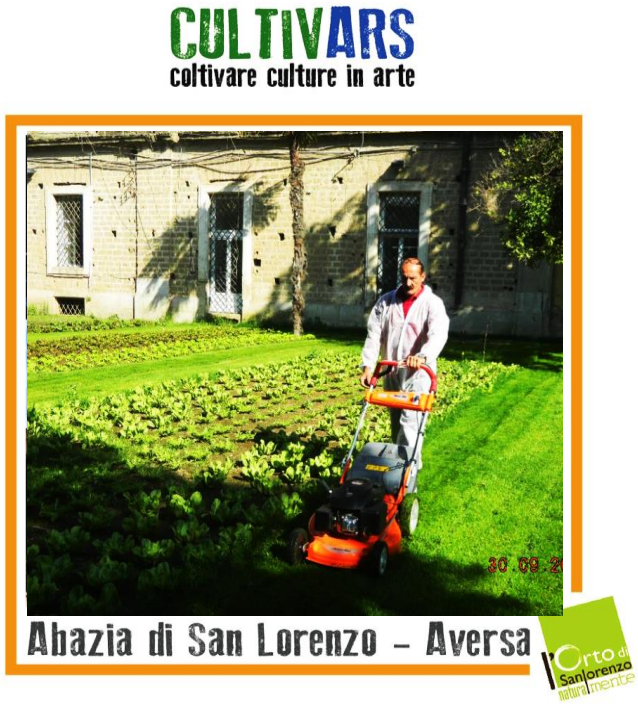

Fig. 9: Mostra d'Oltremare in Naples.
Fig. 10: Abazia di San Lorenzo in Aversa.





Fig. 11: The three phases-structured workshops.
Fig. 12: Historically.

- 20.000 school students;
- Design and construction of 80.000 gardens in schools;
- Recovery of 120.000 square meters of areas intended for agriculture gardens.

3. Historically, naturally, creatively

CULTIVARS is aimed to activate a group of services in the selected architectural complexes to strengthen their attractiveness for tourism. The starting point is to turn tourists who passively consume their time and space into travellers who live and positively interact with places. The Building heritage must be an active and alive heritage which produces, (softly) changes and interacts with travellers. The project includes the utilization of green spaces to create gardens and settlings of urban agriculture that can be the core to realize workshops on the culture of the Mediterranean diet and Campania food and wine. The workshops will take place in three levels:

STORICA_MENTE (HISTORICALLY): it is oriented towards the knowledge of the artistic and architectural context through a narration of places, the history of monuments and their connection with the land. A "widespread museum of work" will be able to improve and facilitate the access to information through digital resources and tools.

NATURAL_MENTE (NATURALLY): it includes workshops on sowing and/or harvesting, according to seasons, in the gardens and green spaces of the monumental complexes, to know the key elements of the Mediterranean diet.

CREATIVA_MENTE (CREATIVELY): it is a workshop which allows travelers, in a convivial dimension, to learn to transform products who have been cultivated, harvested or sowed in the gardens and the green spaces of the involved areas. The project includes partnerships with third sector bodies to develop extramoenia agricultural services aimed to improve green areas. This model is scalable for other regions and architectural complexes containing areas to be turned into gardens and workshop spaces.

Through various meetings and workshops this project is a network of third sector branches that can be involved both directly, in the management of artistic complexes and services, and to map skills, resources and new "art areas" in which to implement the CULTIVARS model for new services. Meetings and workshops with the third sector actors will be an opportunity for socializing in which to identify the necessary skills to set up the staff of experts who will plan the workshop contents and will train the operators. The project includes small operations to improve green areas, with the co-operation of associations in the different territories. These areas, called "tissues of urban agri-cultures", will be widespread in the cultural approach of the project and will also have the task to promote and communicate the in initiative. The third sector will be also involved in the development and production of memorabilia designed by design students and to be sold in the hop; partners who have handicraft productive skills will have the opportunity to apply for the production of memorabilia, even by networking to integrate their skills. In the final part of the project there will be workshops to identify new art spaces where to implement CULTIVARS services and laboratories and create partnerships between subjects who can manage the initiative in the territory.

The project provides partnership with professional tour operators who are directed to an international public, as well as partnership with tour operators of cruising and hotel sector. This activity will be taken into care by the project marketing referee. Through CULTIVARS the different tour operators will be able to improve their offer by proposing a new and involving kind of travel which combines the artistic and historic dimension with the food and convivial one (which is strongly attractive for the foreign market and not fully exploited!).This offer is highly competitive in South Italy tourism, where advanced services for accurate and not trivial experiences are rare. The valorization of architectural works such as those of the Mostra d'Oltremare with specific services for language targets adds value and competiveness and shows an unusual vision of architectural heritage in Campania. The project CULTIVARS provides the development of a system of reception and services for cultural and linguistic targets with ad hoc communication and digital supports. Partnership with university departments of foreign languages and cultures and conventions encouraging students traineeship will allow an offer which is qualitatively adequate to the international market.

The project develops web and new technologies through different solutions.

1) The project provides the creation and the installation of interactive video projections stimulating the user through a recreational and creative approach on three thematic levels corresponding to laboratories: storica_mente with artistic and cultural contents; natural_mente which concerns the garden care and management; creativa_mente with interactive installations stimulating the use of garden elements and artistic contexts for the virtual creation of products, recipes and narrations, suggestion. The installation will be dynamic works changing according to seasons and the intervention of users who can add and modify elements or information. 2) Widespread digital museum: the architectural complexes and their green spaces





Fig. 13: Naturally.
Fig. 14: Creatively.





Fig. 15: Contents.
Fig. 16: "I CANTIERI DEL SAPER FARE".

will be enriched with elements allowing, through smartphones and tablets, to use contents which will strengthen the access to information. 3) Web platform will be helpful both in managing the organizational phase, through reservation and services customization, and contents presenting CULTIVARS art places and exploring Campania and Mediterranean agri-food issues. This platform offers contents extending the user's experience, making accessible photographs, productions, contacts created during the user's real presence in CULTIVARS (For example the user can see the growth of the young plant he contributed to plant or cure.

4. The worksites of know-how

The project CultivARS considers the period of start-up and building of spaces and services as the opportunity of developing training laboratories for tutors and operators, the worksites of know-how. Training activities will be directed to tutors and operators and will be based on the action learning that is training combining theory and practice. Construction and activation of the spaces and the services will be the training worksite where operators will face critical issues and will find solutions in a participatory way. The worksites of know-how have three thematic levels that are parallel to workshops: Storica-mente: this worksite concerns the valorization of the two selected monuments, therefore it will be focused on: the dissemination of contents referred to artistic places, the development and the dissemination of the contents in language for the international users, the development and the dissemination of the contents in language for the special users (lis and different abilities), the installation of the work museum and of information and communication materials. Natural-mente: this worksite is focused on the creation and valorization of green spaces and urban agriculture within the two artistic contexts; basis and elements of the agricultural technique on-site, typical Campania agro-food, the design of garden and green, field preparation and creation of the urban garden. The participants in the training activities will receive the qualification of "urban farmer" and can be involved in maintenance and management of gardens and green space. Creativa-mente: this worksite is focused on the activities and contents of cultural and educational laboratories: the development and management of workshop contents, the development and management of the support for laboratories, the creation and setting up of laboratories.

The activation and maintenance of spaces, the co-operation in the management of CultivARS workshops will be entrusted to social cooperatives or third sector bodies to build processes of work inclusion involving at least 50% of operators with different abilities or coming from difficult situations. The operators will be trained in the phase of start-up and will receive the professional qualification of "Urban Farmer". Through some "special editions" of workshops, the project CultivARS is aimed particurarly to emphasize the involvement of people with sensorial disabilities (both as users and as operators): for example, deaf persons will be directly involved in the tour of art places and in services for laboratories for deaf people, events in LIS (Italian Language of Signs) will take place. Blind persons can be involved in sensorial workshops about taste and touch. All laboratories will be open and accessible to people with different abilities, a specialized tutor will follow the activities of special users. The project CultivARS will also facilitate some micro-operations for the valorization of green or agricultural spaces in all Campania, these "tissues of agri-cultures" will be activated in partnership with associations of the third sector that are active in the involved territory, in the selection of partnership to activate policies and practices directed to the work integration of persons from so-called "poorest categories" will be an advantage, as well as to involve poorest categories in the identification of those who will produce memorabilia.

5. Best practice to Pompei and for the world: International Interuniversity Master [diaeta mediterranea: landesign/ali-ment-azione]

The project Cultivars has seen in the ancient city of Pompei the possibility of its development through the knowledge of the ancient city which admirably combines not only archaeology, architecture and art but also agriculture and food and investigates the roman house as agricultural company ante-litteram.

Like the "diaeta", the space of the roman house designed to reception and relationship, theInternational Interuniversity Master [diaeta mediterranea: landesign/ali-ment-azione] of the Department of Architecture and Industrial Design SUN and of the Department of Pharmacy UNISA is the place of re-formulation of the relationships between man and environment, food and health, land and design, content and container, of the research and scientific innovation for the development of products and service of the food production chain: [ali-ment-azione] ali = creative ingredient + mente = scientific ingredient + azione = productive ingredient.

Through an educational new model [landesign/ali-ment-azione], with a multidisciplinary approach, participants will be trained to the management of the food production chain in its formal and functional, medical and nutraceutical, food and wine and culinary, anthropological and symbolic, economic, environmental and emotional aspects.

Participants will receive the qualification of EXPERT IN MEDITERRANEAN DIET aimed to the work integration in companies of agri-food, nutraceutic, gastronomic, design, fashion, tourism sector and to the constitution of new agricultural enterprises and of green economy.



Fig. 17: A stake holders network to support the comunication, the promotion and the development of the project.



Fig. 18: International Master in *Diaeta* Mediterranea.

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From the management plan to a protection management system of mosaic decorations in 'Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale' itinerary

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Abstract
The rich Arab - Norman architectural heritage of Palermo is, in its manifestation of different forms of art, an exceptional and unique result of a cultural syncretism. It describes the city as a privileged gathering place of the West Christian culture with the Eastern Byzantine Empire and the Islamic world in the twelfth century.
The serial nomination of the 'Arabic - Norman itinerary of Palermo' includes monuments holding inside a unique mosaic wall and pavement decoration as one of the major artistic features of its outstanding value.
Starting from the 'Management Plan' presented in December 2011 for the nomination in the World Heritage List of UNESCO, the present contribution reflects about the opportunity to include issues related to the preventive conservation management of mosaic decoration within the strategies of management plan or to relegate this topic exclusively into a specific conservation plan.
Through a comparison study with other Word Heritage Sites from Sicily and from the international context, the paper investigates the opportunity of an interaction between the management plan and the actions for protection and maintenance of the heritage material essence.
The case study of the Arab - Norman itinerary as complex ensemble of sites seems to ask for the management of a coordinated and integrated system of protection of this exceptional and fragile decorative technology that goes beyond the occasional event of a massive restoration site.

Keywords: Arab-Norman Architecture, , Mosaic decorations, Management Plan.

1. The nomination of Arab-Norman Itinerary of Palermo, Monreale and Cefalù

The nomination process started on 1996 when the 'historic centre of Palermo, Botanical garden and Monreale complex' had been inserted on the national tentative list. The nomination partially changed in 2001 with a proposal named 'Palermo and the cathedral church of Monreale'. However, in order to better follow recent UNESCO strategies, the proposal changed once again towards a more historical theme and a wider territorial context, including also the cathedral church of Cefalù. Therefore, since 10th October 2010 the itinerary 'Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale' is on the World Heritage Sites (from now on WHS) Tentative List of UNESCO.
The nomination is about a complex ensemble of different site typologies running from cathedral churches to civil constructions also involving three different municipalities: Palermo, Monreale e Cefalù.
The statement of its Outstanding Universal Value describes the Arab-Norman heritage as the legacy from the socio-cultural syncretism that characterized civil and monumental architecture as well as fine arts, during the Norman Kingdom (XI - XII century). The cultural elements from byzantine and Islamic period that were still present in the ordinary reality from previous dominations, had been mixed up

together with local and north European components generating an *unicum* and endemic cultural configuration. [1]
Being quite ignored by the national historiography, Arab-Norman heritage has been studied by several eminent foreign scholars (Lazarev, Goldsmith, Otto Demus, Kitzinger) probably inspired by travellers like Goethe, Guy Maupassant or travellers from the *Grand Tour,* like Viollet Le Duc, that used to reproduce their visual experiences by suggestive and often, detailed drawings.
The nomination recognizes three out of ten possible eligible criteria imposed by UNESCO: criteria I, II and IV.



Fig. 1: Territorial context (source: Google earth).

Together with the two outskirt cathedrals, the 'inventory' of the candidate properties constituting the Arab-Norman heritage of Palermo includes eight monuments.
Those properties have been selected within a range of 23 Arab-Norman sites settled in Palermo and described in chapter one of the Management Plan [2]. Following the UNESCO criteria – integrity, authenticity and state of conservation - three categories have been determined in order to distinguish properties feasible to be part of the nomination. The A_1 category holds the eleven properties of which features respond to UNESCO requirements. The A_2 category includes four properties described as needing for 'management and infrastructural interventions'. 'Due to the lost of original elements' the remaining eight properties are classified in the category B as inadmissible to the Arab-Norman Itinerary.
However, the management plan contains historical information e data about the whole series of Arab-Norman properties. Apparently the inclusion on the WHL is not approached as an opportunity limited to the areas holding the eleven nominated properties. In some case a succeeded nomination as WHS, could generate a great risk through the increase of the gap between nominated sites and the rest of monuments. This also prompts to a stronger exclusion from touristic routes, preservation actions and general care. On the contrary, the overall future perspective of the nomination aims to include the rest of Arab-Norman heritage as well as the historical city centres, into an integrated system of safeguard, conservation and evaluation set up around the UNESCO label. In such a sense, the Management Plan seems to evocate a holistic vision in which 'individual monuments and historic buildings are only part of the larger ensemble of the heritage resource' [3].
However, the complexity of this nomination presents some critical points mainly concerning two issues: the geographical extension with related problematic and the lack of homogeneity within individual monuments in decorative features, use, fruition and social contexts. Section three will go deeper in these problematic relating them with the setting of a management system. (V. Megna)

2. Preservative management system of mosaic decorations: the past and the present

2.1 The past

The first of three criteria selected to define the outstanding value of those monuments named to the WHL regards their mosaic decorations. The criterion *(i)* of UNESCO refers to the site as 'a masterpiece of human creative genius'. Referring to the description given in the Nomination Dossier 'the Byzantine mosaics of Palermo, Cefalù and Monreale are among the most important and best preserved examples of mosaic art Comnenian. In Particular, the mosaics in the Cathedral of Cefalù are a supreme example of mosaic art. The muquarnas painted wooden ceiling of the Palatine Chapel

in Palermo is an artefact unique in the world, its combination of constructional expertise with the elegance of Its forms and decorations mark it out as a masterpiece'.

SITES	MOSAIC DECORATIONS		
	MOSAIC (WALL)	OPUS SECTILE (FLOOR)	OPUS SECTILE (WALL)
PALAZZO REALE	X	X	X
CAPPELLA PALATINA	X	X	X
SAN GIOVANNI DEGLI EREMITI			
S. MARIA DELL'AMMIRAGLIO	X	X	X
S. CATALDO		X	
CATTEDRALE DI PALERMO			
CASTELLO DELLA ZISA	X		
CUBA			
PONTE DELL'AMMIRAGLIO			
CATTEDRALE DI MONREALE	X	X	X
CATTEDRALE DI CEFALÙ	X		

Fig. 2: Table of nominated sites including mosaic decoration (by V.Megna).

The excellence and the quality of mosaic decorations that today we admire in the Arab-Norman heritage should be interpreted looking at high technical and artistic skill of Byzantine artists who worked in twelfth century, together with the skills of further figures operating within the mosaic yard. In this regard close similarities have been recognized between the Norman constructions and those in Constantinople, confirming their Byzantine character. The Admiral George of Antioch brought in Palermo Greeks mosaic artists, who probably worked in the Palatine Chapel and in the Church of Saint Mary of the Admiral – build by the same George of Antioch. They were joined by new workers also from the Byzantine Greece, which gave birth to the great mosaic decorations of the Cathedral of Monreale, in the reign of William II. [4]

In mosaic yards the starting point used to be a paper model, part of the collections of drawings that could be in the form of "cartone" or " book of models" from which artists could draw the iconographic repertoire of both sacred scenes and individual figures. Starting from the "cartone" preparatory drawings were produced impressing the fresco mortar later filling them with colour backgrounds that served as a guide for the subsequent laying of mosaic tiles proceeding "day by day". The personnel at the cutting of glass tesserae also do not work in the laboratory but in situ under the close direction of mosaic master that selected the type of tiles to be cut during the day. Inside the mosaic yard different figures used to work side by side covering a specific role: painter, mosaic worker, cutter. [5]

Given the quality and the high level of these Byzantine mosaics recognized over the entire Mediterranean basin, such decorations had been the object of attention and systematic 'maintenance' over the centuries. From the history of restoration works related to Arabic-Norman sites emerges as the mosaic tradition in Palermo has always been alive and active thanks to the numerous and frequent maintenance performed through the handing down of knowledge, even over families' generations. From the early restoration works until those from the twentieth century is possible to detect continuities and discontinuities in executive modalities and techniques carried out in construction site. Since 1345, extensive restorations of mosaic decorations in the Palatine Chapel are recorded over the centuries together with the names of the mosaic artists. [6] However, these interventions often aimed to remake or embellish entire portions of the mosaic in which restorers often changed also the subject of representations. In the sixteenth century, the medieval craft tradition was already lost and interventions on mosaic decorations started to be carried out in basic way, being poor in aesthetics and technique quality and therefore recognizable. [7]

This is the case of Monreale cathedral where in the sixteenth century a restoration site had been directed by Master De Masi Oddo, founder of a dynasty that worked to the cathedral for more than a century. During the interventions ceramic tiles which technology is far from the Byzantine tradition had been arbitrarily added. [8]

Restoration works from eighteenth century recorded the contacts between Palermo, Rome and Venice. Indeed in 1753 the mosaic artist Mattia Moretti came from the Vatican City, for restoring the mosaics of the Palatine Chapel. He established within the Chapel a mosaic school on the model of the Vatican Mosaic Studio, being its director from 1753 to 1779. In the school different figures involved in different roles and tasks within the organization of a mosaic yard were trained. The mosaic conservators trained in the school learned about medieval art and techniques becoming specialists in the imitation of ancient Byzantine style and able to carry out simple additions or entire figures. In nineteenth century, the renewed interest in the Middle Ages, the in-depth study of ancient periods and the desire of stylistic restorations invaded also Palermo.

The Palatine school trained the largest mosaic artists engaged in Sicily in the nineteenth-century restoration yards of Palermo Arab-Norman heritage: Rosario Riolo and Bonanno Zuccaro brothers. They achieved so high levels in quality that 'deserve the acclaim of foreign and domestic artists and archaeologists" [9] not only for the results of mimesis but also to refine of the execution technique. During the second decade of the twentieth century the restorer engineer Francesco Valenti will be the successor of the superintendent and architect Joseph Patricolo, the pioneer that in late nineteenth century started actions for the protection and restoration of Arab-Norman monuments. The restoration works conducted by Valenti on mosaic introduced the technique of strappo - tear – of mosaic layer from the substratum then followed by its re-adhesion, and the use of what at that time was considered as the most innovative and reliable material: the cement. It has been used to make the mortar being armed with wire anchored to the substrate with nails on which mosaic tesserae were inserted. [10] (C. Spallino)



Fig. 3: Mosaici della Chiesa di Santa Maria dell'Ammiraglio, dettaglio della cupola. (Ph. C. Spallino).

2.2 The present

The long and complex history of mosaic restorations that have taken place over the centuries highlights the extreme fragility and vulnerability of the Byzantine mosaics that are an integral part of architectural systems. Despite the vicissitudes and interventions, Caesars Brandi about the mosaic decoration of the Palatine Chapel, stressed their 'undoubted formal coherence, the quality of which, in spite of the restorations, renovations and triumphs of diversity of mastery, rather than school'. [11] This formal coherence is also found today in the church of St. Mary's of the Admiral as well as in the Cathedral of Cefalù and Monreale, whose mosaic have been restored since 1960 until our days certainly with a conservation vision but always under the pressure of emergency assets caused by pending risk conditions. This typology of restoration work is the most common and informs also the most recent restoration works. The Palatine Chapel was damaged by the 2001 earthquake. Its restoration was funded by the German patron Wurth. Works for the conservation of mosaic decorations have been carried out from 2003 to 2008.

The recent restoration of the Church of St. Mary's of the Admiral, ended in December 2012, for the first time applied on the mosaic decorations the *quality control procedures* during executive phases of work. In this procedure the chief for 'operating quality control' is in charge of writing a plan that provides the necessary information to carry out a controlled management of the restoration site. The plan defines and programmes inspections, control procedures for materials, control procedures of the site construction activities, the plan for diagnostic analysis and all necessary documentation forms.

Today, the rigorous documented record of materials, construction techniques, methods of intervention and preliminary investigations carried out in the mosaic decorations of the Church of St. Mary's, is an issue of fundamental importance in order to optimize future maintenance operations and thereby ensure the preservation of the site.

In order to replace this traditional logic of post-damage interventions with a vision of maintenance practices and preventive conservation planning specific structures have to be created and charged of mosaic maintenance and conservation.

The old *Fabbriceria* of the Cathedral of Monreale and the *Fabbriceria* of Palazzo Reale in Palermo, founded in November of 2010, represent the institutions responsible for the conservation and

enhancement of the same architectural heritage hosting them. The art.37 provides of the Rules of the National Association of *Fabbricerie*, states that one of the aims is to 'provide for the costs of maintenance and restoration of the church and outbuildings and stable administration of the assets and offerings intended for that purpose'. This impose to these institutions a very high financial commitment and management. The rules also make explicit reference to the principles of preventive conservation as a common strategy to be taken into account 'tending to the prediction of the damage and to be implemented by programming controls on works and actions carried out in accordance with the logic of minimum intervention (....) a system of preventive practices so to postpone the need for restoration'. [12]

Beside the related heritage preservation, the new *Fabbriceria* of the Royal Palace of Palermo aims the development and promotion of the Norman period in Sicily through a long- term project to be developed starting from the Royal Palace, as a pilot project and later applied to all Arab-Norman emergencies 'in view of the development of a conservation management and enhancement plan, involving the whole Arab-Norman heritage, being the Royal Palace the urban and geographic epicentre'. [13]

Apart from the two *Fabbricerie*, for remaining nine sites included by the nominations, ordinary maintenance works on the mosaics are in charge of the owner. Just in the case of extraordinary measures the Regional Superintendence of Cultural Heritage has to be contacted and asked for carry out the interventions. Unfortunately, the general lack of economic resources often leads to a rebound of responsibility which in turn generates waiting situations referred which the heritage is the only victim. (C. Spallino)

3. The criticism of 'Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale' itinerary Management Plan

3.1 Management critical points

As mentioned in section one, the setting of an efficient management system concerning the 'Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale' itinerary could be complicated by the specific features of the nomination.

One of the critical issues that increase the difficulty in managing the proposed heritage sites is the set of territorial differences. The three municipalities involved in the nomination have different spatial dimensions, administrative references and social attitudes. The amount of inhabitants differs from 653.790 in Palermo to 38.562 in Monreale and 14.393 inhabitants in Cefalù. [14]

As 'itinerary', this nomination does not involve only the single properties and their buffer zones but embraces the connections – spatial, cultural, social, economical, infrastructural etc. - within the three urban centres.

The wide extension also involves a large range of private and public 'stock-holders' that are responsible for the maintenance and the management of their own properties. This makes the assessment of management system even more difficult encountering complex bureaucracy processes and different expenses modalities.

The Management Plan for the nomination partially dedicates the forth section to the analysis of economic and touristic resources of the three municipalities. A wide and very detailed range of data about urban and territorial infrastructures, demography, economic structures and activities, tourism dynamics and trends as well as indicators for tourism supply and demand, are provided from accurate urban studies both in urban and territorial scales. An introductive chapter provides an overview on local and regional administrative systems together with conservation and urban planning instruments and policies.

Within the existing Sicilian WHS, also 'Aeolian Islands' and 'Late Baroque Towns of the Val di Noto (South-Eastern Sicily)', Including different urban centres and their Management Plans afford the same issue. Nevertheless, previous studies highlighted the difficulties in matching times and modalities of local ordinary planning with WHS Management Plans, especially within the Sicilian context. [15]

The inclusion of several municipalities involves different local ordinary planning tools (i.e. three different master plans for each city). The study of those Sicilian WH sites demonstrated that above mentioned criticism make management plans inefficient in achieving the foreseen objectives, being unable to coordinate different planning instruments so to also reach the objectives (i.e. the tourism deseasonalization).

Moving into the scale of the single properties, further critical points lie into the different features of individual sites as well as in their actual state of use, conservation and fruition. The richness in internal or external decorations cover a wide range going from its total absence (i.e. Admiral Bridge) to a massive presence (i.e. Monreale Cathedral). Furthermore, the material of decorations can be difference holding a variety of mosaic tesserae – some of them made by glass paste some by stone or

ceramic - ceiling woods and *opus sectile* mosaic floors and 'lambris'. Those differences will consequently lead to various problematic issues asking for different actions.
Some of Arab-Norman monuments included in the nomination procedure still keep the original use (i.e. all cathedrals are still used for regular religious services) while others either have today a different use (i.e. the Royal Palace hosts the Regional Parlament) or do not hold any specific function being only part of touristic routes (i.e. San Cataldo church). Some monuments (i.e. Admiral Bridge) are settled in neglected contexts or are outside both to city historic centre and tourism paths. Furthermore, remarkable differences in fruition modalities and amount of visitors are between monuments already intended as sightseeing which also prompt a variety of tourism-related pressure impacts. (V. Megna)

3.2 The role of conservation within the Management Plan

In order to guarantee protection and conservation actions concerning WHS, as stated by the 1972 UNESCO Convention [16], in 2002 the Budapest Declaration established Management Plans as part of required documents for new WHL nominations. Three years later UNESCO Guidelines made the required Management Plan a compulsory document also for previous nominated WHS.
The present study will point out the role that an integrated conservation system plays within the Management Plan focusing on the outstanding resource of byzantine mosaics hold in the Arab-Norman itinerary. It will highlight the dichotomy between theoretical principles informing the concept of Management Plan and their interpretation in the specific case of the Arab-Norman nomination.
UNESCO did not provide for specific guidelines for WH sites Management Plans as it was taking into account the specificities related to each States Party concerning culture, environmental, economical, social conditions as well as legislative and administrative systems.
Therefore, in 2004 the Italian Ministry together with the National Commission for WHS provides for a 'Model of Management Plan'. The text structures the plan into five planning levels and related strategic plans [17/] :

PLANNING LEVELS	STRATEGIC PLANS
- Assessment of monument value and state of conservation	- Assessment
- Preservation and Conservation	- Protection
- Cultural Evaluation	- Participation
- Economic Evaluation	- Development
- Monitoring	- Marketing

The preservation and Conservation level is developed into work-plans that concerns: a) definition of safeguard measures chronologically defined and ordered in specific sequences for individual objects to be protected; b) directions to address urban planning tools to the needs of heritage sites; c) executive plans for material conservation. It is also stated that the state of conservation has to follow damage typologies detected in the Risk Charter of which methodology comes from the Italian Minister of Cultural Goods and Activities and the ICR - Central Institute of Restoration -. It is suggested the comparison between damages surveyed in individual sites in order to detect the frequency and the eventual causes of damage phenomena and to address conservation intervention plans. Ministerial guidelines underlines as specific features of each WHS nomination can invalidate practices set up for a different case. Nevertheless, for any kind of nomination, from individual site to territorial nomination, it is stressed that efficient management is usually guarantee by a preventive conservation vision.
In order to ensure an efficient and faster system to carry out the WH Arab-Norman nomination procedure, a new management structure has been defined. Therefore, the 'Fondazione UNESCO Sicilia' took in charge the drafting of the Management Plan.
The Management Plan for the nomination of Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale', officially presented in 2011, shows a double order of anomalies. The first one refers to the general structure of the plan while the second one concerns specifically the vision and the concept of conservation that informs the whole text.
The plan is structured three 'cumulative' planning levels:

- Heritage knowledge, protection, conservation, enhancement plan
- Action plan for social, cultural and economic research and enhancement
- Communication and territorial marketing plan

Except for the 450 pages of Aeolian Islands MP, compared with remaining four Sicilian World cultural sites Management Plans, the 560 pages of this text seem an anomaly. Indeed, the massive gathering of data and information provided within the document does not really match with the general purpose of being a practical and operational tool. The structure is not pointing out clearly the main operational sections. Provided information about damage analysis, risks, objectives, actions, financial resources, indicators etc. are not synthesized together in order to offer the reader with a general framework and a

clear management tool. The vision informing the Plan is slightly present within proposed interventions and operational guidelines as well as a coordination in management system, is missing.
The 'Fondazione UNESCO Sicilia' provided expertises setting a specific team for the Management Plan reporting. The results from a project promoted by the CNR within National Program Research (PRIN) on monitoring efficiency of Italian WHS Management Plans, underlines that the lack of managerial skills within MP team (contrasting with a wide presence of architects) contributed to the lack of measurable indicators thus with the inefficiency of the plans [18]. It suggests that the involvement of certain expertises within the drafting process of management plan have influences on the general structure and vision of the document as well as more specific issues.
This would, for instance explain the in-depth analysis on historical issues, intangible culture as well as on urban and territorial studies.
Now, 'since conservation is an essential part of the management process, the theory guiding conservation actions must be understood and used by the multidisciplinary management team' [19], the absence of conservation experts appear rather bizarre.
Despite several statements included in the text remarking the relevance of monuments preservation and conservation as objective of the plan, a real focus on this basic seems to miss.
Data about the state of conservation concerning single monuments are fragmented and repeated into different sections of the plan. They provide general information referring specifically to short or long time restoration works. However, the state of conservation never refers to a synthetic analysis of physical and material conditions and specific deterioration conditions related to the peculiarity of individual site. A table summarizing risks analysis for each of the site settled in the three municipalities define three different risk impacts: physical, fruition, environmental impacts. It is detectable a prevalence of 'high' physical risk factors investing 7 out of 11 nominated heritage sites while only one site, where restorations works were carried out during the drafting of the MP, is evaluated as low-risk. However, the table is missing in related explicative text about criteria and procedure leading to 'High-Medium-Low' risk assessment. The same assessment has not later consequence in a conservation program proposal.
Following the risks analysis, a synoptic table provides an overview relation between intervention areas, objectives, actions and expected impacts. The words describing the intervention areas – conservation, protection, 'valorizzazione' – enhancement - are used inside the matrix in an ambiguous way. For instance, the word 'conservation' used together with the word 'protection' refers to actions concerning maintenance operations, monitoring net and conservation state monitoring, while used by herself indicates actions for visitor management. Also the term 'monitoring' used several times within the range of actions has not clear reference to a specific contexts and the relative meaning results unclear.
The list of actions related to the 'state of art, protection, conservation and enhancement plan' reveals an exceeding of actions in security field (remote distance control systems, security personnel, video security) as well as in visitor management. Despite this, few actions are referred to maintenance
This aspect is highlighted by the related specifications that should follow in next paragraphs. The phrases 'ordinary and extraordinary maintenance' as well as 'systems for monitoring the conservation state in short and long terms' are only repeated without any development. It is the same for the proposal about a pilot project concerning the development of Arab-Norman heritage risk charter that is inappropriately referred to the objective concerning 'security enhancement'.
In these terms, a best practice within Sicilian WHS is the Management Plan of 'Villa Romana del Casale' that refers to the archaeological park of the roman villa and to those of nearest municipalities [20]. Furthermore, it includes exactly the same action concerning the 'systems for monitoring the conservation state in short and long terms'. The action refers to the same objective – enhancement conservation and monitoring related activities – and it is close defined by a table that concerns: the general vision of the plan, the planning field, objective, action, description, stakeholders, financial source, expected impacts, monitoring indicators.
On the whole, aspects like a simplified bureaucratic procedure for the management of the interventions, specific actions related to the specific features of each site, detection of ordinary financial sources, etc. are never taken into account by the plan.
The lack of a priority scale within the list of actions does not allow a planned strategy for budgeting. The real needs of heritage sites are revealed to be less relevant than achieving the opportunity for found programs.
Although it is evident that contemporary economical crisis, national cutting founding and local economical dislocation made the availability of financial resource a basic issue for cultural site management, the MP does not take into account available economical resources or budgeting programs concerning fixed and unexpected costs. Above all, the presence of different actors in charge of management site – municipalities, Sicilian Region, Catholic Church etc. - could face a different in economical availability for affording maintenance expenses and following management guidelines.

Founding programs often concerns extraordinary and big-scale restoration works while very few programs are suitable for sustaining preventive conservation or ordinary maintenance.
A recent newspaper article informs that UNESCO Sicilian Foundation will get a fixed contribution (€ 0,30 cent) for each ticket sold and also a further fixed average (€ 0,80 cent) for inhabitants from each the three municipalities [21]. In those economical supports, it is likely suitable the budgeting for an ordinary found concerning ordinary and fixed expenses related to maintenance but also to security and communication.
The Management Plan of a further Sicilian WHS serial nomination – Syracuse and the Rocky Necropolis of Pantalica – includes an excellent example of tables where each action has individual evaluation of related costs. It is also specify which will be the eventual financial source. The table goes deeper defining expertise needed, human, technological and infrastructural resources, phases and timing for realization. Referring to indicators it also defines periodic controls. [22]
Sicily hosts five WHS classified as cultural site while the Mount Etna is a natural site. Like the present nomination those related to Aeolian Islands, Syracuse and Pantalica, Baroc Towns of Val di Noto, are serial nominations. Despite same mentioned good example of Management Plan, the 2013 Dossier from Legambiente association highlights that all WHS show a dramatic situation concerning threats related to their conservation [23]. WHS label and related Management Plan does not seem to guarantee the preservation of the site and the development of the surrounding socio-economical conditions, especially if the nomination is approached as and ending point instead of a responsibility action toward the whole humankind. (V.Megna)

4. Mosaic decoration Management: future proposals

Once problems and complexities for the definition of a management plan that involves eleven sites within a large itinerary have been identified, it should be emphasized as the conservation of mosaic decorations is an issue somewhat lacking in the Management Plan.
Given that the apparatus of Byzantine mosaics satisfy one of the UNESCO criteria for the WHL nomination, that they are vulnerable and fragile also in the light of an increase in the tourism impact, that the presence of several stakeholders and the involvement of different public and private actors responsible individual sites, a Management Plan must be a "guide" for the conservation management of the precious Byzantine mosaics held within the nomination sites. A correct interpretation and adaptation of National Management Plan guidelines as well as further best references concerning the preparation process and its implementation phase would be aware of not negligible complexity of WH sites management. In order to be an operational tool, the management plan should include a strategy of integrated and coordinated actions that relate to the conservation of all mosaic decorations within the Arab-Norman itinerary. The Management Plan should contain take into account the Outstanding Universal Values of the application to the World Heritage List and should provide guidelines addressed to the overall of involved sites under the auspices *Fondazione UNESCO Sicilia* as the coordinator entity for operational actions of preservation and management.
The actions concerning in the Management Plan knowledge and research fields will be engaged in the collection and systematization of so far gained information on the mosaic decorations through the realization of thematic databases, promoting the integration and interdisciplinary nature of the information. A careful digital collection and systematization of data is necessary to bring together into a single tool historical and technical information as well as diagnostic results. For each site, the use of detailed geometric surveys, graphic and iconographic supports will allow a deep approach to single detected areas of mosaic surfaces. Each of those areas will be referred to constituent materials, techniques, laboratory data thus reconstructing the history of the restoration through summaries and scientific mapping to better address future interventions.
Management Plan's guidelines should take into account the need to optimize the monitoring activities on the mosaic decorations by establishing diagnostic plans, permanent detection systems of environmental conditions, and the definition of specific risk maps that assess the level of vulnerability to the aggression of environmental territorial factors. This wealth of information will then be available to different areas of interest of the scientific community helping to promote multidisciplinary debate.
The implementation of existing data must also be supported by the application of quality control procedures for all future maintenance and restoration works concerning mosaic decorations. The documentation of those works will raise a wealth of information about materials, construction techniques, intervention methods, cycles and phases of individual processes, preliminary investigations thus taking full advantage of the architectural knowledge for the optimization of future maintenance operations and ensuring the preservation in time of the site itself.
The mosaic maintenance plan is in fact based on the actions of knowledge and research and is the real operational tool for actions of conservation and protection. Through the establishment of protocols shared by all sites of the Arab-Norman itinerary is possible to define different types of instructions for carrying out the inspections and the different procedures for periodic inspection of the main damage factors. This allow to preventive uncontrolled dynamics of pathologies or damage factors.

If these protocols are defined according to the principles of quality control "measurable" indicators will be established leading to specific "corrective" actions. Taking into account also the expected increasing of vulnerability of both wall and floors mosaic surfaces in view of a tourism high-impact, protection measures for the mitigation of risk, must also go through the application of *ad hoc* protocols that are specific to individual sites. These include for example the periodic assessment of values detected by the environmental thermo-hygrometric monitoring control which is necessary for the conservation of mosaic decorations. In this regard it is necessary that *Fabbricerie* of the Cathedral of Monreale and the Royal Palace in Palermo together with the other actors responsible for the management of individual sites become the real protagonists of the maintenance actions through the adoption of shared protocols.
The Foundation UNESCO Sicilia through its control and supervision, considering the itinerary Arab-Norman in its complexity, will periodically define a "program plan of interventions" in the short, medium and long term in consultation with individual operators. It must also operate on the inspection of individual manager decisions.
The expansion of such existing structures must also take place through the review of internal human resources by adjusting the composition of the team responsible for the actions of protection with the inclusion of specialized figures. The procurement of financial resources is necessary for the establishment of permanent laboratories and teaching facilities that may become the point of reference for the restoration of Byzantine mosaic . Here, the scientific community will be able to share a unique and constantly updated documentary heritage about mosaics. Considering the actual Management Plan may be that this last proposal could flow into the ambitious project only mentioned in the plan for the Arab-Norman itinerary, and called 'City of Restoration'. [24] (C. Spallino)

5. Conclusion

The present contribution had as starting point the search for preventive conservation and maintenance strategies concerning byzantine mosaics within the Management Plan prepared for the inclusion in the WHL of 'Arab-Norman Palermo and the cathedral churches of Cefalù and Monreale' itinerary.
The investigation of this specific topic encountered several difficulties due to the unclear structure of the document. The lack of a close examination of preventive conservation programs providing guidelines for coordinated and integrated extraordinary maintenance and restoration works of those sites included in the serial nomination highlights the inappropriacy of the plan.
Management Plans certainly ask for multidisciplinary contributions and interests coming from different academic fields are more and more increasing. Economic, management and tourism disciplines are approaching the topic of cultural heritage from a specific point of view. Nevertheless, the 'physical preservation of sites nominated as the world's most important non- renewable resources, need special care and efforts to redress the imbalance between our needs' [25] (see tourism increase, economic development) and its protection (referring to its material not just to security issues). Without physical and material preservation of tangible heritage all expected result lost their existing sense.
The fragility of mosaic decorations, holding an outstanding value, certainly ask for specific maintenance and conservation procedure coming from an active conservation system – see Fabbricierie -. Therefore, planned financial resources should be used in order to define the most efficient conservation management system for those decorations. Existing structures (Fabbriceria di Monreale e Fabbriceria di Palazzo Reale) could be strengthen while a new structure could provide for mosaics maintenance of the remaining sites (Castle of Zisa, Chiesa di Santa Maria dell'Ammiraglio, San Cataldo). Of course coordination within the management system of individual sites should be guarantee through guidelines under the auspices of the Foundation UNESCO Sicilia.

Bibliographical References

[1] *Siculo-Norman art: Islamic culture in medival Sicily*. Vienna: Electa & INGO Museum with no Frontiers, 2004. 327 p. ISBN 1874044406

[2] AA.VV. *Piano di gestione per l'iscrizione nella World Heritage List dell'itinerario Palermo arabo-normanna e le cattedrali di Cefalù e Monreale*. Palermo: Regione Siciliana, Assessorato dei Beni Culturali e dell'Identità siciliana, 2011.

[3] FIELD, Bernard M. and JOKILEHTO, Jukka, *Management Guidelines For World Cultural Heritage Sites*. 2nd ed. Rome: ICCROM. 1998

[4] SANTORO, Rodo. *La Cappella Palatina e Palazzo Reale,* Palermo: Arnone 2010.

[5] ANDALORO, Maria. *Nei cantieri musivi della Palermo Normanna.* In QUINTAVALLE Arturo Carlo (a cura di), *Medioevo: le officine Atti del Convegno Internazionale di Studi Parma 22-27 Settembre 2009*, Milano: Electa,2010, pp.152-168.

[6] TRIZZINO, Lucio. *La Palatina di Palermo. Dalle opera funzionali al restauro dal ripristino alla tutela,* Palermo: Flaccovio Editore, 1989.

[7] KITZINGER, Ernst. *I mosaici di Santa Maria dell'Ammiraglio a Palermo,* Palermo: Istituto siciliano di Studi Bizantini e Neolellenici, 1990.

[8] KITZINGER, Ernst. *I mosaici di Monreale,* Palermo: Flaccovio Editore, 1991, pp 9-21.

[9] TOMASELLI, Franco. *Il Ritorno dei Normanni. Protagonisti ed interpreti del restauro dei monumenti a Palermo nella seconda metà dell'Ottocento* 1ª ed. Palermo: Officina Edizioni, 1994.

[10] GENOVESE, Carmen. *Francesco Valenti: restauro dei monumenti nella Sicilia del primo Novecento.* Napoli: Edizioni Scientifiche Italiane, 2010, p.176.

[11] BRANDI, Cesare. *Sicilia mia,* Palermo: Sellerio, 1992, p.135.

[12] AA.VV. *Nuova luce sui mosaici di Monreale,* Pisa: Associazione Fabbricerie Italiane, Marzo 2012. pp. 5-8.

[13] AA.VV. *Piano di gestione per l'iscrizione..*op.cit. p.230.

[14] http://www.istat.it/en

[15] LO PICCOLO, F. LEONE, D, PIZZUTO, P. *The (controversial) role of the UNESCO WHL Management Plans in promoting sustainable tourism development*. Journal of Policy Research in Tourism, Leisure & Events, 2012

[16] http://whc.unesco.org/

[17] http://www.unesco.beniculturali.it/

[18] http://www.tafterjournal.it/2012/10/01/monitoraggio-e-controllo-della-gestione-dei-siti-unesco-il-piano-di-gestione-come-opportunita-mancata/

[19] FIELD & JOKILEHTO, Op.Cit

[20] http://www.villaromanadelcasale.it/en/

[21]http://corrieredelmezzogiorno.corriere.it/palermo/notizie/arte_e_cultura/2014/7-febbraio-2014/palermo-arabo-normanna-prende-vita-intinerario-che-comprende-9-monumenti-2224041650175.shtml

[22] http://www.patrimoniounesco.it/SIRACUSA/piano_di_gestione/pianodigestione.htm

[23] http://legambientesicilia.it/wp-content/uploads/DossierSitiUnesco2ed.pdf

[24] AA.VV. *Piano di gestione per l'iscrizione..*Op.Cit. p.426.

[25] FIELD & JOKILEHTO, Op.Cit

XII International Forum Le Vie dei Mercanti

BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII

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HERITAGE AND TERROIR: the Revival of Ancient Pompei Vineyards

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oral presentation
Paesaggio: Paesaggi culturali

Abstract

Mediterranean area has been marked by connections between wine, economy, landscape and culture. If it is true that first few sips of wine were those of the peasants of Anatolia, the cultural assumptions behind the idea of *Wine Terroir* implies a rich network of identities at the intersection of land, and heritage varieties and products.

There are many connections between architecture, landscape and identity, which could be analysed with different interpretations. The key issue is the concept of "*terroir*", that in every place involves a network of meanings arising from the intersection of landscape, grapes vines, products and economy. The rural culture, with a social structure of family type, over the centuries has helped to preserve the integrity of different environmental contexts.

A specific example is the case of the recovery of Pompei ancient Winery that are productive today, in which is evident the importance of maintaining a recognizable environmental impact of historical heritage signs connected with nowadays productive landscapes towards innovations.

Keywords:

Landscape Heritage; Local Production; Wine Culture; Local Identity

1. Wine landscape and Mediterranean Connections[1]

There are many relations among architecture, landscape and Old Roman identity which still nowadays influences the terroir. In a broad sense the entire Mediterranean region has always been connoted by a relationship among wine, economy, landscape and culture. In this paper we focus on how the Mediterranean area has been marked by these connections, discovering how this area, its grape varieties and its products are united in a unique relationship. The role of Roman expansion confirmed this relationship. Ancient Rome had a pioneering role in history of wine. Its influence on the viticulture moved from Italian land toward a wider extension. So the Mediterranean Sea could be considered as the cultural assumptions which is behind the Wine Terroir, implying a rich network of identities at the intersection of land, heritage varieties and products.
The term "terroir" is an idea that was born at the origin of the wine world. The physical characteristics of the chemical soil and the geological one, such as those of the climatic and exposure aspects, shall be regarded as essential conditions for having a high quality standard which is strictly depending on a given spatial system. So the terroir is the basic condition for obtaining those products which we, in the common sense, define "real products". In this prospective it is important to describe the features that characterize the terroir, studying the effects on the products.
The idea of " typicality " is then born at the intersection of spatial data and anthropological factors and, speaking of wine, it includes the territorial traits, on one hand, and the cultural traditions and methods of cultivation on the other one. This idea is then extended in a broad sense because the world of wine can be one of those steps to regain territorial identity. The operational strategy, in wine landscape culture, generally borrows many approaches from other scientific fields and analyze the derivatives that influence the architecture of the wineries and ultimately the declinations of the environmental planning, into the interaction with the places and the people.
These considerations change the notion of earth into something more compound than soil, characterized by a movement of energy that reminds us the idea of eco-museum complexity.
Many French eco-museum experiences have connected winery spaces inside wide landscapes, respecting the identity of each different little space. The two main reasons for the establishment of an eco-museum in fact is the need to rebalance the environment of a place and a willingness to work for the recovery of traditions that have developed in the same place. These characteristics make southern Italy winery areas particularly suitable for eco-museums in order to promote tourism and sustainable identity.
A marginal place has good chances to be easily adapted in a composition of peculiar united mosaic with an attitude towards flexibility, if we operate with a framework of variable conformations of landscapes that have to be recovered.
The renewal of intrinsic value of a Landscape should start from a method based on an appropriate relation among elements of small size, as it was usual in the Mediterranean tradition, with a strong durableness of differences, which become an identity character for the landscape of a place.
Specially in order not to totally cancel the distinctive feature of the identity of southern places, specific measures are to be adopted not only as regards the specificity of the product, like it frequently happens with autochthon wineries, but also with regard to perceptive aspect of places. However, the most relevant coming out focus is that the best choices are the ones that found a balance with respect to the perceptive rules. At a first glance one might argue that a polarization would lead to a decrease in the intensity of identity. This claim rests on the ideas that a synthetic idea would emerge in a landscape, but there is a relation inherent the correspondence of wine economy and wine landscape aspect: the recognition of a specific historically founded traditional economy corresponds also to a special organization and, if the economic structure is fragmentized, an homogeneous landscape asset design seems better

[1] Francesa Muzzillo

suited to describe reality of big economic standard and it is not often apt to be reapplied in southern contexts.
An innovative approach should offer the opportunity to enhance the cultural identity of local communities, urging the integrated conservation of the evidence of fragmented economic reality, respecting on one side the production processes and on the other side the natural ecosystem.
Notwithstanding the inherent difficulties, there are hidden opportunities in old Southern Italy rural wine landscapes as they maintain a sensible attention to the environment which moves onto the natural environment level and onto the human behaviour level with the same attitude, an attitude towards adaptability, accommodation, contextualization.
Here, in Southern Italy Roman footmark is still strong. It connotes the quality of products that into southern reality is very often bound to the extreme variability of grapes. In fact onto the double planes of landscapes, on one hand, and of wine tasting, on the other hand, we could try to determine common denominators of landscape organization and wine identity.

2.Wine Landscapes in Architecture and trough the history[2]

The concept of landscape in Architecture is seen as a natural setting rather than as an inert atmosphere, mostly changed and transformed by men; the reading of the territory has always taken place according to aesthetic criteria without considering the fact that the landscape is also conditioned by the changing of economy and by the evolution of technology.
In our century human activity has already significantly altered the landscape, so that it could be hard to identify all the significant variations occurred in a short time. However, in many situations, it is still possible to detect the main aspects that bear witness to our past and, therefore, offer the opportunity to set in motion the most appropriate protective action. Therefore, we'd better modify the landscape in which we live only if we are really aware of the value of our cultural and historical heritage as well as of the environment.
Sometimes, the new identity that landscape gains through the changes is carried out by the human being, who re-interprets the landscape according to his or her own sensitivity.
So many are the elements that interact and merge into one single result, which is obviously eclectic; for this reason, Landscape is a very complex entity, made of tangible descriptors as well as abstract ones, such as culture, history and traditions. The landscape contains the history of its people, while its shapes and lines are the concrete sign of human intervention, which has made the environment productive. The archaeologists say that the territory is like a palimpsest upon which all human activities have left some trace. Of course, it is very important not to forget that, with the passing of time the Landscape has often changed its physiognomy, for better or for worse, alternatively becoming the place of disfigurement (think of natural disasters or the disfigurement of our countryside in times of famine). However, the first element in charge of the landscape's change is always the work of man: the landscape becomes the mirror of human action, which turns a large part of what we call natural into artificial.
The above-mentioned concepts lead us to an important consideration, namely the ability to understand the uniqueness of the landscape and its quality of non-transferability. Landscape mutually reacts to human activities and natural environment. About the specific topic of Wine Landscapes, full enhancement of modern wine production, conforming to the morphology of the landscape, as well as to its history, is advisable especially since a vineyard gives a hard to replace and almost inimitable identity to the landscape itself. Topography, climate, and soil cultivation techniques that are imposed from time to time, are programmed for specific environmental realities.
The landscape has been created from man, making it both productive and aesthetically appealing. In few words, man becomes one of the main actors of the landscape.
Perhaps for this reason, the value acquired by wine landscape over time can be defined as a sort of "territorial imprinting." It is through the architecture of vineyards that the landscape

[2] Fosca Tortorelli

takes shape, providing its wines with peculiar traits, becoming the basic value for economic processes and the synthesis of a multiplicity of relationships.
The structure of the Italian viticulture/wine system is due to the territory, intended in its physical, anthropic and cultural dimensions, and to the ecosystem, meant as quality of the landscape and of the vineyard environment. It has been repeatedly stated that the viticulture landscape is made up of sets of colours, but it is also true that even the smallest details of the vineyard can revive distant landscapes, which are continuous or hidden. We can recover this concept in the case of the farm called Amastuola (fig. 1).
The attentive viewer will note the differences with the passing of seasons and the enduring charm of the intimate vitality of the vine; landscape should therefore be lived and touched with our hands.
We have said that the landscape is synonymous with culture, history, and nature, and if it is true, this means that its appeal is given by its physicality, by its diversity. In this logic, landscape is a notion deeply linked to spatial and chronological variability.
The farm, mentioned above is located within the agro Amastuola Crispiano, on a plateau above sea level in the homonymous district, and is in an area dotted with farms since the late medieval age.



Fig. 1: Picture of "Amatole's garden vineyard".

Luxuriant Mediterranean vegetation characterised the surrounding area, with pine trees and the Mediterranean marquis, which create a set of aromas and flavours. Vine cultivation in this rural area is an ancient practice: grape seeds and Greek amphorae have been found during archaeological excavations.
The buildings of the farm, which are not currently used, have been renovated to avoid deterioration and to encourage tourism industry and cultural development in the whole area. The winery is underground. The barriques and barrels area, also underground, once open to the public, will be the starting point for amateurs visits to wineries and tasting and the centre of initiatives in cultural tourism, sustainable mobility paths, rural receptivity.
Is also meaningful the design of Amastuola vineyard /garden that has been highly valued from many perspectives and received several awards, among which one for the "Good Practice for the recovery of agricultural landscapes no longer productive " and for the "Good practice for the protection and enhancement of the agricultural landscape also for tourism purposes. "
It can be considered as a unique case of harmony between production and aesthetics. The vineyards were planted on the basis of the design thought of the great landscape architect Fernando Caruncho.
Also the colour had an important meaning in his work; in addition, 1,500 olive trees, items recovered as historical monuments were relocated in 24 islands organically positioned over the surface of the vineyard and along the historic streets of the Farm, featuring the project with the contrast between the green and silver of the olive. Bright green waves of the vines. Philosopher and gardener at the same time, Fernando Caruncho drew for the first time the entire agricultural landscape as if it were a garden. When designing a garden has the task of

combining the human and the natural, not only to realize a correct and beautiful to behold, but to achieve that purity and simplicity that is built into the nature of things.
The geometry becomes the grammar of the garden itself. In fact, it is precisely through this sensitive geometric design that, coming to Amastuola, and along the long avenue flanked on both sides by olive trees, the visitor can grasp - seeing them parading by side - a kind of silver grey wall that, gradually, it composes and decomposes. The purposes of this project, reported as a case study, designed to stimulate, promote and induce a different conception of the landscape, which recovered fully its value and its potential in proposing the environments and the national wine industry.
Another important example is close to our place and is strictly connect with our roots.
If we recognize that the wine in the Mediterranean is so closely tied to a specific identity construction that, in the past, incorporated the building processes to the quality of the food product. Therefore the quality of the product was linked to the way of constructing both typological/building that of the material used.
The land is one of the connecting elements of identity construction and in this area it is distinguished as a sustainable building material, if we think of the raw land, effective bioclimatic point of view, both as a basic element of agriculture, both as a modification of the soil, carried through altimetry variations made to communicate in a manner appropriate for the processing stages with those of production. So, for the interconnections of different types of knowledge that are integrated around the "wine", the tests may not be much of a practical nature, but cultural, as projects of multidirectional network between existing reality.
The ancient Pompei is comparable to a metropolis of culture, business, merchants and trade since right before the eruption of Vesuvius, it was an important trading centre between Rome and the Roman provinces. Vineyards and wineries abound in the city and surrounding areas as leading manufacturers of fine wine, which played a key role in the culture of Pompei.
In 1996, Mastroberardino was mandated by the *Government department responsible for the environment and historical buildings* of Pompeii to conduct research in an open-air laboratory.
The objective was to investigate and discover the originally used variety of grape, the techniques of wine production in ancient Pompeii investigating it prospective nowadays.
The various botanical studies, the discovery of some casts of the support poles and the roots of the vines, only give confirmation of how and where the vines were grown.
From the study of the writings of Plinio il giovane and the frescoes found on the walls, have been identified many specific varieties.
The project to restore the ancient techniques of cultivation of vines and reintroduce them in Pompeii has resulted a success. Piedirosso ancient grape vines, Sciascinoso, and Aglianico have been planted in the same areas cultivated in antiquity. These vines grow on the soil of Mount Vesuvius and Pompei's soil is the is ideal.
Today, the total area of vineyards in Pompei has become of approximately 0.60 acres divided into 15 lots, in which the experimental vineyards were planted using ancient traditions. Regarding the properly architectural aspect, in that area was found in the cell transformation and processing of grapes, with the press and channels that carried the juice in ceramic underground jars (dolia) for the collection of the must.
Another interesting area is that of '"Oste Euxine" (Figure 2), or experimental vineyard, which has an area of 300 square meters, in which we find the screws of eight different cultivars, choices always following the bibliographic and iconographic studies.



Fig. 2: Picture of “Oste Eusino” vineyard within the archaeological area of Pompei.

The choice of these case studies has been done just to stimulate, encourage and induce a different conception of the landscape, which has recovered its full value and potential, also emphasizing the fundamental relationship between the history and the wine and consequently the strength of the relationship between nature and culture.

Bibliographical References

Caballero R. , Díaz Vera J. E.,. de Gruyter W ,Sensuous Cognition: Explorations into Human Sentience: Imagination, (E)motion and Perception

Barocchi R., Manualetto di progettazione rispettosa del paesaggio ad uso dei professionisti e delle commissioni edilizie integrate, ISPAR – Istituto per lo studio del paesaggio e dell'architettura rurale, Edizioni della laguna, 2002

Brun, J. P. Le vin et l'huile dans la Méditerranée antique. Viticulture, oléculture et procédés de transformation. Paris 2003

Falcetti M., De Biasi C., Campostrini F., and Bersan A.- *Dal vigneto alla cantina: la zonazione al servizio dell'enologo* . Vignevini, 6, 43-74, 2001

Muzzillo F., a cura di, La progettazione degli ecomusei. Ricerche ed esperienze a confronto, ESI, Napoli 1999

Pastore R. Il marketing del vino e del territorio: istruzioni per l'uso. Franco Angeli, 2004

Scienza A. Failla O.- Raimondi S.-Angelini R. (A cura d). *La vite e il vino,* Script, 2009

Rossetti M. Cantine. Tecnologia, Architetture, Sostenibilità Maggioli Editore, Rimini, 2011

World Heritage Status of the Cultural Itinerary of the Vine and Wine Among the Peoples of the Mediterranean, World Heritage Expert Meeting on Vineyard Cultural Landscapes, 11-14 Luglio 2001, Tokaj, Hungary

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Promotion and conservation of cultural heritage through the institution of Tourism Clusters in Campania

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Abstract

Promotion and enhancement of cultural heritage is now increasingly related to an integrated planning of the territory and to a careful political governance. This paper aims to analyze the potentialities related to the newly created "Tourism Clusters", provided by Italian laws involving parts of the coastal area of Campania Region.
"Tourism Clusters", are "large areas" organizations from the urban point of view, because each area may include several municipalities, and large parts of territory. They are based on open consultations, through which public and private actors work together for the economic development. First clusters, each having its own characteristics, have been identified and delimited after a phase of listening to the stakeholders. The goal is to create a new structure that supports tourism and economic development consistent with the mechanism of "Tourist Local Systems" as defined by a regional law still under discussion. In this paper we will describe the potentialities of the Tourism Clusters in Campania Region, the resources made available in order to speed up European Structural Funds expenditure and, first of all, the possible effects on actions for protection, enhancement and promotion of cultural heritage.

Keywords: (Cultural heritage, Tourism Clusters, tourism policy, competitiveness)

Past experience: Cultural Regional Routes

Campania Region suffers strong competition with other countries even less rich in landscape and cultural heritage, but being most active and organized to promote their resources by intercepting considerable tourist flows. The competition with other routes is more complicated for the inland areas, already marginalized and in many cases affected by the phenomena of migration with consistent depopulation. Countries which due to the scarcity of employment opportunities and no economic perspectives have to deal with the effects of depopulation with many of their young people being forced to leave. Negative factors are the high rate of unemployment, a fragile and pulverized production structure, anchored to traditional sectors with small firms, poor infrastructures, scarce quality of public transport. A past experience developed by the Campania Region in accordance with the European Multiannual Financial Framework 2000-2006 has been the territorial development program related to some “Territorial Integrated Projects”, a set of inter-sector actions, coherent and integrated with each other, that supported Cultural Regional Routes. These represented one of the main tools the Campania region has chosen to implement development strategies, in order to ensure a high concentration of the available financial resources.
Territorial Integrated Projects are a tool for local development policy, in full compliance with EU regulations. They support the integrated design, aiming at tangible and intangible interventions in a territorial or homogeneous thematic area. The strategy of the design revolves around the definition of a core idea “idea- strength”. The Cultural Routes help economic development, pointing to interventions along a physical path and that could coincide with a tour.

Among the positive effects of the Cultural Regional Routes there was the expected action of the communities around their cultural and environmental assets, stimulating involvement and interest. But they did not inspire either durable network mechanism or a long-term marketing strategy planning. Actually, there is not the desired economic growth nor local development.
It has happened that financing the recovery of some monuments or helping individual companies for the mere fact that monuments to be restored or companies to be supported were all physically situated along a certain route within a specific territory, has not produced a critical mass sufficient to provide a new development . Small tourist centers have been strengthened, individual companies were supported, but they remained unrelated to each other and the local context.
The objectives of this old regional programming pursued a deep idea of urban renewal. Redesign underpins new routes and new virtual development where this was slowed by critical and problematic factors. On the other hand, the old EU funds program tried to involve a lot of inland and less populated areas, without neglecting coastal areas. This was a positive and ambitious goal. A number of other initiatives were implemented following the 2007 - 2013 programming in favor of the regional economy and the environment, while the regional programming attached to the multiannual financial framework 2014 - 2020, is still in its early stages.
Structural Funds coming from Europe are a great opportunity that we often fail to fully grasp. Meanwhile, the Italian government established the model of the Tourism Cluster (Tourist District) by law, which already is interesting and valuable in itself, but it may serve to operate in an appropriate manner and focused European Funds available soon.
In this light and shadows scenario, tourism clusters model seem to be a promising perspective.
The purpose of this paper is to analyze whether the concepts of cluster or industrial district can be adapted to the concept of the Tourism Cluster as it was conceived by Italian law, and what perspectives may arise from this.

Clusters and Competitiveness: from the model of the industrial cluster to tourism cluster

Michael Porter of Harvard University twenty years ago gave us a remarkable definition of cluster. He defines clusters as: "*critical masses in one place of linked industries and institutions--from suppliers to universities to government agencies--that enjoy unusual competitive success in a particular field*."[1]
This concept, that has come to be regarded as a strategic tool for local economic development, was proposed in 1990 and has attracted much attention from politicians and academics.
While noting some differences, as we shall see later, this territorial model of industrial origin can be extended to tourism industry, so as to use the model of the industrial cluster for tourism cluster or tourism district.
The cluster is intended as a new governance system applied to a given territorial bounded space, controlled by parameters such as the development and exchange of knowledge, their interrelation and all the elements that make an area unique and unrepeatable.
The skills and baseline requirements that characterize a cluster are: the fundamental link between local production and territory, the definition of a quality standard for goods and services, the exchange of knowledge and skills, the ability to increase productivity, (access to information, access to institutions and public goods), strategic complementarity between different sectors, innovative capacity, (aggregates of businesses are often more careful to understand the needs of the market compared to individual operators); the ability to create new companies (spin-offs); to establish a strong physical and information infrastructure to sustain regional economy; developing local talent with a strong educational system, knowing that universities and specialized research centers are the driving force behind innovation in nearly every region. Specialized talent and training are more important than abundant labor.
It would be especially important a strong presence of the public sector to support the production, with an advantageous tax regime for firms.
The competitiveness of the system will depend on the presence of elements such as a suitable system of cultural and recreational facilities, a well-integrated social system that participates in the development and last but not least, a strong marketing strategy. According to academic definition, cluster is a "*geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities*"[2].
In broad terms, clusters are concentrations of firms that work in synergy on the basis of their geographical proximity and their interdependence, joining forces of different companies and promoting productivity of individual companies in the area, encompassing innovation and growth, and finally stimulating new businesses for the cluster's expansion [3].
Within the cluster, individual enterprises can co-operate and work together and positively contribute to innovative processes, facilitate relations with other institutions and channel knowledge and information, they can also compete directly with each other. The cluster's virtuous operation suggests

the ability of the stakeholders to work together towards a common goal. With respect to globalization, we can affirm that belonging to an innovative cluster becomes a real advantage for regional businesses in the tourism sector, particularly small and medium enterprises (SMEs). Supporting factors and resources such as infrastructure provide a firm foundation upon which a destination's tourism industry can be established.
Clusters create an environment outside individual companies that accumulate knowledge, relationships, and motivation which are key competitive advantages. For each cluster, logistics support and linkages are necessary for the success of a particular sector [4].
For example, the provision of quality tourism experience is the goal of developing a tourism and hospitality cluster. It requires not only quality attractions, but also efficient "*complementary businesses such as hotels, restaurants, shopping outlets, and transportation facilities*" [5].
In the long term, all firms in the cluster can provide and enjoy mutual benefits to and from one another. It is composed of participants from throughout the tourism value chain, including government agencies, tourism promotion authorities, private sector associations and individual firms.
Among the determinants of an Italian tourism cluster, we have to put cultural heritage and landscape. Core resources and attractors such as culture and history can be the fundamental criteria for which visitors choose one route rather than another.

Campania Region_The Territory and Tourism clusters as a competitive edge

Regional economy is made up mostly of small tourism enterprises that have to compete on the world market, and under globalization, competitiveness is essential for the survival of small firms.
In order to maximize their competitiveness, firms of inter-related sectors are invited to join clusters to better meet consumer needs, foster relationships with other institutions, contribute to innovation, and facilitate technology development for their own knowledge and information needs.
This opportunity is provided by the recent legislation related to cultural and tourism clusters, currently aimed solely at coastal areas.
The cluster approach is increasingly being employed for tourism development. Indeed, the Tourism Clusters share some similarities with Industrial District model, that complies with firms' tendency to localize in the same region, and the Cultural District model based on the integration in the same region of cultural activities, cultural heritage and landscape, all determinants that identify a territory[6].
If the integration of Small and Medium Enterprises is widely developed in the industrial cluster, it is necessary to investigate how much that model is transferable to the development of the tourism, and describe what may be the differences between Industrial economic structure and Tourism Cluster.
While product manufacturing is driven by the linear logic of the value chain, with the distinction between production, distribution and consumption, the tourism is driven by the logic of the constellation of value given by a simultaneous interdependence of individuals which define and make up the tourist offer. The local community and the territory are transformed from "passive" resource into "active" resource [7] .
In this sense, the element that really differentiates the tourism cluster by the academic definition as it has been conceived by Porter is the deep link with the territory.
In our definition, the tourism cluster defines a very large group of businesses that have a special dominant in common: the territory and the landscape, the environmental and cultural context in which they feed on and derive their reason for existence. Binding firms with a given territory is far more important than the characteristics of similarity among the enterprises. It is the land, the place, the landscape that creates the basic framework within which businesses can grow.
It follows that local community is a source of supply, a factor of co- production. With regard to the territory a Tourism Cluster may include one city or region or an entire country or even a number of neighboring countries. The size of a cluster depends on the recognition and identification of a given territory that for some characteristics (prevailing economy, geographical and morphological features) can form an homogeneous unit, and at the same time a summary of diversity.
Maybe this is the most important focal point, the design of the area, knowledge of the boundaries, the identification of its salient features, identification of potential cluster partnerships. The second step is how to join existing tourism stakeholders to form an effective cluster, and finally how to organize clusters into sustainable business practices. Government can have a significant influence on the business environment, both positively and negative. It is on this point that Campania region is focusing to improve the contribution of institutions to the tourism industry. We can now imagine how new important perspectives may be opened in Campania, with the approval of the new law on tourism, currently under discussion, which includes important innovations on the harmonization of the tourism offer, quality improvement and regulatory interventions. In this context, clusters are considered as innovation drivers at a regional level and we can now hope for a better dialogue between regional stakeholders and the creation of a new stronger public - private partnership.

Set up of Clusters, the legislative framework

The new law on tourism clusters is the legislative framework. The rules on Italian tourism clusters are set out in Law no. 106, July 12, 2011. Article 3 of the law provides for the possibility of setting tourism clusters in the coastal municipalities aiming at redeveloping and revitalizing national and international tourism, enhancing the development of the areas and sectors of the cluster, improving efficiency in the organization and production services, ensuring legal certainty and guarantees to firms that operate with particular reference to the investment opportunities of access to credit, simplifying and speeding up dealing with public administrations.

The steps

The process of establishing a tourism cluster starts with a bottom-up initiative. In this first phase, local associations were formed promoting local authority the establishment of the cluster, and at the same time opening a public discussion with all local operators. Organizers might start with meetings involving tourism stakeholders at the most. Every person directly or indirectly involved in tourism should participate. As clusters develop, trust, awareness, and cohesiveness grows, while existing tourism firms are often too focused on their own business to consider the larger tourism industry. One way to build trust is work together in trade shows, study tours, public meetings and even involving medias.
The formation of the idea of the tourist district is based on the knowledge of the characteristics of the local context, explored through the study of the socio - economic and structural values.
Although the process of establishing a cluster does not require a strategic analysis and planning of the territory, the promoters of the district should start from an analysis of the area and its features, before proposing a logic definition of its physical constraints. Thus, it is useful to consult the address provided in the institutional planning, in order to assess the compatibility of the strategic vision with the decisions made at an higher scale.
Any individual or group can approach the legislative body of the Region and request that an area be studied to determine its significance under a Tourism profile. The promoters should include the public, the business men in the process from the beginning, as soon as the decision is made in agreement with the local municipality. Educating the public about the significance of the proposed cluster is a primary responsibility of the promoters. Including the public and the business men in the process will help to increase their understanding and participation of the cluster designation.
In Campania, the proponent committees were formed by creating promoting associations, representing the main local actors. These associations have submitted the request for the establishment of the cluster to the municipality they belong to.
If the local municipalities approve the request , each one of them adopts a resolution, an act , that expresses the common will to participate to the cluster. So each municipality has to adopt the requested resolution within the chosen territory.

The Region's role

The delimitation of clusters (Distretti Turistici) is fixed by the Regions, once listened to the stakeholders through a decision-making Services Conference which is a discussion between representatives of the institutions involved, Municipalities and Associations.
In this discussion a representative of the Ministry of Economy and Finance also took part. The final report of the Conference has an official value, and it is used as a basis by the regions for establishing the district.
The regions issue an establishing decree that is transmitted to the Heritage and cultural activities and tourism Ministry. Finally, the Ministry decreed the establishment of the district in accordance with the approved territorial delimitation and in accordance with the matter discussed in the previous phases. Even if Law no. 106, July 12, 2011 does not provide for a timetable for carrying out all the phases of the process, it have been overcome in few months, from June to December 2013. To date, 12 Tourism Clusters have been already delimited, all the decrees were issued by Campania Region in December 2013. The first four approved by the Ministry of Cultural heritage are: Distretto Litorale Domizio *Domitian Coastal District* (including the municipalities of Cellole, Castelvolturno, Mondragone, Sessa Aurunca), Isolaverde *Green Island* (including the entire isle of Ischia with its six municipalities), Golfo di Policastro *Policastrum Gulf* (including the municipalities of Vibonati, Sapri, Ispani, San Giovanni a Piro e Santa Marina) Penisola Sorrentina *Sorrento peninsula* (Massa Lubrense, Mete, Piano di Sorrento, Sant'Agnello, Sorrento, VicoEquense).



Fig. 1: General Delimitation of *Policastrum Gulf Cluster _Distretto del Golfo di Policastro*

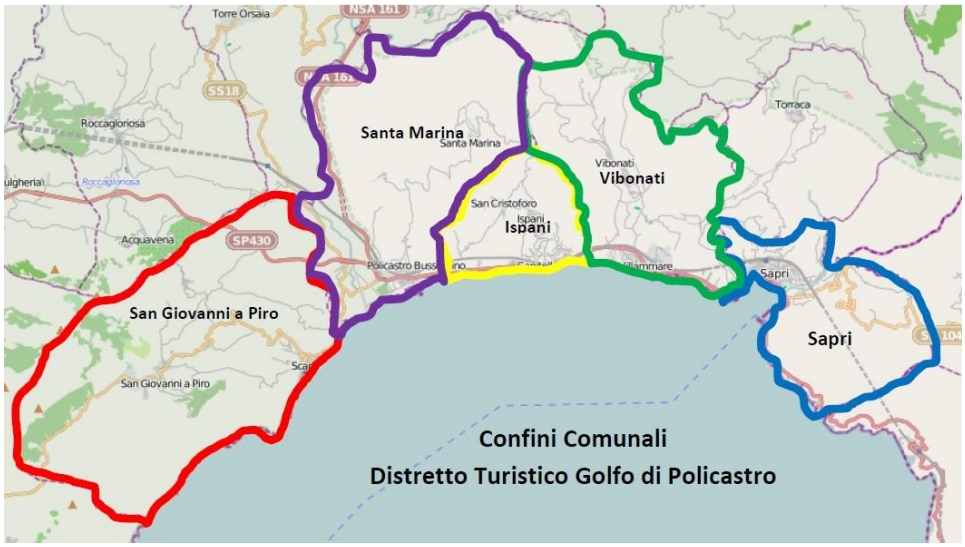

Fig. 2: *Policastrum Gulf Cluster* includes the municipalities of Vibonati, Sapri, Ispani, San Giovanni a Piro e Santa Marina. Graphic elaboration by ”Associazione Distretto Turistico Golfo di Policastro”

Effects and results

The "Tourism District" is a new legal figure officially recognized, which can work in autonomy for the tourist development of public and private organizations that belong to it. A bottom-up approach, from companies such as major players in the tourism sector. The District has a streamlined body that has the mandate to manage the identified initiatives, being able to take advantage of important benefits: The Tourism Clusters are according to the law "zero bureaucracy zones".
Zero Bureaucracy zones are the evolution of the Urban Free Zones introduced by the 2007 Finance Act (Law no. 296 of 2006), drawing on the model implemented in France, intended to promote the economic and social development , even with the interesting mechanism of exemption from some taxes on person and buildings (IRAP and IMU and exemption from contributions on salaries of employees, mainly in the cities of the South). Subsequently, with the art. 43 of D.L. n . 78/2010, the above Urban Free Zones have been fully replaced by so-called Zero Bureaucracy Zones (ZBZ), extended to whole Italy with the stability law (Law no. 183/2011) on an experimental basis until 31 December 2013.
Today the applicable law is as follows Art. 43 D.L. 31 May 2010, no . 78, converted with amendments by Law on July 30, 2010 , no. 122; art . 14 , Law 12 November 2011, no. 183 (Official Journal no . 265 of 14 November 2011). Therefore, for new production initiatives established after January 1, 2012.
The enterprises will have hard financial incentives through changes in the tax regime. It is well known that in Italy one of the reasons for the lack of foreign investments lies in the presence of heavy

constraints, long waiting times for permits, numerous laws to be respected not always easy to interpret. Within the cluster all of this is ridden out and at the same time facilitated. Eventually we might get a Cluster tax policy, where within a framework of transparency and equal treatment, and on the basis of the principle of mutuality, the taxes are paid by cluster in a scheme agreed with our Tax Agency. In the tourism clusters State branch offices will be present and active and will deal with tax and contributions. They will be active points of single coordination of the activities of tax agencies and Social security (INPS), (Social security, Revenue Agencies, State Property Office, regional Offices of the Ministry of Cultural and Environmental Heritage, etc), which allow companies in the district to solve any matter pertaining to such institutions, submit claims, receive provisions. A facilitated access to regional, national and EU contribution is permitted to member companies by the opportunity to make submissions and administrative proceedings through a single collective proceeding. The financial resources could be assigned directly to the mayor responsible for the territory or to the Cluster. Today the financial resources, i.e. European Union structural funds are managed by regions, provinces and municipalities.
In this case all the firms have to establish a network, and the districts will be able to certify that each of them gets the right to access to the contributions.
In general we can state that a public intervention in the tourist sector is needed for two fundamental reasons: first, to finance tourist public goods, structures and infrastructures needed to complete the tourist product and to increase the competitiveness of the whole destination and for which the private market fails; second, to help coordination among private firms supplying different goods and services.

Transferability

A model will be considered a good practice if it can be adopted elsewhere, because a central aim of the project is to assist others to improve their own practice.
It seems that the Campania Cluster project can be considered ‘transferable’, because it has got some characteristics such as common goals related to some core themes eventually not so linked to the specific country, the *Financial requirements are* transferable and repeatable, Legal and institutional requirements are the same in other Italian regions.

Turism Clusters and cultural heritage

Where Turism Cluster is formed and where destinations are located are two important and influential factors. The main resources that draw tourists to destinations are the core resources and attractions, classified as natural resources such as beaches, mountains, and landscape in general, and heritage and cultural resources, such as historical towns, monuments, museums. These are called by economists Dwyer and Kim (2003) endowed resources [8]. It is clear that the main resources of the newly created twelve Clusters are endowed resources, Amalfi Coast, Cilento’s Landscape or Ischia Isle are undoubtable very rich in historical heritage and have got a very well known environmental resources.
With the establishment of the cluster, the Campania Region, entrepreneurs, companies related to the tourism industry and all turism Cluster actors are forced to work together.
When all actors cooperate with each other, the tourism cluster is more likely to succeed in achieving tourism
competitiveness in a global market and in turn contributes to regional and national prosperity [9] .
Producers are made up of the private sector that provides products and the public sector that manages endowed resources. Suppliers support and add value to core resources and attractions by providing complementary products [10]. To complete this framework, we are waiting for law "Organization of Tourism System" ’s approval.
The draft law "Organization of Tourism System" also provides that a Regional Commission should identify the "tourist homogeneous territorial areas" in accordance with the provisions of the instruments of regional planning; tourist homogeneous territorial area is an area delimited within the region's territory, in which the local tourism system, such as an association of public and private entities, operates for the development of the tourism economy of a given field of tourism in areas characterized by the presence of an integrated tourist offer of the excellence of heritage tourism, cultural and environmental, of local agricultural products, and wine and local crafts [11] [12]. As stated in the recent academic literature, the Local Tourist System (LTS) [13] may be considered a particular case of Marshallian Industrial District . Through the definition of LTS, the policy maker can take into account the complexity of tourism, characterized by a strong heterogeneity of goods, services and subjects involved; secondly, LTS helps promote a stronger coordination between the public and the private sector, by identifying an homogeneous territory and recognizing its importance in tourists' decisions; thirdly, through the LTS the policymaker can analyze the externalities and promote the idea of cooperating networks in a context of local development. The systemic nature has also been

recognized by the Italian legislation (Legge Quadro sul Turismo, no. 135/2001) [14] by means of the creation of an economic policy instrument, namely Local Tourist System: "*We call local tourist systems, homogeneous or integrated tourist environments, which comprise territories also belonging to different regions, and which are characterized by the integrated supply of cultural, environmental goods and tourist attractions, including typical agricultural and local handicraft products, or those characterized by a widespread presence of individual or associated tourist firms*" (National Tourist Law Reform, Law 29 March 2001 no. 135) [15].
The design of Clusters could be harmonized with the "*Tourism homogeneous territorial areas* ", as expected in the Law "Organization of Tourism System".
The law, pending approval by the Campania Regional Council, provides for specific powers to municipalities, such as " competence exercise in the field of tourism, with particular regard to the performance of the following duties and functions:
a) promotion of local tourism systems,
b) activation of the structures of information and tourist accommodation (IAT);
c) harmonization of public services, opening and closing hours of shops to meet the needs of tourist flows;
d) organization of base tourism services relating to the reception;
e) implementation of administrative procedures in the field of accommodation;
f) transmission of data relating to the tourism facilities available in the municipal area of the IAT.
From this the link with the Tourism Clusters. It is assumed that the definition of "Distretti Turistici" (Tourism Clusters) must necessarily be in keeping with regional planning in the area, identifying areas that have common characteristics and homogeneity both from the point of view of cultural heritage and environmental tourism [16], and according to the structure and territorial offices organization being competent in the area, as well as in the socio-economic profile of the population and characteristics of companies operating in the area, even in order to delineate intervention strategies based on common goals and widely shared by public and private institutions.

Conclusion

The Campania region was the first region in Italy to introduce the Tourism Clusters or *Distretti Turistici* as defined by the Law. The process has not been concluded, because the Region has proposed 12 districts and not all of them have already received the final approval by the Ministry of Cultural Heritage. It is therefore a process being currently still in progress. We expect , however, important developments: the unity of the territory covered by the cluster, the enterprises will be facilitated and will work in a coordinated manner. They will get tax privileges and concessions in all the paperwork. The territory in which they grow will become an economic subject itself, the site of a new development. This will have serious implications for urban planning because firms tend to bind more strongly to the territory on which they are born, and in which all of them share together what we define "the tourist offer". This will strengthen the sense of belonging and also the care and respect of the territories. The proposed global tourism offer will have a stronger and more uniform image.
The creation of the tourism clusters shapes the economic framework within which a network of companies moves. The territory, the cultural and environmental heritage are creative parts of this scenario. One of the pillars on which it rests is in fact the creation of a community that is more aware, able to attract investment, generate growth, but most of all a community that moves within a landscape, with all its assets, a source of economy, the glue and the reason for the existence of the cluster.

Bibliographical References

[1] – [2] PORTER, Michael E. *Clusters and the New Economics of Competition,* Harvard Business Review, pp. 77-90 Harvard Business School Press 1998

[3] JACKSON, Julie Anne, MURPHY, Peter Edward. *Tourism destinations as clusters: analytical experiences from the New World,* in *Tourism & Hospitality Research*, 4 n. pp. 36-52, 2002.

[4] PORTER, Michael E. *Clusters of Innovation: Regional Foundations of U.S. Competitiveness*, Washington, DC: Council on Competitiveness, 2001

[5] PORTER, Michael E. *The Competitive Advantage of Nations*, New York: Free Press,1990

[6] CIAMBRONE Alessandro. *Promotion of cultural heritage as an engine for territorial development in France*, Le vie dei Mercanti XI International Forum of Studies, Aversa-Capri 13-14-15 June, La Scuola di Pitagora: Napoli 2013

[7] DELGADO Mercedes, PORTER Michael E., STERN Scott. *Clusters, Convergence, and Economic Performance,* National Bureau of Economic Research, Cambridge 2011

[8] MAZILU Mirela, SAVA Cipriana. *New Ways of Innovation in Tourism Economy: Implementing Clusters,* Proceedings of the 2-nd International Conference on Business Administration (ICBA 2011), Montreux, Switzerland, p.71-78, coordinated by European Society for Environmental Research and Sustainable Development, Published by WSEAS PressUniversity of Craiova, Romania 2011

[9] DWYER Larry, KIM Chulwon. *Destination Competitiveness: Determinants and Indicators*, Current Issues in Tourism, Vol. 6, No. 5 2003, pp 369-413

[10] KIM Namhyun, WICKS Bruce E. *Rethinking Tourism Cluster Development Models for Global Competitiveness*, July 30, 2010 International CHRIE Conference-Refereed Track. Paper 28.

[11] SACCO Pier Luigi, FERILLI Guido, *Il distretto culturale evoluto nell'economia post-industriale*, Working papers Università IUAV di Venezia, Dipartimento delle Arti e del Disegno industriale.

[12] SACCO Pier Luigi, TAVANI BLESSI Giorgio, *Distretti culturali evoluti e valorizzazione del territorio* in "Global & Local Economic Review", VIII, Tracce 2005.

[13] CANDELA Guido, FIGINI Paolo, SCORCU Antonello. *The Economics of Local Tourist Systems, Second International Conference on "Tourism and Sustainable Economic Development - Macro and Micro Economic Issues* CRENOS (Università di Cagliari and Sassari, Italy), Fondazione Eni Enrico Mattei, Italy, World Bank, Chia, Italy, 16-17 September 2005

[14] ANTONETTO, Piergiorgio. *La nuova legge quadro: luci e ombre*, La Rivista del Turismo, n. 5-6, pp. 13-16 Centro Studi Touring Club Italiano 2001

[15] CANDELA Guido, FIGINI Paolo. *Economia dei Sistemi Turistici*, Milan: McGraw-Hill, 2005

[16] SANTAGATA, Walter, *Cultural Districts and Economic Development*, *Handbook of the Economics of Art and Culture,* Elsevier, Amsterdam: K. Arrow and M.D. Intriligator, Elsevier Science, 2004

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Trgovski Dom in Gorizia by Max Fabiani Survey and Simulation of the Petrarca Hall

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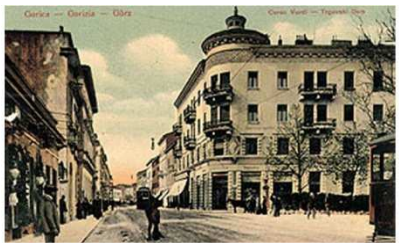
Abstract
The aim of this research was to study a part of the Trgovski Dom, a relevant building by Max Fabiani, realized in the beginning of 1900 in Gorizia, actually in a great state of degradation.
The first step was the survey of the theatre, subdivided in three parts: the entrance, with a staircase, the main hall – in two levels, parterre and gallery – and then the space for artists, with the stage, the dressing rooms, a large underground space as warehouse, and an helical staircase to connect all the parts.
The main space is the double-level hall, where the spectators take place. Connected by a second staircase, it expresses very well the design idea of the author.
The second phase was the geometrical analysis and the comparison between the drawings resulted by the survey and the technical ones produced by Fabiani himself. Some differences were revealed, such as a different configuration of the staircase in the entrance, a variation in the distribution of the technical spaces, the presence of a small tower in the position of the helical staircase, going to the roof of the building.
After the survey and the geometrical analysis, we started to reconstruct the digital model to simulate the interior space before the restoration of the building, to understand better the Fabiani's thought for a theatre space.

Keywords: Architecture, Survey, Representation, Max Fabiani, Gorizia

1. The Architecture of the Trgovski Dom

This research intended to analyze the building called Trgovski Dom, designed and realized by Max Fabiani in Gorizia, in the beginning of XX Century. The building was thought to be a kind of "Commerce House" – this is the translation of the Slovenian name – placed in the middle of the town, at the intersection of Via Verdi with Via Petrarca, and having the side façade exactly in front of a public garden.
Before starting to describe the building, it is necessary to speak about the architect, because in this case he creates a very interesting architecture, having his aspect derived by the Wiener Secession artistic group.
Maximilian Fabiani was born in Cobidil, near San Daniele del Carso, in 1865 and died in Gorizia in 1962. He studied architecture at the Technische Hochschule in Vienna, where he met Otto Wagner, who in that period was one of the major professors and architects. Fabiani collaborated with the studio of Wagner between 1894 and 1898, understanding the spirit of the new conception of architecture proposed by Wagner for his own projects, under the general idea of the Secession art, which was formed by painters and architects exited from the Academy of Arts, to join an autonomous group.

As we know the spirit of the Secession artists was to combine all the different aspects of arts – painting, sculpture, decoration, architecture – creating a Gesamtkunstwerk, a kind of total work of art showing all the different artistic applications to realize a masterpiece. So architectures were rich of decoration and details to express the new vision of art that could be created by the designer.
The Trgovski Dom was based on this typology of ideas, and its configuration is very diverse from the other ones in the town.


Figg. 1, 2, 3: Perspective drawing and two historical photographs of the Trgovski Dom.

As its name is written in Slovenian language, the main destination of the building was a commercial center for Slovenian people staying abroad. But during all the XX Century, the function changed a lot, also for the political events there were before and after the two World Wars.
Started in 1903 – the date of the approved design by the Major of the local Municipality – it was built in 1904, and after the end of the First World War it was attacked by the fascists, that in 1926 destroyed all the offices and furniture there were inside, changing also its name in “Casa Littoria”. The building was used by their organization for political and social meetings. Then in 1933 it was bought by Fascist Party, remaining until 1945 of the same property.



Fig. 4: Front drawing by Max Fabiani of the Trgovski Dom with the development of two façade in plan.

After the liberation of the partisans, it became the Ljudski Dom (People’s House), opened to Italian and Slovenian people for developing cultural associations. From 1950 to the end of 1980 it was used by the National League, to organize social events and cultural meetings, using also the very beautiful theatre hall that Max Fabiani has designed inside the building. After this date the building was only partially utilized, and the theatre was not used at all, leaved in a great state of deterioration.
The project is configured into two blocks, everyone of them parallel to the public street located in front of it. The intersection is resolved with a corner hinge, with a circular roof upstairs. A third block is present, in which there is a small theatre, generating a small courtyard inside.

The main subject of this research was the survey and the digital reconstruction of this theatre hall – called Petrarca Hall – in order to simulate a virtual renovation of it, studying the impact of new functional organization of spaces, the use of materials and the illumination, before starting with the physical restoration of this architecture.





Figg. 5, 6, 7: Photographs of the actual state of the building: corner view, main entrance of the Petrarca Hall, detail of the ashlar around the door (from left to right).

2. The survey of the Petrarca Hall

The Petrarca Hall is a small theatre, opened on Via Petrarca and structured in three spaces: the first one is the main entrance, with an eleven steps' staircase, leading to the main hall and upstairs through another staircase.
The second one is the main hall, divided into two vertical levels. It has a length of 16.60 m and a width of 11.80 m with an elevation of 7.60 m. Two pilasters at the end support the upper floor, that is organized in the shape of a horseshoe.

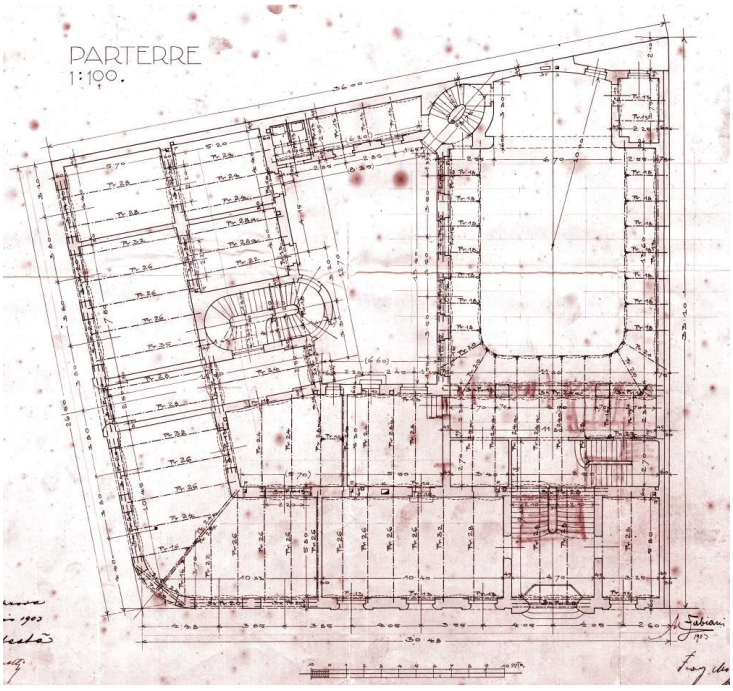
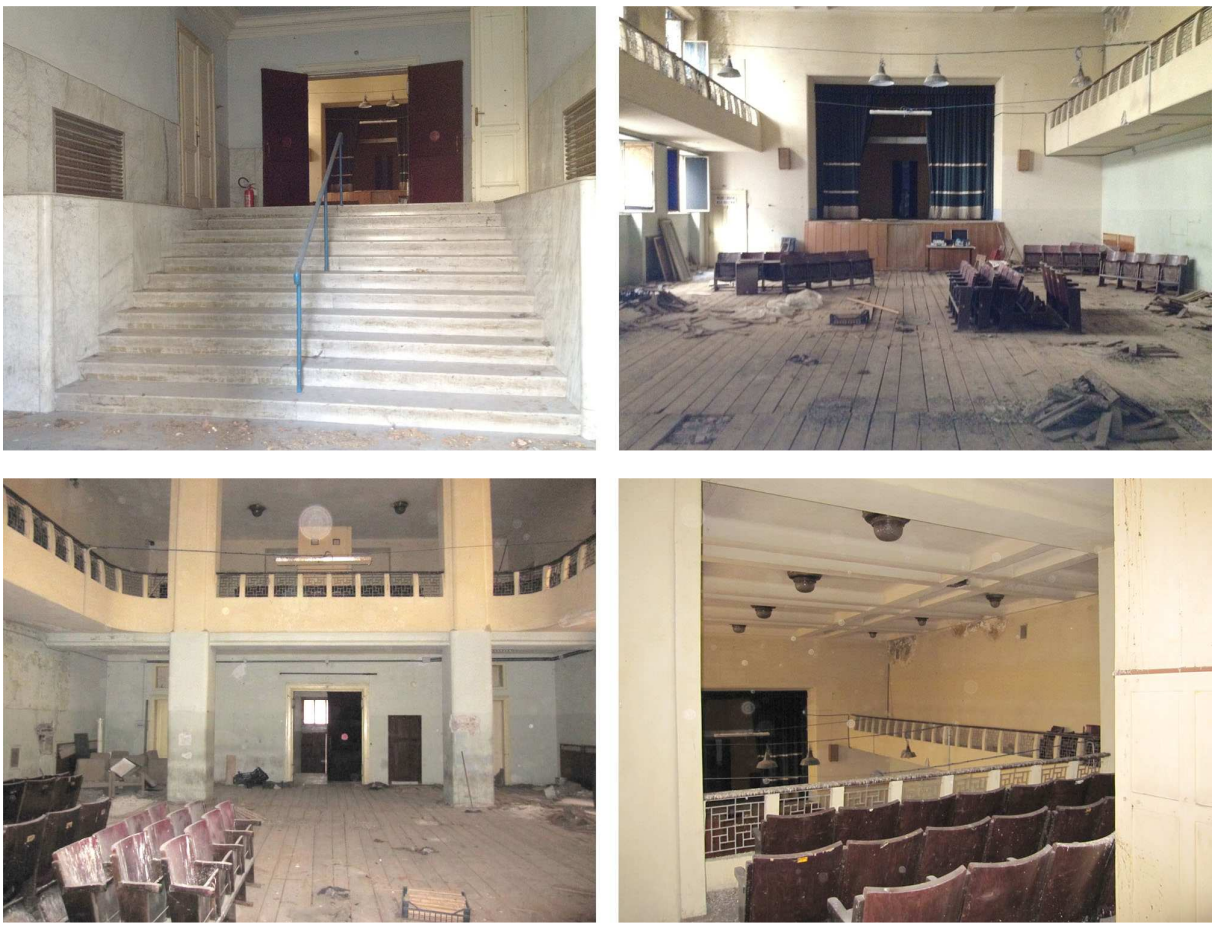


Fig. 8: Plan of the ground floor of the Trgovski Dom (drawing by Max Fabiani).



Figg. 9, 10, 11, 12: Views of the interior space of the Petrarca Hall: entrance, hall towards the stage, back view of the hall, first floor towards the stage (from left to right, from above to below)

The third one is the stage, located in front of the main hall, with an height of 1.40 m from the ground floor, having some other spaces next to it, such as the backstage, the dressing rooms and a warehouse under the stage.
Another interesting architectural solution is expressed in the ceiling, that is composed into a series of squares, that show the horizontal structure of the space.

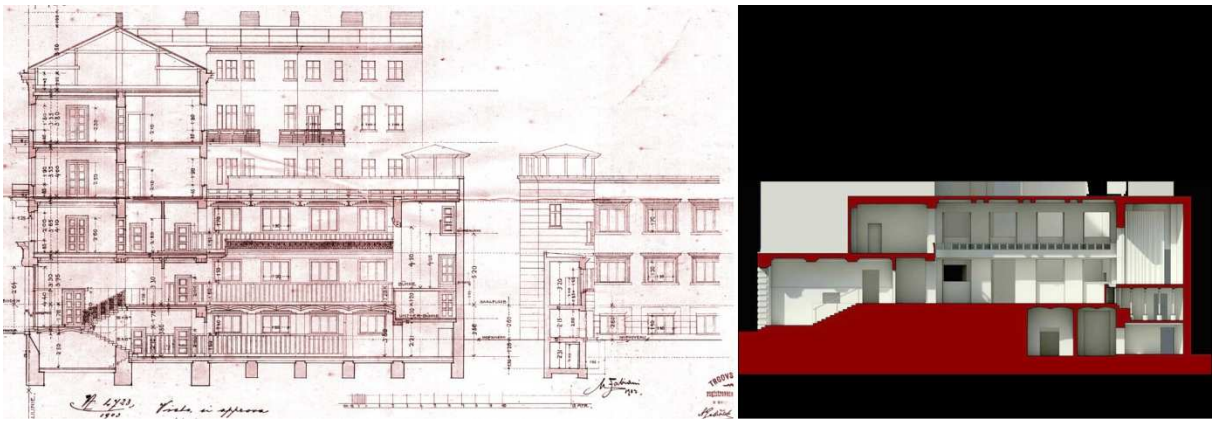


Figg. 13, 14: Graphical restitution of the front side and the first floor of the Petrarca Hall after the survey.

As we said before, the interior state of degradation, with broken glass, floors disconnected, the presence of dead animals – birds and rodents –, strong smell of paint and gasoline coming from the underground, obliged us to protect our body with special protective suits and face masks, deciding to concentrate only in few days the activities of the survey in order to avoid any possible negative consequences for our health. All the spaces behind the stage were really small, and it was impossible to use advanced instruments such as theodolite or total station, but we only could used pocket laser rangefinder and other small survey tools.
Then, the survey was done in a direct way, verifying the dimensions signed on the Fabiani's drawings. An internal polygonal network and a series of trilaterations allowed us to control every measure, integrating the information with the ones coming from the survey.
A relevant architectural object was the elliptical helical staircase located behind the stage, used as a tehnical vertical connection among the three different levels. In this case Fabiani resolved a very complex situation, having only a small part of the space to use, but considering it a significant portion of the whole building. Analyzing it, in fact, we can comprehend the architectural philosophy of composing of the author, who was able to enrich also some technical elements, that results very armonized with the rest of it. This kind of staircase was used by him in some other designs.
After the phase of surveying, we translate all the data into drawings – plans, elevations and sections – preparing the information for the next step that is the construction of the digital model for the final simulation.
But before starting modeling, we analyzed all the drawings – the Fabiani's ones and the one coming from the survey – to compare them in order to find significant analogies and differences to undestand better the architect idea of the project.

3. Geometrical analysis and comparison of drawings

The main 3D geometry of the space is a parallelepiped, having a rectangular basis and two corridors upstairs against the side walls. The windows are located only on the left side and they allow the lighting of the whole hall. From the comparison of the drawings we have found some relevant differences between the design and the actual state. In particular the main staircase of the entrance as a different configuration. Fabiani, in fact, drew a double staircase, to go upstairs and downstairs. Now the staircase is only for going upstairs, but probably the actual solution was realized by the architect itself, with a variation of the design during the construction.



Figg. 15, 16: Comparison between drawings: longitudinal section by Max Fabiani and rendering of the actual state (from left to right).

Some other differences are in the underground space: in fact it is divided in more parts, separated by an interior wall, and there are different ways to reach it. It is due, perhaps, to the subdivision of the building during its history, and for different uses.
From the original drawings we can find also an interesting solution over the flat floor, that now is not present anymore: a small tower with a pitched roof and an exterior refinement with horizontal slabs, exactly located over the helical staircase. We can suppose that the first intention of Fabiani was to create a way for going outside from the theatre, maybe to be used in some particular events. Although there is no trace of this solution in the building, we can hypothesize either they never built it, or – as it was partially destroyed during the War – that this tower was built but then not realized after the destruction.




Figg. 17, 18: Digital simulation with Texture Mapping and Global Illumination algorithm of the main entrance and the hall towards the stage.

4. Digital reconstruction

The next step was the 3D digital modelling of the building, trying to mix the survey data – measures and photographs – with the ones from the original drawings.
The graphical primitives used were mainly the vertical and horizontal extrusions, composed with Boolean algorithms for generating holes (such as windows, doors, etc.) and unifying the single parts together. Some detailed elements required some advanced algorithms to describe with great precision the decoration.
For example the railing of the upstairs balcony, or the one of the elliptical staircase were constructed using a loft procedure that interpolates variable sections along an extrusion path, adapting the morphology to the measurement taken from the survey. As shown by the rendering images, there is a strong similarity with a photograph, thanks to some details that usually are not considered during the 3D modelling phase of an architecture, such as the handles of the windows, the small lamps on the ceiling, the curtains with folds.
After having generated the 3D model, we decided to control the quality of the representation using Global Illumination algorithms for the simulation of the natural light. This procedure allowed us to simulate not only the direct light coming from the windows, but also the indirect illumination of the walls that are not touched by the sunlight. So the typology of shadows, and the quality of chiaroscuro are really impressive and very similar to the reality.
The last step was the application of texture maps and the realistic simulation of the space. We decided to refer to the photographs taken during the survey, and reply the same visualization as if it was already restored.
In particular we used colours and materials – for example the same strips of wood present in the floor, but as if they were cleaned – to have a verisimilar perception of the appearance of the theatre, finalized to prepare a sequence of frames for generating a simulation: a virtual visit to this architecture by a spectator, who arrives to see a performance with actors in the flesh.




Figg. 19, 20: Digital simulation with Texture Mapping and Global Illumination algorithm of the back of the hall and the view from above.



Fig. 21: Digital simulation with Texture Mapping and Global Illumination of the Petrarca Hall.

5. Video animation and 3D real-time simulation

As we have introduced in the preceding chapter, the construction of the digital scene was finalized to simulate a real perception of the space. In particular the idea was to present the research to a public audience, by involving the visitors into the new configuration.

To have a real experience of it, we decided to use two different technology: on one hand a simple animation – generated compressing about 5,000 frames into a video; on the other one a 3D stereoscopic real-time navigation.

As the animation do not contemplate a particular reorganization of the file – in terms of illumination, application of materials, and so on – but only a key-frame structure to give the software the required input for generating automatically every single frame, we prepared the screenplay thinking to a person entering the place from outside, as if it was a spectator, arriving finally on the stage, as if it was transformed into an actor. The 3D real-time simulation, on the contrary, needs a further preparation of the model – reapplying new compatible textures and studying the illumination setup, as it uses different computing methods to process the digital model. So we have to reconsider all the model, for seeing with a stereoscopic system that simulate the human way to perceive a real scene.



Fig. 22: Frames from the video animation.

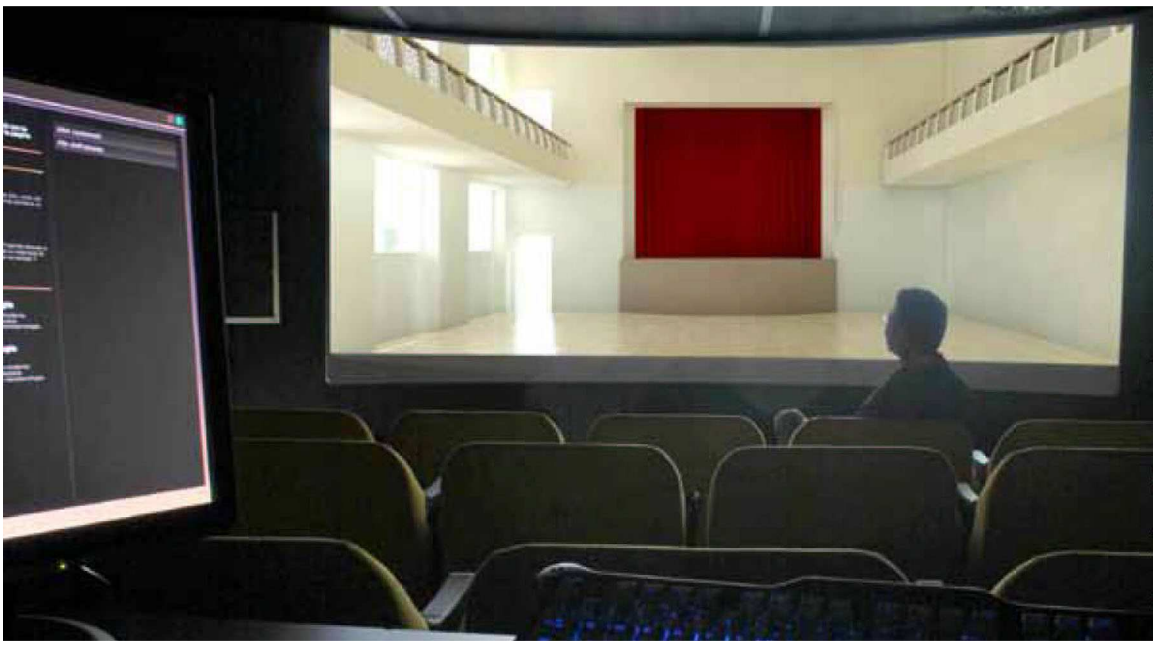


Fig. 23: Real-time simulation of the Petrarca Hall in the 3D Showroom in Area Science Park (elab. Arsenal).

Acknowledgments

This research was scientifically directed by the Dean of the Faculty of Architecture of the University of Trieste, Prof. Giovanni Fraziano, The survey and the 3D visualization were directed by Alberto Sdegno: in particular Silvia Masserano did the two-dimensional drawings and the geometrical analysis (Chapter 3) and Dimitrij Pozar prepared the 3D model and all the rendering images. Both of them were involved in the survey phase. Chapters 2, 4 and 5, were edited by Alberto Sdegno. Finally the real-time simulation was done in Area Science Park in Padriciano by Arsenal, and presented with a 3D stereoscopic installation during è*Storia, VIII International Festival of History*, held in Gorizia between 18 and 20 May 2012, inside the space of Petrarca Hall. We would like to thank Piero Miceu and Marco Jez of Arsenal, for their collaboration to the 3D real-time simulation.

Bibliographical References

[1] POZZETTO, Marco (ed.). *Max Fabiani: nuove frontiere dell'architettura*. 1ª ed. Venezia: Marsilio, 1988. 189 p. ISBN 88-7693-038-8.

[2[AAVV, *Max Fabiani, 1865-1962: Bauten und Projecte in Wien*. 1ª ed. Wien: Architektur-und Baufach-Verlag, 1982. 36 p. ISBN 3854410034.

[3] POZZETTO, Marco. *Max Fabiani 1865-1962. Ein Architekt der Monarchie*. 1ª ed. Wien: Edition Tusch, 1983. 206 p. ISBN 3-85063-124-9.

[4] SDEGNO, Alberto. Percorsi dell'immaginario. La rappresentazione dinamica di architetture non realizzate. In SALERNO, Rossella (ed.). *Teorie e tecniche della rappresentazione contemporanea.* 1ª ed. Maggioli: Milano, 2011, p. 217-230.

[5] SDEGNO, Alberto. Between Design and Survey: Interpretative Problems in the Study of Drawings for Digital Modelling. In AAVV. *Proceedings of MIA Conference - Informative Modelling for the Architectural heritage.* MAP UMR 694 CNRS: Marseille, 2006, p. 39-50.

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FROM POINT CLOUD TO ARCHAEOLOGY: THE CASE STUDY OF VILLA DEI MISTERI IN POMPEII

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Abstract
In the range of actions for the safeguard and conservation of cultural heritage, present computer technology confirm the crucial role of survey among all activities aimed at exploitation, recover and enhancement. As a working group we have carried out a research project, for many years now, on the themes about 3D survey; in particular we are testing the use of mathematical algorithms and programs as an additional tool, in the surveying photogrammetric process, for data mining and interpretation. Among our working experience related to archaeological survey we present a test on the use of the software *Mathematica* for new data processing on *Villa dei Misteri* in Pompeii. In particular we develop some algorithms which allows the semi-automatic extraction of the sections as well as planar surfaces contours and texture mappings (masonry walls, plaster or fresco walls, mosaic floors). The present goal is to complete the data already acquired, developing a speed working methodology which allow the different analysis, such as constructive or stratigraphic, using a 3D GIS, which links 3D objects to data.

Keywords: 3D Survey, Archaeology, GIS, Algorithms, Stratigraphy

1. Introduction
Over the last few years, 3D surveying has taken centre stage in the phases of study of monuments, and generally of archaeological sites and territory, raising a series of questions about the quantity of data that can be automatically acquired, about their management, interpretation and restitution (graphic or not). These questions seem even more delicate in the application of these techniques to archaeology, and they call attention to some points about which there is a lively international debate: the first point concerns procedures and the way they contribute to knowledge in such complex and stratified contexts; a subject that refers to the need to make the different skills interact in order to determine the most suitable methods for answering specific questions. An attempt to manage the application of the new instrumental surveying methods to archaeology is included in the Declaration of Seville [1], in which the need to substantially differentiate procedures according to the contexts in which one works and to the goals one sets, is highlighted. The Declaration also refers forcefully to the question of interdisciplinarity. The process of interpretation and evaluation of acquired information has to correspond to a specific and coherent semantic reading and can't disregard a specific and conveniently focused goal. As previously mentioned, the use and management of 3d models in archaeology requires a continuous debate among professionals working in different sectors, to correctly direct the project of measurement taking, data reading and selection. In this sense, the described operational methods can be considered part of the knowledge process. The second topic of discussion pertains to the efficacy of surveying automated procedures in the presence of bare masonry, absence of sharp edges, different states of preservation of structures, etc. The need to create a three-dimensional model, constructed from a scanning with a 3D laser scanner, seem unavoidable, for the possibilities it offers in terms of dimensional control and for the graphic immediacy. However, especially in the study of archaeological architectures [2], interpretation

problems can arise in the transition from the point cloud to the creation of triangulated meshes: as is well known, the point automatic reduction can modify considerably the morphology of objects, misleading their correct reading [3]. Therefore, even in a period of time in which the possibilities offered by the 3D laser scanner would seem to direct the debate in the opposite direction, it is our opinion that the idea according to which direct survey is necessary and irreplaceable, since it is a moment of objective comparison with real objects, has grown stronger. On the one hand, then, it is necessary that the quantity of information that one chooses to acquire be of quality, that quantity and accuracy in data collection be proportioned to data complexity; on the other hand, it is necessary to bear in mind that the following interpretation phase can't disregard the direct knowledge of what is being surveyed. On that basis, survey procedures discussed here can certainly be considered effective in archaeological contexts. The third topic concerns the advantages offered by using semi-automatic procedures for detecting and drawing different levels and quantities of information, for example, the stratigraphy that characterizes the wall surfaces, included the sections that characterize them. The possibility of producing a three-dimensional model, from a point cloud, and of determining 3d elements to which linking alphanumeric information, integrates – in the archaeological field – the operation of storage and retrieval of data linked to single wall stratigraphic units. In this context we present a research which concern the creation and application of specific mathematical algorithms to the point cloud to extract some 3d elements in a semi-automatic way. In this article we will describe the adopted procedure highlighting the advantages that it can offer.

2. Case Study

Our test site is a masonry portion of the Peristyle of Villa dei Misteri in Pompeii, surveyed in 2006 by an interdisciplinary working group of the Dipsa of the Roma Tre University, whose members are Prof. Diego Maestri – scientific supervisor– the authors (Marco Canciani, Giovanna Spadafora), Prof. Rodolfo Maria Strollo and the archaeologist Domenico Esposito of the Soprintendenza Archeologica di Pompei [4]. The survey carried out in 2006 was made integrating instrument and direct techniques, through the use of photogrammetric software for section drawing and masonry surface characterization. The aim of the survey carried out in 2006 was to have the geometric and spatial knowledge of the Villa, in which no measurements had been carried out after the surveys conducted by Amedeo Maiuri who, in 1931, published: a ground plan, a phase plan and a section.

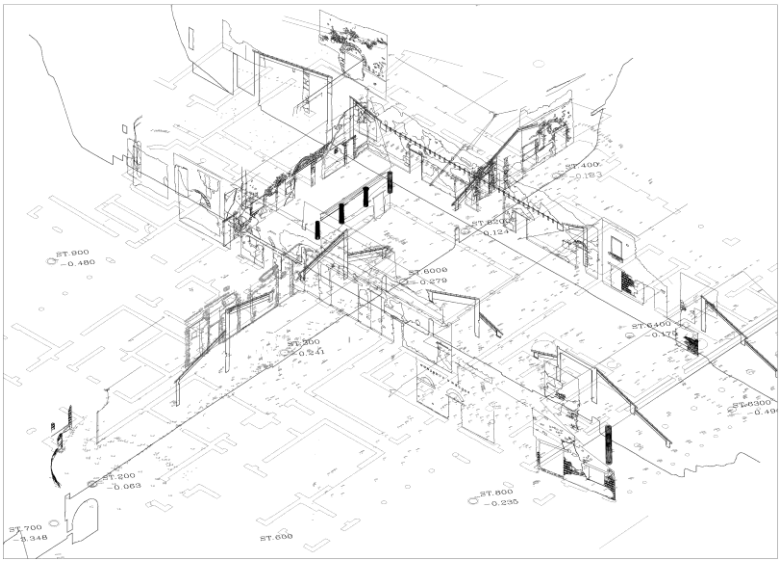



Fig. 1: Villa dei Misteri. View of the 2,5D model (photogrammetric restitution of the elevations with some sections)
Fig. 2: Villa dei Misteri. View of the Large Southern Portico.

Our research was aimed at acquiring a wide and up-to-date knowledge of the above-ground structures of the Villa, included the roofs built during the last century and the outer perimeter. Later, in 2009, we were given the task to update drawings, surveying the new arrangement of the terraced levels that surround the Villa and some archaeological remains emerged during the works of slope stabilization and of construction of the new access to the area: some columns of the Large Southern Portico and two old roofs belonging, respectively, to a southern and a northern room of the Villa. In all, we produced: a general planimetry of the excavation area, plans, elevation drawings and some sections at a scale of 1:50. For the purposes of our research, whose first results are presented here, we

produced an image-based three-dimensional model, following procedures which connect several frames and render a point cloud on which it is possible to construct a textured mesh. These procedures need to be accurately checked and produce optimal results if they are integrated with data obtained through measurements carried out with other methods; in this case, we already had a series of data accurately surveyed in 2006, to which we referred to compare and evaluate the adopted procedures.

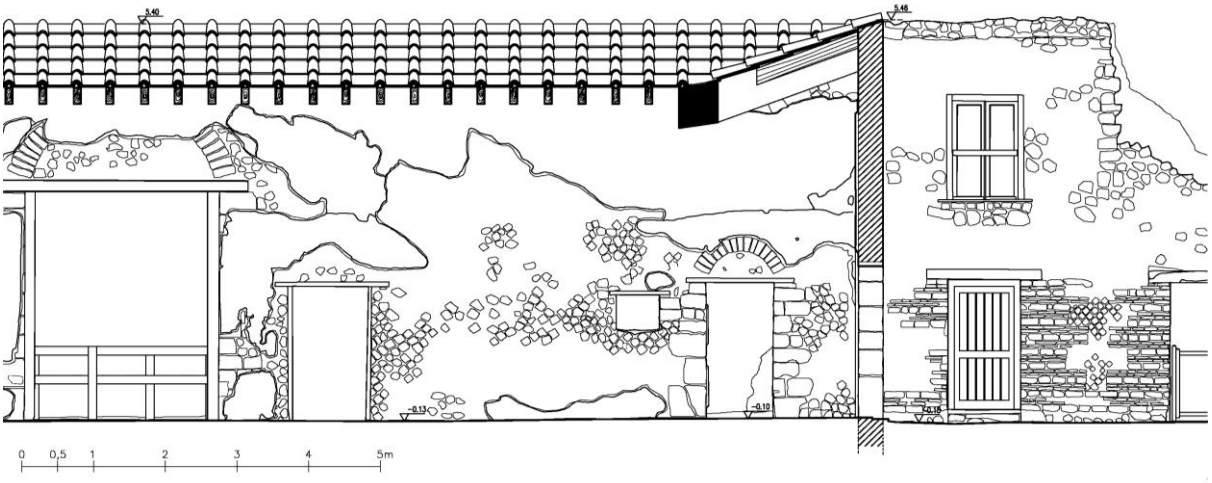

Fig. 3: Villa dei Misteri. Section of the Large Southern Portico (at left) and the kitchen (at right).

3. Related works

3D surveying techniques produce a large amount of data: point cloud, mesh, texture, etc. [5] [6]. In Archaeological site, the data collection is greater because the information to be acquired are more complex. It is very important organize this kind of data (picture, text, documents, ecc.) for example to integrate information gathered in previous excavations [7]. To combine 3D survey, spatial analysis and data, we use an Information System [8] but there are more examples of AIS (Architectual Information System) [9] [10] [11] in which the three-dimensional model of the building is connected to a database. In this work we use a 3D GIS to collect information about stratigraphical unit (S.U.) as in the study of Drap: "Going to Shawbak and getting the data back" [12]. According to our previous work, in this paper we talk about algorithms to extract section directly from point cloud [6] [13]. The next step of our research is how to introduce a semi-automatic segmentation process to define 3D object linked at database. Many algorithms have been developed for the segmentation of point clouds, less studied are methods to segment point clouds without creation of surfaces [14] [15]. Usually this kind of segmentations are used for airborne Lidar systems in wich points were grouped by using variation of the X Y and Z coordinates [14]. Many studies use the Douglas-Peucker algorithm [16] and produce short and long segments typically for distinguishing roofs from other surfaces. In our case study we need a similar segmentation of point cloud, so we use the variation of first derivative to have different objects that may be useful to identify the stratigraphical units.

4. The proposed methods and procedures

The method we propose tries to keep innovative and traditional survey methods together, starting with the assumption that survey procedures have to combine quickness and accuracy characteristics with real object correspondence and representation.

3D survey systems make it possible to obtain a survey that satisfies the first two conditions, concerning quickness and precision in the data acquisition phase, following a partially automated process, whereas traditional direct survey enables the fulfillment of the second two conditions, allowing, in the data processing phase, a description of the object most significant details, on the basis of a representation possibly more similar to the object.

The three-dimensional object, firstly processed as point cloud and later as textured triangulated mesh (realized by image-based and range-based procedures), and detailed through its particulars direct surveys, is the ***core*** of the whole process.

It is possible to extract both the dimensional data and the intrinsic features of each element from the object in every phase of the process, and it is also possible to link additional textual data. This method integrates and reprocesses the documentation produced in previous excavation campaigns, pursuing two specific goals: on the one hand, to organize data according to a GIS-based classification related

to single elements and, on the other hand, to develop the graphic restitution using new information and different procedures.
The Geographic Information System is structured on the basis of a series of 3D elements (environments, masonry walls or its specific layers), geo-referenced in a system of spatial coordinates, which are made to correspond to a well-structured database. The system that we have adopted, has been developed within the Revit software (by Autodesk) where it is possible to connect 3D objects (point clouds or triangulated mesh elements each), to a structured database and perform the queries on data.
This system allows to support the analysis normally performed in the field of archaeology, in particular those concerning the critical survey [17] [18] and analysis of the stratigraphy of the masonry walls [19] [20] [21].
Compared to the GIS systems now commonly adopted in the archaeological field, referred above, which substantially use two-dimensional objects (orthophotos, 2D cad drawings, such as [22]), the method we propose, following the one studied by P. Drap, [12] uses objects that maintain the three-dimensional information during the whole process. For example, a construction layer of a masonry wall is defined through a 3D object, whose visible parts are defined with a textured triangulated mesh, and, the parts of contact with other layer are bounded by a flat surface. 3D elements describe built structures such as masonry, floors or coverings, broken down into single parts related to specific components, such as wall statigraphic units, architectural elements and details etc. The database is structured on the basis of the forms provided by the Soprintendenza Archeologica di Pompei and organized according to records, related to the single components, and fields, concerning specific features.
3D data processing allows the implementation of the graphic restitution, through a feature extraction process, based on algorithms described below, and focused on three features: sections, surface contour and masonry textures. The sections, useful to define the path in the depth of the elements (according to the algorithm, referred in [13]), are processed on several planes developed perpendicularly to the plane of the element's largest surface. The contour, applied to continuous surfaces of wall and floor structures (for example, plaster layers, frescoed walls, floors and mosaics), makes it possible to define the extent and structure/shape of the elements referable to flat surfaces, with constant thickness and section. The masonry texture, useful to define the construction type and the tipical size and profile of bricks and mortar layers, is extracted according to the procedure that uses the algorithm described below.
The procedures of our proposed method can be divided in three distinct phases:

first a **data acquisition phase**, obtained through: a topographical survey for the general reference frame and the orientation of the specific surveys; a photogrammetric process of several images of each defined element (wall, floor, architectonic detail); a traditional direct survey for the architectonical details.
Secondly a **data elaboration phase**, which consists of: definition of the reference system as deduced from the topographical survey; specific photogrammetric georeferenced models restitution; models segmentation in elementary components; features extraction; planes of sections definition and their profiles; 3D GIS definition through the links of the 3D components to the corresponding database.
Finally a third **phase of graphical restitution** which is referred to: 2D graphics elaboration with respect to the chosen section planes; 3D elaborations, with thematic analysis, using GIS queries.

5. Algorithms for features extraction

As previously mentioned, our goal was to create a mathematical algorithm able to detect, automatically, areas with plaster or fresco fragments on walls, to draw the relative cross-sections and to obtain a redrawing of the unplastered masonry portions.
We have implemented some algorithms for segmentations of walls at different levels of accuracy, detection of contours and brickwork weaving using smooth section curves.
Smooth section curves are calculated directly from the point cloud [6], without the use of a triangulated surface, using a regular plane parametric curve which fit the closest points projected to any given plane.
We have started calculating a reference plane as close as possible to the largest wall layer: first we find vertical sections of the wall and take a segmentation of each section detecting high and low derivative intervals; secondly we select the longest intervals with almost constant value which should belong to the largest layer. Finally we take the best plane for the longest intervals of all the sections.
Given such a reference plane we have recalculated and segmented, with higher accuracy, the wall orthogonal sections taking one axis along its normal (see fig. 4). Using the segmentation procedure we are able to detect different wall layers for which we calculate contours and inclinations with respect too the reference plane (see fig. 5).

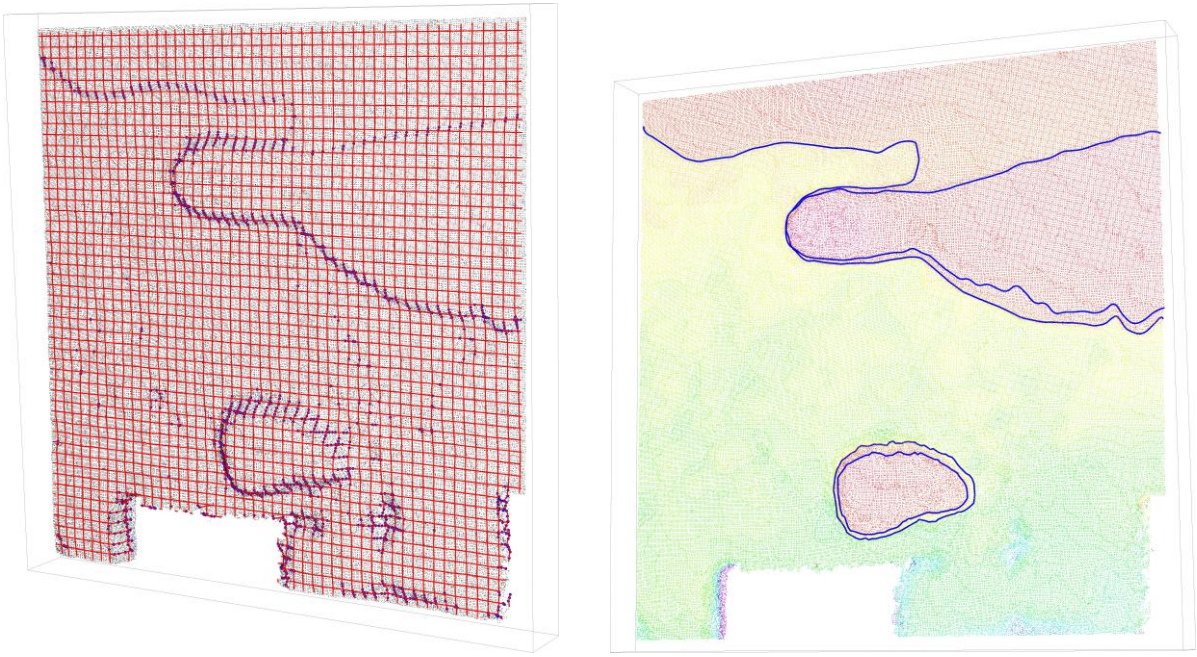

Fig. 4: Orthogonal parametrical sections: the blue dots represent high derivative along the section.
Fig. 5: Wall layer contours: background colors represent different distance from a reference plane.

Another algorithm is related to the analysis of brickworks trying to detect differences in brickwork weavings starting from brick detection. The problem of detecting singular bricks is not easy to solve (see for example [23]): we have tried several solutions starting from a given picture (see figg. 6, 7).

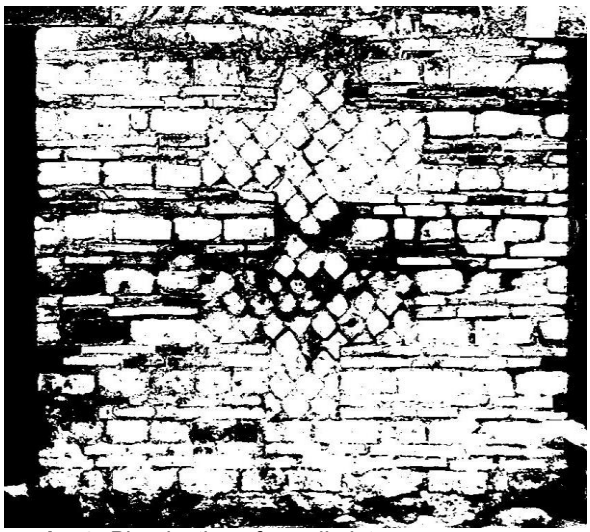

Fig. 6: Binarization of a wall picture.

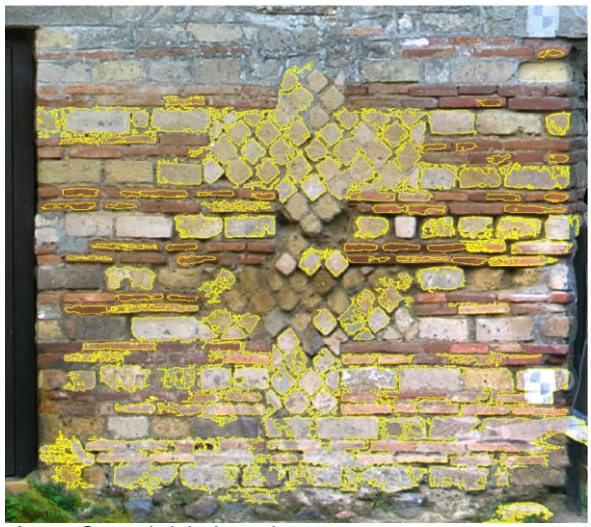

Fig. 7: Some brick detection.

We have implemented a rough procedure to detect some of the bricks or stones in a given picture: We produce a segmentation of the picture looking for morphological recognition of some pattern: starting from a binarization related to a convenient threshold for a defined distance from a chosen color (see fig. 6). This procedure needs to be polished and optimised (see fig. 7).
We are studying a more efficient way of integrating different methods for edge detections in pictures and point clouds, using the information on color gradients and point normals which are present in a textured point cloud of the given wall.

6. Representation

Regarding the representation, just because the problem that arises isn't only of a technical or technological nature (related, for example, to accuracy or detail definition) but it's rather a **problem of selection and interpretation**, we have explored this aspect, trying to support this process of filter and interpretation of data.
Whereas on the one hand **three dimensional models**, organized in a GIS, allow an easy and immediate consultation, presenting a simulation of the real object, being more and more close to the

object; on the other hand, the **two-dimensional drawing** makes it possible to give a description of the object, which is more commonly understandable and more selective, highlighting, from the huge quantity of data, some specific features, relating to the section plane and the elements in projection and excluding other ones, for an as focused as possible data interpretation.
The proposed graphic elaborations are developed entering two series of data: the first one is related to the extracted features (characteristic sections, masonry or floor surface contours and textures, in order to describe in detail and spatially the represented elements; the second series concerns data connected to elements and is filtered according to specific themes (masonry types, wall stratigraphic unit, historical dating, etc.).
The **first graphic type**, referred to the structure's geometric-dimensional description, is developed in 2D along the choosen section plane using the orthographical view of the texturized model. Moreover on this model we insert several information extracted by semi-automatic procedures, which we propose, such as: some sections elaborated *in situ*, which are useful to underline the differences of surface depth, contours for layer or different wall elements detections, wall textures necessary to classify different type of constructions (see figg. 8, 9).

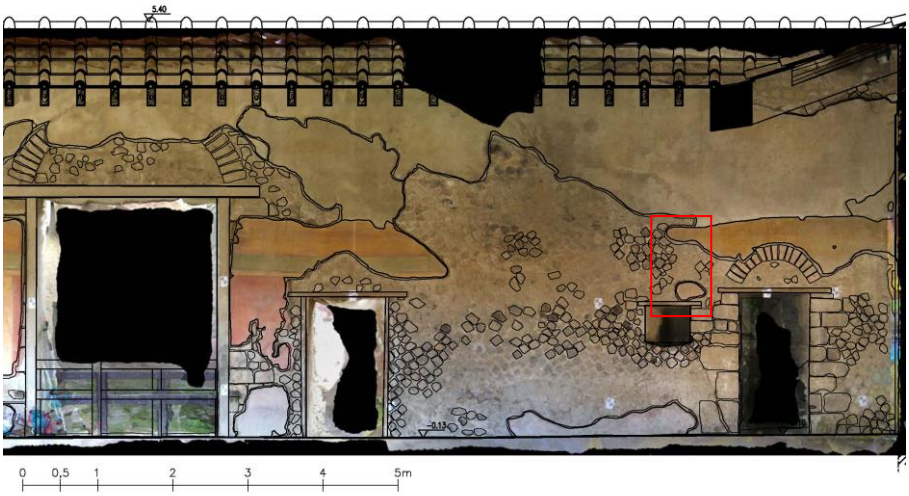



Fig. 8: Section drawing superimposed with the orthographic view of the 3D model.
Fig. 9: Detail with section *in situ*

The **second graphic type** refers to the structure's analytic studies and is developed in a 3D environment, using data linked to each element to produce a graphic of analytic type on which one can define the specific features selected in the database fields (see figg. 10, 11).
In this way our works highlight, directly on the 3D models, the analyzed classifications (for instance different wall stratigraphic units), without the bi-dimensional reduction with the necessary perimetral redrawing on a plane.

7. The achieved results

Over the last few years, our research group has constantly pursued the purpose of obtaining a graphic representation of the surveyed object that could focus all collected information on it, through a system of signs that can be immediately interpreted.

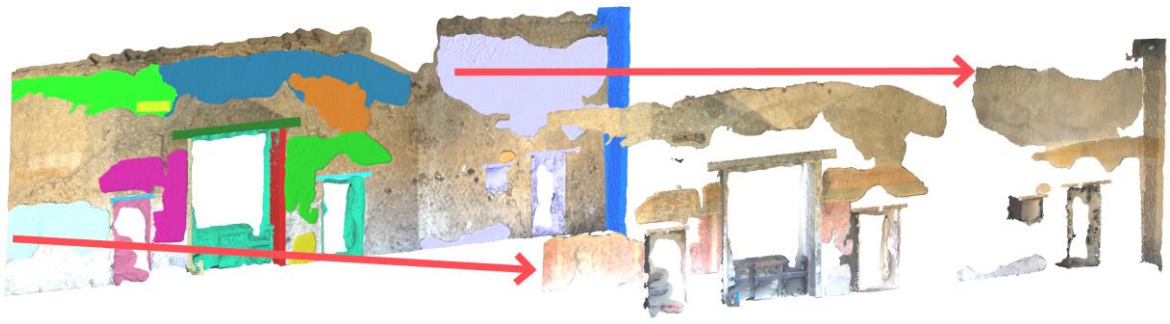

Fig. 10: View of the **3D** model with some highlighted elements

Paradoxically, this purpose, which architects specialized in survey have always had, has been made more complex by the amount of data that nowadays are at surveyors' disposal. The process of selection of what has to be measured doesn't take place anymore upstream but downstream, shifting the problem of the selection of what has to be taken into consideration and then represented, from real space to virtual space.



Fig. 11: View of **3D** model of the masonry wall with an element linked with data form.

The point that is essential for the specificity of our field of expertise is, instead, to work in order to obtain a graphic representation which expresses just the interpretation of data, i.e. which is the result of a process of analysis, selection and synthesis of complexity and not the reproduction of the status quo. The graphic representation process is, then, an essential moment of summary and control based on conscious choices which determine what to discard and what to represent.
In this sense, we are working to create a semi-automatic system of extraction of the plastered surface contours and redrawing of the masonry types. The "semi" prefix reduces the predominant use of automated processes and claims the fundamental role of an accurate evaluation.
Also for the redrawing of the masonry type the aim isn't – and couldn't be – to slavishly redraw all components, but to detect the type and the main constituent elements (such as the size of bricks and of mortar layers). It isn't possible not to recognize that the extraction of these data – also useful for the relative dating – reduces the time it takes to produce a two-dimensional drawing and to count.
We agree that IT tools haven't to be considered as displaying tools any more, but as information and content gatherers [3], letting the two-dimensional drawing have the privileged role of summarizing and representing the complex analysis and interpretation work that was done.

Bibliographical References

[1] The Seville Charter: International Charter for Virtual Archaeology, *revised version, July 2010 published on the International Forum of Virtual Archaeology website <http://www.arqueologiavirtual.com/forumcronogramaing.php>*

[2] CAIROLI GIULIANI, F. *Archeologia e documentazione grafica,* Roma: De Luca Editore, 1986.

[3] BARATTI, G. *Verso un approccio archeologico al rilevamento e alla modellazione tridimensionale*, "LANX" 13 (2012), pp. 11-26

[4] SPADAFORA, G. CANCIANI, M. MAESTRI, D. *The integrated survey for the knowledge and the documentation of the archaeological heritage: the "Villa dei Misteri" in Pompei*, in The Cipa International Archives for Documentation of Cultural Heritage, vol. XXI-2007.

[5] RUSSO, M. REMONDINO, F. GUIDI, G. *Principali tecniche e strumenti per il rilievo tridimensionale in ambito archeologico,* in Archeologia e Calcolatori, 22 . pp. 169-198. ISSN 1120-6861, 2011.

[6] CANCIANI, M., FALCOLINI, C., SACCONE, M., SPADAFORA, G.: *From point clouds to architectural models: Algorithms for shape reconstruction*, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-5/W1, 27-34, doi:10.5194/isprsarchives-XL-5-W1-27-2013, 2013.

[7] SEMERARO, G., PECERE, B., MIANULLI, A., *Applicazioni Gis alla Ricerca Archeologica: Il Santuario Di Tas Silg a Malta*, 2012.

[8] MEYER É., GRUSSENMEYER P., PERRIN J.-P., DURAND A., DRAP P., *Integration of heterogeneous cultural heritage data in a web based information system: a case study from Vianden Castle, Luxembourg.* Proceedings of the Computer Applications and Quantitative Methodsin

Archaeology 2006, "Digital Discovery. Exploring New Frontiers in Human Heritage", Oxford: BAR International Series, 2006
[9] DE AMICIS, R. CONTI, G., GIRARDI. G., ANDREOLLI. M., *3d Webgis And Visualization Issues For Architectures And Large Sites*, 2011.
[10] BRUSAPORCI, S. CENTOFANTI, M., *Sistemi Informativi Architettonici per la gestione, tutela e fruizione dell'edilizia storica,* in Atti 16ª Conferenza Nazionale ASITA, Vicenza, 2012.
[11] CENTOFANTI, M., CONTINENZA, R., BRUSAPORCI, S., TRIZIO, I., *The Architectural Information System Siarch3d-Univaq For analysis And Preservation Of Architectural Heritage*, ISPRS-The international archives of the photogrammetry remote sensing and spatial information sciences. Vol. XXXVIII-5/W16, 2011.
[12] DRAP, P., SEINTURIER, J., CHAMBELLAND, J.C., PRUNO, E., *Going To Shawbak (Jordan) and getting the data back: toward a 3D GIS dedicated to medieval archaeology*, in Proceedings of 3D Arch 2009, 3D Virtual Reconstruction and Visualization of Complex Architectures,Trento, Commission V, WG V/4, 2009.
[13] CANCIANI, M. SACCONE, M. *The use of 3d models in integrate survey: the church of st. Thomas of Villanova in Castel Gandolfo*, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XXXVIII-5/W16, 591-597, doi:10.5194/isprsarchives-XXXVIII-5-W16-591-2011, 2011.
[14] HU, X. AND YE, L., *A fast and simple method of building detection from lidar data based on scan line analysis*, ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci., II-3/W1, 7-13, doi:10.5194/isprsannals-II-3-W1-7-2013, 2013.
[15] MELZER, T. *Non-parametric segmentation of ALS point clouds using mean shift*. Journal of Applied Geodesy 1 (3),159–170, 2007
[16] DOUGLAS, D., PEUCKER, T., 1973. *Algorithms for the reduction of the number of points required for represent a digitzed line or its caricature*. Canadian Cartographer, 10(2):112–122.
[17] CARBONARA, G., *Restauro dei monumenti, guida agli elaborati grafici*, Roma, 1985.
[18] DOGLIONI, F., *Stratigrafia e restauro, tra conoscenza e conservazione dell'architettura,* Trieste 1997.
[19] HARRIS, E.C., *Principles of Archaeological stratigraphy,* London 1979, (trad. Ital. D. Manacorda, Principi di stratigrafia archeologica*,* Roma 1983).
[20] FRANCOVICH, R., PARENTI, R., a cura di, *Archeologia e restauro dei monumenti,* I Ciclo di Lezioni sulla Ricerca Applicata all'Archeologia, Certosa di Pontignano (Siena), 28 Settembre – 10 Ottobre 1987, Firenze 1988.
[21] BROGIOLO, G.P., CAGNANA, A., a cura di, *Archeologia dell'architettura metodi e interpretazioni,* Firenze 2012.
[22] ALAGNA, A., *Stratigrafia per il restauro architettonico, il metodo dell'analisi stratigrafica delle superfici murarie per la conoscenza e la conservazione del costruito storico,* Roma 2008.
[23] SITHOLE, G. *Detection of Bricks in a Masonry Wall*, in The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*.* vol. XXXVII*. Part B5.*

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Cultural Heritage.
Best Practice and a new proposal.

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Abstract
To be a member of UNESCO, a site must be an extraordinary example of an architectural and landscape group, or it must be rich in geomorphological process, which represents a typical period of human history or of an anthropological culture.
Survey suggest a comparison between two topics. Among them, one is already part of UNESCO and is recognized as best practice. This site is analyzed whether through architectural, landscape and cultural characteristics or by analyzing both strategies and retraining interventions, together with sustainable promotion interventions which are brought about.
The other site, which isn't in UNESCO yet, is chosen in order to recognize all the typical characteristics able to highlight the promotion of the heritage.
Once checked out the standards from the best practice, a management strategy is supposed to be done also in the second one, which involves not only the technician but also the inhabitants.

Keywords: Avola, Alto Douro, UNESCO, cultural tourism, heritage

1. A potential candidate: Avola, Siracusa, Italy (1)
Going back to the date of reconstruction of the different centers of the Val di Noto, following the 1963 earthquake, it is important to consider the architectural and urban, agricultural and landscaping character, to enter the town of Avola in the list of centers valley.
Therefore, it is interesting to identify the many qualities that characterize this site to create the basis for a useful research to understand and highlight the real possibility of its desirable insertion of UNESCO sites already existing in the south-eastern Sicily.
The eight towns in south-eastern Sicily included in the list of UNESCO World Heritage sites, and members of the Val di Noto, are: Caltagirone, Militello, Catania, Modica, Noto, Palazzolo, Ragusa and Scicli, all rebuilt after the earthquake of 1693.
"*They represent a considerable collective undertaking, successfully brought to a high level of architectural and artistic fulfillment. Keep within the late Baroque, they also describe particular innovations in urban planning and construction of the city."*
To enter these cities in the world heritage, it is necessary that they represent *" a remarkable testimony to the exuberant genius of late Baroque art and architecture and the 'development project to be an example in this area permanently at risk of earthquakes and eruptions from part of Etna. "*
Unfortunately, as emerged from the research and collected in the results that follow, the site of Avola, identified for its extraordinary scenic beauty and the uniqueness of its formal urban plan as another possible candidate to be included in the list, it was not considered suitable to be inserted between the other centers heritage of the Val di Noto. Avola, a town flat wet to the east by the Ionian Sea, is surrounded to the north-west by the Iblei chain, is located about 40 m above sea level. Its territory lies between Cassibile and Asinaro rivers.



Fig. 1: Territorial framework of Avola in Sicily, Italy

Its name originally was *Abolla* or *Abola*, of Arab origin, after it became *Castrum Hiblae* or Castrum Abulae. The Arabs have also changed the name of *Hybla* in the Ab, the Normans in *Abola* and, finally, with the Angevin have definitely changed in Avola. Then, the city has become marquis under Aragonese rule and remained so until the earthquake of 1963.
The present town is built in the early eighteenth century, after the destruction of the old Avola. In sixty years, the new country-city center, since 1756, has indeed become a much more extensive reality.

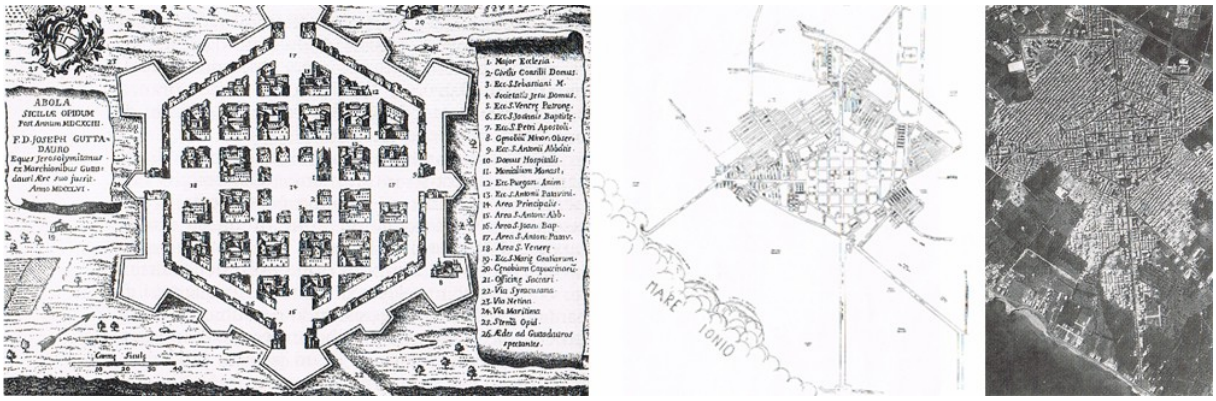

Fig. 2: The evolution of the city of Avola

After the disastrous earthquake, some of the cities destroyed were rebuilt on site, while others, among them Avola, were rebuilt in other safer areas for the protection of the inhabitants from future seismic risk. This choice derived from the complete destruction of the buildings, due to their placement on the slopes of a limestone soil unable to resist the violence of the earthquakes: so, the underlying coastal plain was certainly good for its greater elasticity.
So, Avola is not a city prone to seismic risk and this is, therefore, one of the reasons for exclusion from the centers of the city of Val di Noto, declared a World Heritage Site.
Another aspect that, for this purpose, is not good for the city of Avola is the fact that the Management Plan of the UNESCO World Heritage Site considered for this research, raises the need to clearly identify, for the possible inclusion of a center in the World Heritage, a late baroque architectural and artistic style: not coincidentally, the title of this UNESCO World Heritage Site Management Plan is *Late Baroque Towns of the Val di Noto*. In fact, while the reconstruction phase of the centers included in the list is configured through a decidedly and richly late Baroque style, manifested in sacred and profane buildings, both public and private, the same is not true of the avolese style, that in general is more sober and straightforward. The studies and observations allow to conclude that the origins and architectural presence of Avola are too modest compared to those present in other towns in the valley, and they are characterized, above all, by a simple peasant or craftsman architecture. Too bad, very

few are considered, among the public buildings, the important and representative examples of architecture made with a late Baroque style.
Among the examples worthly of mention, emerges the Church - Abbey of SS. Annunziata, declared a national monument: it is, in fact, a typical Baroque building, featuring a façade embellished with two semi-plastic orders. The church, with its magnificent façade concave - convex, built starting in 1753, is still considered one of the most beautiful and accomplished expressions of the Baroque in the Val di Noto. However, it may be interesting to note, as can be seen at the website *www.patrimoniounesco.it* , that the cities of Modica, Palazzolo and Militello, have only two churches built in late baroque style. But this observation does not detract , however, the town of Avola from the fact that it has been rebuilt in a safe condition from the point of view of seismic risk. This fact suggests, therefore, the need to draw a route describing, making justice,of this center's identity, and the need of a research focusing on the important points to observe and investigate, and therefore useful in order to declare the city in the UNESCO World Heritage Site. Today, the increase in Avola building is impressive, especially thanks to the tenacity, temperament and work of avolesi citizens, very determined to achieve this goal.
Not surprisingly, the emblem of Avola depicts three bees flying at the foot of some hills to express the typical industriousness of its citizens.



Fig. 3: To the left, the Church of SS Mary Annuziata - to the right, the emblem of Avola

Among the selection criteria, in order for a site to be inscribed in the World Heritage List,
there are several aspects that identify Avola as suitable site, including *to represent a masterpiece of human creative genius,* and the need to prove that *a site is a place of major interchanges of human values, over a span of time or within a 'cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design*: it is enough to think about its unique urban hexagonal plan or about the important Nature Reserve of Cavagrande;
it is also necessary that a site is *an outstanding example of a traditional human settlement, the use of local resources or marine […]*, and in this regard it is sufficient to look at the extraordinary production of typical local products, such as Avola's almond or Nero d'Avola wine,known throughout the world for its unique characteristics, that distinguishes them.
There are many features that seem important to emphasize urban planning and production, and also historical – artistic aspects, for the possible inclusion of Avola in the heritage of 'UNESCO.
To achieve this goal the citizens, including the President of the Proloco Giuseppe Corsico, show a lot of commitment, enthusiasm and interest.
Urbanistically, between the potentially cities UNESCO presenting geometrical characteristics very similar to those of Avola, and which may present some possible common points to be taken into account for the insertion site of the object of study within the World Heritage, are surely reported the cases of Palmanova and Grammichele.
The hexagonal pattern of a fortified city, which Avola has got, is considered, in the nineteenth century, able to defend the city from enemy attacks, and it was used in Europe since the sixteenth century.
So, in addition to Avola, the other existing cases with hexagonal plant are Palmanova, urbanistically resolved in 1593 with the radial system, and Grammichele, which in 1693, was designed at the same time of the town of Avola. Palmanova, Friuli city-fortress in the shape of a nine-pointed star built by the Venetians in the late sixteenth century, still preserves the original topographic system, with roads that

converge radially from the walls and the ramparts in the central Piazza Grande: its square, which has the form of a hexagon, is different from the avolese central square, which is quadrangular. Palmanova, declared National Monument, is part of the UNESCO World Heritage. Grammichele, as Avola, is a Sicilian town, and it is instead located in the south eastern side of the province of Catania.
From these comparisons, it is important to emphasize the possibility to admire the city of Avola as unique and unified artistic product, thus able to compensate the absence of magnificent buildings like those that are in the other cities in the Val di Noto.



Fig. 4: The comparison between the plant of Avola, Palmanova and Grammichele

In this regard, some authors say that this choice has been determined by the expressed desire to give greater force to the layout system of the city, thus voluntarily placing overshadow the architectural singularity that would distract the viewer from the original plant.
Analyzing the plan through simple geometric and structural patterns, extrapolated from this carried out research, it is clear that the orientation responds to the dictates of the Vitruvian city.
The two primary roads and perpendicular, a Greek cross forming the *decumano* and the *cardo*, meet in the large square and define the epicenter of the town: along the cardo are placed the most representative buildings of the city.
It is possible to read and to report the presence of five large squares, covered by the orthogonality of the principal axes, and the system of the four smaller squares, placed on the vertices of the large quadrangular square.
Archeologically, in 1955, the important work of excavation begun, from which is derived the discovery of several archeological remains, including, very importantly and found on the beautiful Ionian avolese coast, a dolmen, whose name is *Ciancio Dolmen*, which is a Neolithic prehistoric monument, probably early built as necropolis, but later used as a dwelling containing ten small niches rituals. It is part of several discoveries distributed in the region and, in particular, relating for the most part to the province of Syracuse.

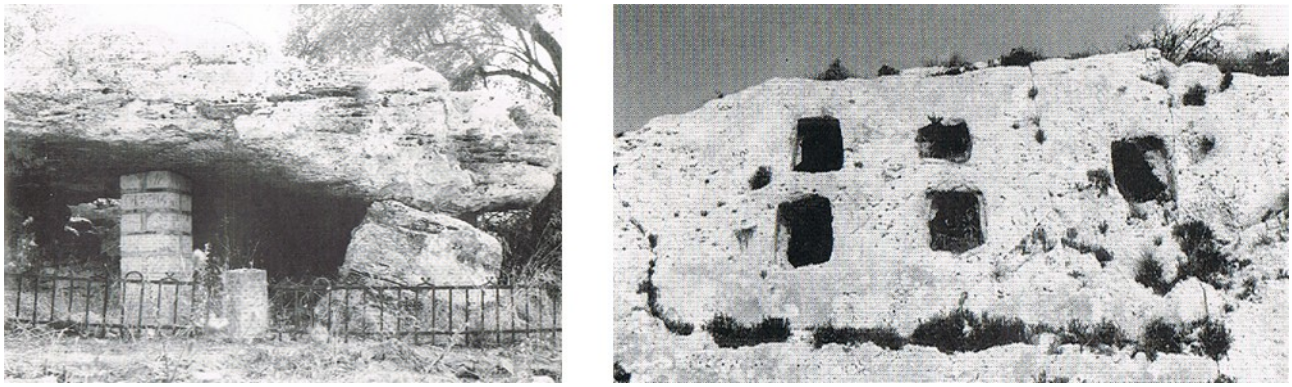

Fig. 5: On the left, Tombs of the X and IX century. B.C. – On the right, the Dolmen Ciancio

Scenically, as it emerged from a brief interview to the President Proloco of Avola, it seems important to point out the natural reserve Cavagrande of the river Cassibile.
This reserve is included in the municipalities of Avola, Noto and Syracuse.
It is a deep valley formed by the continual erosion of the river water, which over millennia has created a series of deep canyon in the limestone soil of the Iblei mountains.




Fig. 6: The Nature Reserve of Cavagrande

In the valley, there is a complex system of small waterfalls and natural reservoirs often bathing: it's possible admire numerous lakes, with fresh and clear waters, among which stand out for their beauty small lakes near Avola Antica. In addition, on the north side it's possible to see a small cluster of cave dwellings, while in the south, there is a complex system of houses dug into the rock. At the edge of the reserve, in the north-east, there are various ancient necropolis. The reserve was created precisely in order to preserve the different riches of its territory, from a natural, landscape, archaeological and anthropological point of view. Among these, it is sufficient to think that Castelluccio village of Noto, gave birth to a prehistoric settlement that gives its name to an entire type, the so-called Culture of Castelluccio, remembering that we are in the World Heritage Site-UNESCO Pantalica. Very obvious are the natural beauty of Avola, which develop in continuity with the local landscapes and bucolic coastal Sicily, proceeding down to the south, and which represent the important and obvious things in common with some of the centers closest to it, and that are part of the Val di Noto. Along the highway Avola - Syracuse and the road Avola - Noto, you can enjoy the unique spectacle of long and wide expanses of almond trees. Its territory is, in fact, grown mainly in almond orchards, which produce a very fine variety of almond, whose shape, lanceolate and pointed, hence the name ''*pizzuta*''. The almond is a product that makes Avola famous all over the world. There are also olive groves, vineyards and citrus groves. More generally, the territories of the Val di Noto offer typical agricultural products of high quality, such as the red orange of Palagonia, the prickly pears of Militello, grapes of Mazzarrone, oil, wheat and oranges of Grammichele.
From an interview to the President of the Proloco of Avola, Giuseppe Corsico, which involved a major and active sources for the purposes of this research, it's argued that both sites of Cavagrande, partly included within the territory of Avola, and the oasis of Vindicari, which is included within the territory of Noto, and Cava dei Servi, included in the territory of Rosolini, and also the typical products of the southern part of the Province of Syracuse, who are the Avola's almond, ''*femminello*'' lemon and ''*ciliegino*'' tomato of Syracuse, on the initiative of the Pro Loco of Avola and of the Gal Eloro, a consortium based in Noto for the promotion of local development in the area and that consists of the municipalities of Avola, Noto, Pachino, Portopalo and Rosolini, have been included in the UNESCO project to be presented by June 15, 2014, to the Ministry of Agriculture of Rome.





Fig. 7: The typical almod, named ''*pizzuta*'' – the ''*femminello*'' lemon – the ''*ciliegino*'' tomato

2. A best practice: the cultural tourism of Alto Douro in Portugal [2]

Avola's hexagonal shape plan denounces the derivation of the Renaissance type. Instead, the orthogonal urban grid is similar to the urban grids of the other towns inscripted into the UNESCO World Heritage list “Le città tardo Barocche della Val di Noto”. So, even if area inscribed into the perfectly defined hexagonal perimeter, the matrix is open to a linear subsequent urban extension, revealing also a greater cultural sophistication in regard to the radial Reinassance patterns in which the hierarchy of spaces is due to the centrality of a square of buildings and places in a radiocentric sistem, as like for Grammichele and Palmanova. The flat area allows to have a grid almost perfectly oriented in the directions of five of the eight towns of the Val di Noto (Noto, Modica, Ragusa, Catania, Scicli) and tilted about 45° with respect to the other three (Caltagirone, Militello, Palazzolo). So Avola is situated in the same mutual reference and within the network of urban bodies defined by the new cities founded after the earthquake. As previously revealed, the historic hexagonal urban center is not the only peculiarity of Avola. The city, known as the “Pearl of the Ionian Sea” and “Ground almonds in bloom”, it's also characterized by vineyards that produce one of the finest Sicilian wines. Really interesting are also archaeological sites such as the Dolmen, the Roman villas, the tuna and Old Navy and the nature reserve Cava Grande with remarkable landscape and archaeological emergencies.

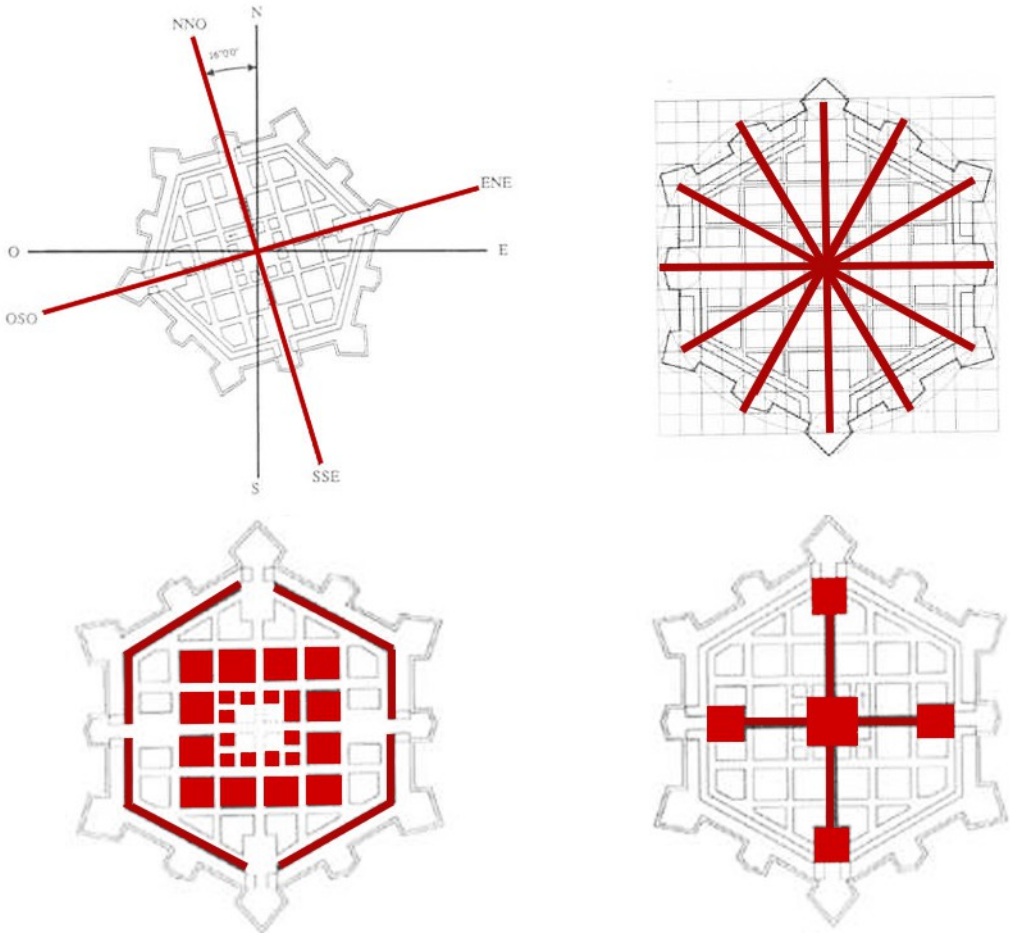

Fig. 8: Geometric interpretative schemes of Avola

In this opinion Avola could be count between those areas setting in the background of the original landscape and environmental excellence, as well as an exceptional offer of Cultural Heritage, witnessed a continuous evolution and merging of peoples civilization which is expressed through unique artifacts and wise use of land.

While not integrated in the list of Late Baroque Towns of the Val di Noto, Avola could be fully included among the UNESCO World Heritage sites of mixed type, as it responds to the dictates of a cultural and natural site, for the management of which is possible to provide differentiated tourism products, relying on the complexity of the spatial features. The aim is to develop a strategic mission of Local Tourist System that transforms the geographical location in a completely usable product, managing the network infrastructure, reception services, access for tourists, consultation between Local Institutions and between public and private. The city might as well take a strategic position in the cultural landscape as rural and cultural tourism destination, the protagonist of an evolutionary process

that the preservation of traditions can go to the enhancement, promotion, up to the definition of a cultural offer wide and varied.
Cultural tourism is in fact a catalyst for new travelers who aspire to explore the places and the cultural and social contexts in order to grasp the essence given by the lifestyle, traditions, art, iconic symbols, from the rural landscape and emergencies and by the flavors of local products. At the base can be proposed a kind of emotional and experiential tourism that poses as legitimate bond between people and places, creating a sort of eternal present and creating a meeting point between the economic and cultural sectors in order to define a sustainable use of the heritage. It creates also valuable capital that increases capital firm to invest in the protection and conservation of natural, cultural and artistic areas of UNESCO Heritage. The emotional tourism brings with itself the logic of the multi-sensory experience, whereby each city or valley become places where you can enjoy an experience of well-being that founds in landscape the ideal scenario because the viewer could play the role of both actor and spectator. Expanding the range of tourist offers, we no longer talk about only visual landscapes, but also about auditory, olfactory, gustatory and tactile evoked by nature trails guided by the sound of the wind, the water, the scents of crops or wild plants, from taste of local products.
Among the UNESCO sites that are already operating according to the logic of multi-sensory experience for the promotion of its territory, for the purposes of this research, the Portuguese region of Alto Douro has been identified as best practice of development and management of the territory, because of its similitudes with the urban area of Avola.



Fig. 9: Alto-Douro Vinhateiro area and Logo

The inclusion of Alto Douro in the list of UNESCO World Heritage Site in 2001 is justified by the criterias iii, iv, v indicate the Region as a producer of wine and historical landscape that has been shaped by human activities and that reflects an evolutionary constant. Even estates, complex wine farm, as well as villages, roads and chapels are the result of this union between man and nature.
The Douro is a river that rises in Spain and flows into the Atlantic Ocean by describing a furrow of 987 km and taking in Portugal on an irregular shape with gradients that reach 400 m. The meeting of the river with the granitic terrain of Paleozoic Era have arisen deep valleys that wise anthropomorphic measures have translated into shale terraces planted with vines. Without sacrificing its original charm, the fragrance and colours, the landscape has undergone a number of changes related to the needs and human intervention, including through the introduction of new farming techniques and modern wine production processes. Over the centuries, the terraces were built with different techniques: datable to the end of the nineteenth century are *socalcos*, narrow and irregular terraces made of slate on which are planted one or two rows of vines; in the immediately following period where built regular shaped terraces with continuous rows of vines.
The new terraces altered the landscape as wider and slightly angled for better sun exposure for screws, small villages, chapels, churches and dirt roads linking the fields. In order to facilitate the mechanization of the vineyard, from 1970, testing techniques of terracing contribute to further modifications of the built landscape. Other typical crops are olive, almond, and orange groves site almond the banks of the Douro. The UNESCO recognition is mainly due to the cultural landscape of

this valley and to its agricultural unchanged over time and specialized knowledge handed down for over 200 years by the inhabitants of this land: it seems that the majority of the grapes was introduced by the Phoenicians. Thanks to the shape of the landscape, characterized by the presence of valleys and uneven ground, along with the abundant water of the river Douro and the fertility of the soil, the cultivation of the vines can perpetuate ancient times. The Atlantic winds are hampered by the mountains *Marão* and *Montemuro* that mitigating climate mainly torrid Portugal, allow the production of Porto, the famous wine.

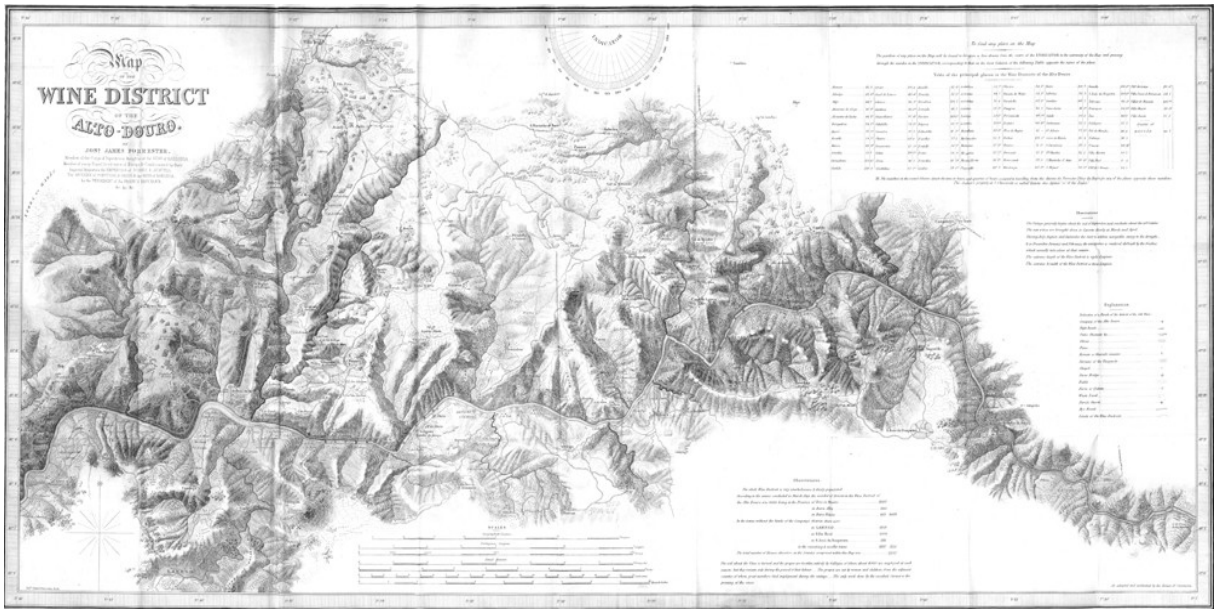

Fig. 10: Historical map of the wine district of the Alto-Douro (J. J. Forrester XIX century)

Beyond the exceptional intrinsic characteristics and anthropomorphic landscape, we want to highlight the practices of tourism development that allow tourists to enjoy the place not as passive spectators, but in an interactive manner, through a multi-sensory and cultural tourism that relies on routes and offers local differentiated products for the revival of historical traditions and cultural values.
Cultural tourism affect first the *quintas* that preserve the history of the country and the secrets of wine making. *Quintas*, major landmarks of the Douro, are readily recognizable as identified by a group of farm buildings around a main house. At some of the oldest of them it's possible to practice *allenoturismo*, thanks to which stay, stroll through the vineyards, visit the sites of production, purchase or taste wines, participate in themed dinners or watch the harvest. Experience, the latter one, which makes the system senses of smell, thanks to the aroma of the vines, hearing and touch, sharing the joy of folk songs, and taste with a glass of wine from the Douro at a glance whole new loaded by the other senses. Tourists can cover different routes of usability that allow to experience the essence of the place through the rediscovery of the commercial, agricultural, historical and artistic traditions.



Fig. 11: Landscape views from *Linha do Douro*

A first route runs along the old trade routes of Port wine with locomotives and carriages to steam and diesel of the twentieth century. It travels to the historic 30 km/h along the *Linha do Douro*, a great feat of engineering, embedded in the natural obstacles with bridges and tunnels.
A second route allows to navigate instead of the Douro by *Rabelo*, typical local boat, or on a boat-hotel, to reach the farms producing Porto Wine and in the meanwhile enjoy the view of one of the most impressive landscapes formed by anthropomorphic rural expanse of vineyards by Barqueiros to Barca d'Alva lining the rocky shores of the river valley.

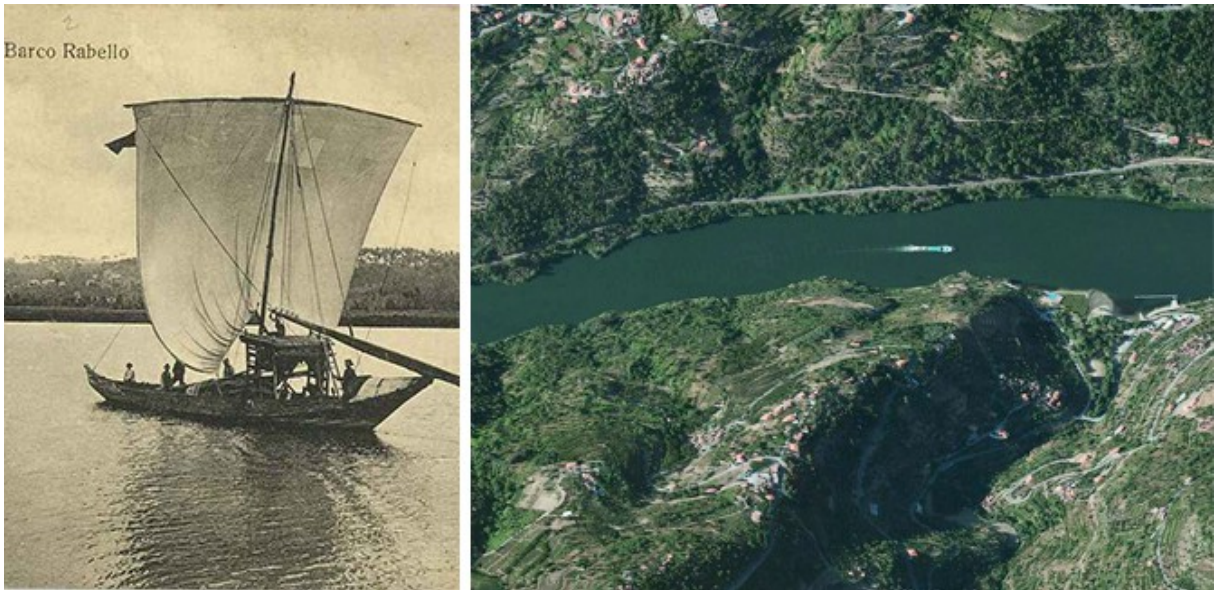

Fig. 12: Traditional Rabelo on the left and view on Douro River on the right.

A third route is finally dedicated to Medieval and Baroque artefacts and cultural sites, from the Monastery of Tarouca, the Sanctuary of *Nossa Senhora dos Remedios* in Lamego, at the *Palacio de Mateus*, Portuguese Baroque masterpiece surrounded by gardens in a large estate and seat of Mateus Rosé wine. Notable examples of vernacular architecture are present along a network of narrow, winding streets.
In this scenario, full of timeless traditions, an important role is played from crafts. Constantly present in any shop they are wooden shoes, metal objects, stone and pottery, baskets and wicker and straw hats, blankets, linen and lace to show off itself during the medieval fairs of crafts and typical food. The popular festivals of the harvest, the cherry blossom, apple, almond, chestnut follow the biological rhythms of crops and the changing of the seasons.
The choice of the development of the area, resulting from the cultural value of the land itself, finds its premises in increasing demand for culture and for the desire to use a place closely linked to the pleasure of immersing in the local way of life and in all that constitutes identity and character. The culture is, in fact, an industry which has a multiplier effect on the economy and monetary social community, as it has significant impact on employment aspects, collective identity and education. In this sense, the tourist offer consists not only in terms of leisure, but in terms of promotion of tourism as a strategic axis of development that is implemented by making multiple system resources, aimed at integrated and unified management of assets.

Register Avola in the UNESCO list would convert it in an attractive cultural and economic magnet founding the exploitation of its territory on the rediscovery of complex vocations of cultural, environmental, and typical handicrafts and agriculture emergencies, as is the Alto Douro .
Thanks to territorial development policies, Avola would come from a fast track within the circuit of the UNESCO towns of the Val di Noto, characterized by its specificity and fitting into integrated development plans. The involvement of neighboring countries through network projects aimed at guiding synergistically international tourism would bring added value to the city and led to the Sicilian territory. Steps in this direction have already been taken by Emilia Romagna and Lombardia with the presentation of the "Quadrilateral Unesco", and Arco Latino sites that focus on common strategies and areas of cooperation between the local communities in order to foster a wider scale local cultural and tourist areas. System through the development of territories from the peculiarities and cultural landscape recognized by UNESCO as World Heritage Sites in a collaborative territorial systems based on shared values.

Bibliographical References

[1] PIGNATELLO, Giuseppe. *Guida di Avola*, Edizione Martorina, Ispica, 1993

[2] Ministero per i Beni e le Attività Culturali. Avvio operativo del piano di gestione del sito UNESCO: le città tardo barocche del Val di Noto, Editoriale Artemide s.r.l., Roma, 2007

[3] PICCOLO, Salvatore. *Antiche pietre. La cultura dei dolmen nella preistoria della Sicilia sud-orientale*, Morrone Editore, 2007

[4] TRIGILIA, Lucia. *Un viaggio nella valle del Barocco: Pantalica, Siracusa e le città del Val di Noto Patrimonio dell'Umanità*, Editore Sanfilippo, Catania, 1954

[5] FIANCHINO, Corrado. *Le fabbriche barocche: conoscenza e recupero ambientale del Val Di Noto*, Editore Alveria, Noto, 1978

[6] TRIGILIA, Lucia. 1963 *Iliade funesta: la ricostruzione delle città della Val di Noto*, Arnaldo Lombardi Editore

[7] www.unesco.beniculturali.it/requisiti-per-liscrizione

[8] www.patrimoniounesco.it/UNESCO/patrimonio_unesco.htm

[9] http://etnaportal.it/avola/santissima_annunziata_badia

[10] http://www.avolesi.it/portale/index.php?spage=cittafortificata

[11] http://www.prolocoavola.it/index.html

[12] http://it.wikipedia.org/wiki/Riserva_naturale_orientata_Cavagrande_del_Cassibile

[13] http://en.wikipedia.org/wiki/Palmanova

[14]http://europaconcorsi.com/projects/174461-Massimo-Gennari-Elettra-Pelli-PIAZZA-CARLO-MARIA-CARAFA-GRAMMICHELE-

[15] http://whc.unesco.org/en/list/1046

[16]http://www.linhadodouro.net/

[17] http://repositorio-tematico.up.pt/handle/10405/1119

[18] http://www.rivistasitiunesco.it/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Pompeii: urban regeneration for cultural heritage.

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Abstract
The subject matter is urban regeneration in support of archeology and cultural heritage in general. Starting from the identification of local resources in the Pompeian area, it's possible develop lines of action for the enhancement of existing heritage, capable of promoting and driving development of the city and the region. If the archaeological excavations World Heritage Site, the Sanctuary of Beata Vergine del Rosario, the favorable geographical position and the horticultural industry represent important cultural and economic resources for the territory, thanks to the interventions of modification and upgrading of some areas that can be create that perfect seam between cultural heritage and the city. Urban regeneration, realized through interventions of urbanistic restructuring and building renovation, also thanks to equalization and densification strategies, on the one hand allows recovery of more or less large parts of territory, degraded or abandoned, on the other the promotion of cultural heritage in the city. It is proposed as an example an intervention located in an area near to the archaeological excavations and along a main road connection between the highway and the sanctuary. The project consists of the replacement of an industrial shed of poor architectural quality, with contemporary formal language, in support of the principal poles of the city and in the design of outdoor spaces with green areas and pedestrian walkways.

Keywords: City, regeneration, development, improvement, modification.

1. Introduction
In the context of the promotion of cultural heritage, improving the use of cultural places and the increase in the supply certainly constitute the fundamental objectives. Operate on a regional scale in order to act on a single archaeological site, such as Pompeii, it becomes necessary to improve the use of the same and make the tourist experience more meaningful and complete. Particularly interesting is the possibility to intervene through the redevelopment and re-use of areas adjacent to archaeological sites, large or small, public or private, now in a state of decay or used badly, in which insert functions, equipment, services, create cognitive and educational paths, directly or indirectly related to the existing cultural heritage. Through the design of the modification of urban regeneration you can create a perfect seam between cultural heritage and cities, so as to develop the local economy, improve the cultural offer, promote and support interventions for heritage conservation and enhancement of the image of Italy at international level.

2. Resources
In order to develop lines of action aimed to the cultural valorization of city it is necessary to know the area, identify existing resources, its problems, recognize the potentials and understand how to best use the opportunities.
In order to develop lines of action aimed at enhancing you need to know the area , identify existing resources, its problems, recognize the potential and understand howto best use the opportunities present.

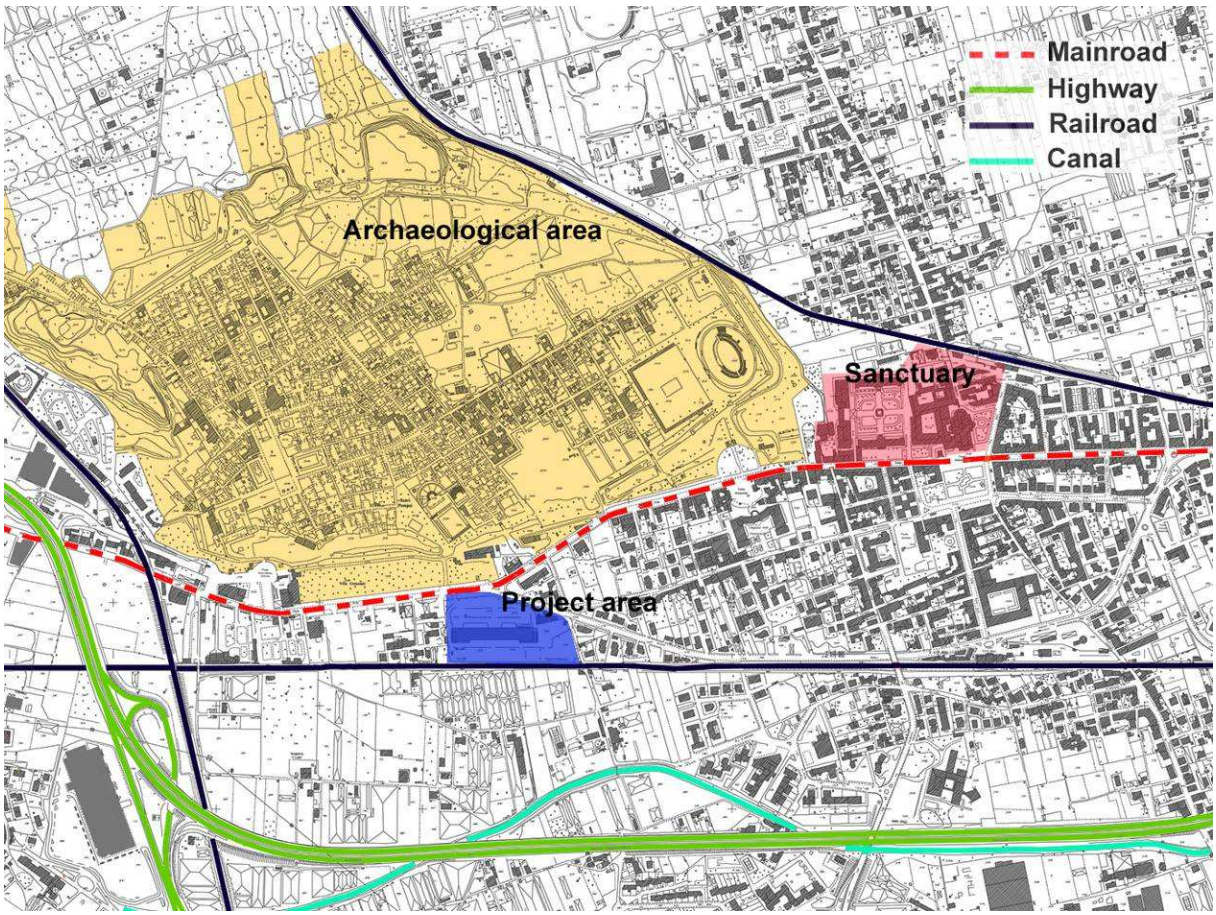

Fig. 1: The territory of Pompeii whit identification of main elements.

Study the territory of Pompeii means to analyze an area rich in resources, certainly capable of promoting and driving the development of the entire piece of land. The two principal attractors of the city are certainly the archaeological excavations of the ancient Roman citadel, a UNESCO World Heritage Site since 1997, one of the most visited sites in the world, with almost two and a half million visitors in 2013 and the Sanctuary of Beata Vergine del Rosario, which welcomes in a year about two million pilgrims. These two poles are certainly two resources of immense value to the city and the region, given the number of visitors, users to whom could be sent further cultural or religious offers.
Another interesting and important resource is the cultivation of flowers, that characterizes the entire vesuvian coastline, and particularly the southern part of the territory of Pompeii. The identification by the satellite of this type of agricultural production is easy due to the massive presence of greenhouses on the territory, constructed in various materials and sizes.
The floriculture industry, if in Italy represents the 5% of national agricultural production, in Pompeii, mainly characterized by the production of cut flowers, it is certainly an important economic resource capable of giving employment to hundreds of people. In addition to the resource listed, it's possible to identity equally important potentialities, starting with the geographical position of the city, particularly favorable due to its proximity to Naples on one side and the Sorrento peninsula on the other hand, they also major destinations for tourists. The looming presence of Vesuvius behind, is also an extraordinary landscape, unique in the world, which alone can be considered an exceptional attractiveness. Another great potential is to be identified in the possibility of intervention in urban areas of the city, a city that has undergone significant changes over the years, the modern Pompeii in fact, born as a result of the construction of the Sanctuary, has expanded in recent decades throughout the surrounding area, also in the areas near to the ruins, coming to occupy the area south of Sarno, an area that, before the repeated interventions in the course of the river appeared to be marshy and unhealthy, and yet now subject to flooding. The presence of archaeological excavations and the Temple, the favorable geographical position, the particular vocation of agricultural areas, with the possibilities offered by the interventions of regeneration and reconfiguration of certain areas, degraded or abandoned, are important elements on which to base the regeneration of the area Pompeii.



Fig. 2: Degraded area near the archaeological site.



Fig. 3: Project area.

3. Regeneration

If then, until today, the city of Pompeii was extended and fragmented so often random and spontaneous, it's necessary now to tend to the model of the city characterized by two words: mixitè and compactness. The compact city is made up neighborhoods, able to accommodate functions and different social classes, which grows and develops according to specific lines of action, through projects of architectural and urban recycling that transform and enhance the most degraded areas, regenerating and making them more beautiful and more useful.

The urban equalization, combined with the strategic inclusion of special use destination and with use of specific building types, would, there where possible, to curb the phenomenon of urban sprawl, arresting the process of fragmentation through the rationalization and optimization of use of the available space internal to the already urbanized areas, giving them a new identity and a new value.



Fig. 4: General plan of intervention.

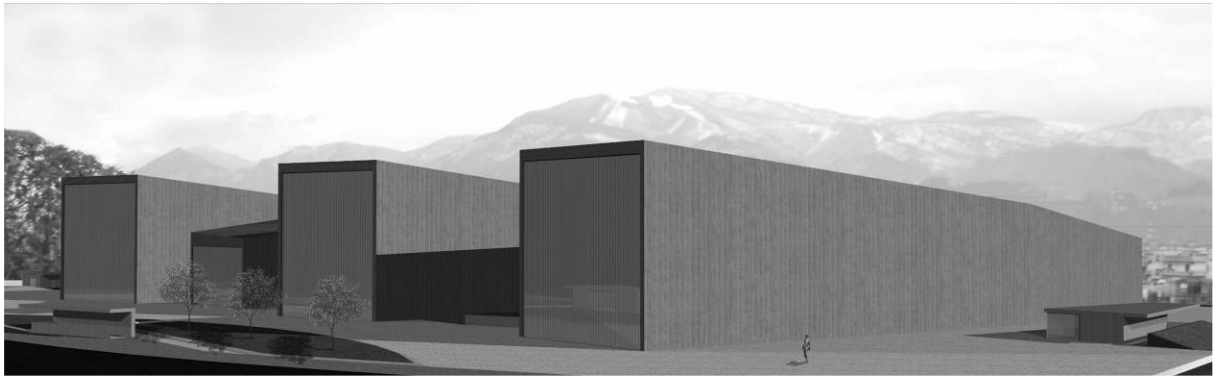

Fig. 5: View from via Plinio.

The restructuring of urban territory if one side is the main way forward for sustainable development of the city, the other is an important form of valorization of existing cultural heritage, because it can create the conditions necessary for the improvement of the use of places of culture and the increase in cultural supply, through the inclusion of specific functions to support of tourist and cultural activities.

4. The project

The regeneration of the Pompeian territory can certainly start from the areas near to archaeological site, in fact, the recent urban expansion has not spared this zone, especially the strip between the ruins and the railway line, which starts from Villa Mystery comes down to the pinewood on Via Plinio, where, in addition to spaces and structures in the direct service of tourist flows , such as car parks, restaurants and hotels were built industrial buildings and small interstitial residential areas , many abusive , invisible from the road because at a lower level.

This area has already been studied in the past in a workshop at the Faculty of Architecture of the Second University of Naples, which was followed by interesting design proposals, subject of thesis with prof. Efisio Pitzalis, such as the design of a multipurpose building with conference and exhibition halls, located in the area between Via Plinio, Via Mazzini, Via di Stabia and rail Naples-Pompei-Salerno.



Fig. 6: View of project from north.



Fig. 7: View from internal park.

The lot that contains the proposed intervention measures about 30.000 square meters, has a fairly regular shape, presents various inclinations, but never excessively steep, sloping down towards the railway.
The planimetric location is strategic, near the entrances to the archaeological site and along a main road connection between the highway and the Sanctuary, due to this placement, the flows, pedestrian and vehicular, are determinant for the insert of particular functions.
From the point of view of landscape it is interesting to note that from the area in question is possible to see from one side the Vesuvius and the archaeological ruins, places a few meters but at a higher quota, on the other the plain that reaches up from the volcano to the mountains of the Sorrentine Peninsula and then to the sea.
The proposed project consists of the replacement of an industrial shed of poor architectural quality, completely decontextualized, now partly used as a supermarket and partially abandoned, with a multifunctional building with contemporary formal language and arrangement of all outdoor spaces with green areas and facilities for public use.
The building has three internal auditoria for respectively 900, 300 and 250 people for a total of 1450 spectators who may assist simultaneously. The two smaller auditoriums can also open up and share a central space, so as to form a single conference room, but are independent from each other, having their own entrances and foyers. The largest auditorium instead is divided into two levels and unlike the other two has an opening that allows the natural lighting. The lower part reaches up to an altitude where it is located the underground stage. Since its foyer you can access the other functional areas of the center or the exhibition hall, bar and restaurant. Also, the bar is divided into two levels, so as to serve the different areas present.



Fig. 8: Plan of ground floor.

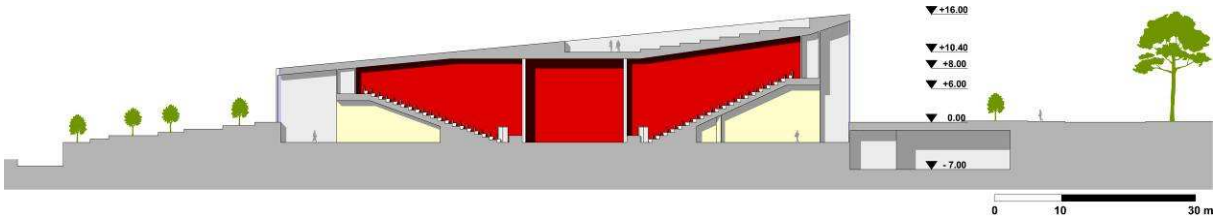

Fig. 9: Section AA'.

The building has three internal auditoria for respectively 900, 300 and 250 people for a total of 1450 spectators who may be present simultaneously. The two smaller auditoriums can also open up and share a central space, so as to form a single conference room, but are independent of each other, each having their own entrances and foyers. The largest auditorium instead is divided over two levels and unlike the other two has an opening that allows the natural lighting. From its foyer it's possible to access to the other functional areas of the center, the exhibition hall, the restaurant and the bar that is split over two levels, so as to serve the different areas present.
The exhibition space is located on the second level and can accommodate different activities because it is an open space, and it's also the end point of an exhibition path that starts from the main entrance of the building and passes through an interior walkway. Interesting is the possibility of using such spaces for exhibitions of cultural, archaeological, religious or commercial nature.
The restaurant, also on two levels, can accommodate up to 650 people and is open on outdoor spaces and courtyards that burrow the building allowing natural light diffused at several points due to the use of translucent panels. Also this dining function can be at the direct service of the archaeological site and the Sanctuary, because it could accommodate the visitors going to or coming from the different poles of the city.
From the main foyer, through a sort of tunnel that connects two different levels you reach the area entrance, where is located the lobby, cloakroom and office area, destined to activities related to the administration and management of events.
Another important function in support of tourist flows is the parking, completely underground under the pedestrian area in front of the building. It can accommodate up to 140 cars and 13 buses, has within it an area of arrival for visitors who can receive an initial welcome and go directly to the structure or go up and come in pedestrian area leading to the entrance of the excavations. From the car park you can also go directly to the roof of the building on which there is a panoramic promenade and outdoor tiers in which to organize various activities and events.

The spaces surrounding the multipurpose building are all pedestrian areas or green spaces. The area in front of the railway is characterized by a series of level curves, modeled after the form of the building that create a barrier of protection, visual and acoustic, against the passage of trains.
However, these curves at a point decline further allowing to see the railroad. The creation of an urban park is a response to a real need of the city that has no enough public green spaces, and creates occasion for stop and recreation for the numerous tourists in the area.

5. Conclusions

Therefore, through interventions of urban regeneration, even small, it's really possible to change the face of the city, adding value to cultural heritage, implement strategies that integrate the archaeological site with other resources and the socio-economic structure of the area.

Bibliographical References

[1] BONOMI, Aldo, ABRUZZESE, Alberto. *La città infinita.* Milano, Bruno Mondadori, 2004. ISBN 9788842496410.

[2] AUGÉ, Marc. *Tra i confini: città, luoghi, integrazioni.* Milano, Bruno Mondadori, 2007. ISBN 9788861590137.

[3] GAMBARDELLA, Carmine. *Atlante di Pompei*. Napoli, La scuola di Pitagora editrice, 2012. ISBN 9788865421710.

[4] Ministero per i Beni e le Attività Culturali – MiBAC, Commissione Nazionale Siti UNESCO e Sistemi Turistici Locali. *Il modello del Piano di Gestione dei Beni Culturali iscritti alla lista del Patrimonio dell'Umanità - Linee Guida.* Paestum: 2004.

[5] SETTIS. Salvatore. *Paesaggio. Costituzione. Cemento. La battaglia per l'ambiente contro il degrado civile,* Torino, Giulio Einaudi editore, 2012. ISBN 9788806198718.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Technological hybridization for the fruition of cultural heritage. Architectural Perspectives of Andrea Pozzo at St. Ignatius in Rome.

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Abstract
The survey techniques based on photo acquisition have nowadays regained importance thanks to three main aspects related to technological innovations: the cheapness of production of digital images; the evolution of capacity to compute, memorize and share data; the consequent development of recursive algorithms on massive data. In the last years many experimentations have been conducted on the acquisition of this data, but the way to display and communicate them - both for scientific and simply informative aims - is still uncertain and not sufficiently investigated.
The experimentation we want to illustrate here concern the opportunity to realize an interactive and multimedia informative system of an architectural or archeological space, based on a progressive fruition of several multi-thematic spherical panoramas. The activities of study, experimentation and test have involved both technological aspects and communication problems, at the different levels of representation, fruition, interaction and characterization. The quality of the realized model and its structuration in an easily shareable format allow to investigate the properties in order to increase the knowledge of it, also in a remote way.
The case study of our experimentation concern the paintings by Andrea Pozzo at St. Ignatius in Rome.

Keywords: Spherical panorama, Survey, Andrea Pozzo

1. Introduction
The instruments and techniques of architectural survey have been deeply transformed by the advent of digital technology.
Within this transformation, we can see clearly a change of orientation in the definition of three-dimensional models, which is focusing on discrete models, rather than on continuous geometric models.
If in the past we tended to catch a few significant points on the object to be detected and with them we built a synthetic geometric model, today we prefer to collect, massively, dense clouds of points on the object and derive from them, only when necessary, few selected geometric information.
Of course, this comes from an exceptional evolution of computational power and data storage currently available.
Today, the laser scanner can easily produce three-dimensional point cloud which describes with very high resolution models captured.
The three-dimensional coordinates of the points can be associated with other qualities, which are sampled simultaneously from other sensors, aligned with those of measurement, such as color, reflectance, etc..
While in the past the final three-dimensional model of a survey operation was constituted by a mesh constructed by interpolation of points clouds poorly defined, it is now usual to provide exclusively the

clouds that, for definition quality, can be directly navigate in 3D and processed for derive, for example, some significant sections.
We tend, therefore, to operate directly on a discrete model, a set of distinct points, rather than on a continuous model, an approximation and geometric abstraction of the same cloud.
This is not surprising if we consider that the real world is discrete.
In the field of discrete models digital images, which are structured sets of sampled points in the quality of color, play a predominant role.
In recent years, due to the increased resolution of the images acquired by digital, several techniques have been developed in the survey
These can be considered supplementary and, in some cases, replacement of the laser scanning. Among these, the spherical panorama giga-pixel takes on a role gradually increasing.
The technique involves capturing spherical panoramas in high resolution, these are taken from different points, chosen appropriately. The images thus generated are virtually navigable and searchable on your computer in various ways.
Using two spherical panoramas, properly oriented, we can define a system of stereoscopic vision and measure with it the space represented. On the market there are different software, both proprietary and open-source, allowing you to navigate this kind of images.
However, if the systems for displaying spherical panoramas have been extensively tested, are still largely unexplored modes of representation, navigation and characterization of multiple panorama aimed at the architectural survey.
Therefore the aim of this study was to investigate the methodology of the survey phase of spherical panoramas, with the critical eye aimed at the subsequent integration and use of the acquired data.

2. Subject of experimentation

The experimentation presented here is suitable for application in many fields: from reconstruction and navigation of partially or totally changed spaces compared with the current configuration, to visualization of in-progress projects; from description of archaeological sites, constantly changing, to interactive and interdisciplinary fruition of environmental, artistic and cultural heritage.
Particularly interesting in this regard, is the representation of two-dimensional or three-dimensional Architectural Perspectives, pictorial or sculptural apparatus making use of perspective representation - on the plane or in space - to offer to the viewer a misleading impression of reality. The two-dimensional Architectural Perspectives are painted on one or more surfaces of different kind (walls, ceilings, vaults, domes, etc.) and allow in most cases a panoramic vision from one or more points of view, depending on the real space conformation and on the author's expressive intentions.
The work that we have chosen is one of the most emblematic of the Architectural Perspective tradition: the corridor frescoed by Andrea Pozzo at the Rooms of St. Ignatius in Rome. In a trapezoidal long and narrow space[1], covered by a barrel vault with elliptical profile (fig. 1), the artist realized a single, wide, 360° perspective, painted on the four walls and the ceiling, which, if observed by the unique center of projection, completely subvert the perception of real space (fig. 2). In place of the longitudinal flat walls, it appears a regular sequence of niches and pilasters. The oblique wall at the end of the corridor is neutralized by an arch supported by two groups of columns that leads to a bright room covered by a large dome, which appears well over the surface of the painted wall. The real vault is replaced by a flat ceiling, consisting of a series of beams supported by large shelves, which rest on the side walls pilasters. Furthermore, the viewer is surrounded by many figures of angels and cherubs, whose physicality is made even more plausible by the strong illusory power of Perspective Architecture.
Even assuming only one privileged center of observation, the work of Pozzo is particularly suitable to a sequential vision. Manifest and declared intent of the author is in fact lead the visitor (the faithful, in the author's conception) through a path that, between wonder and mystery[2], leads to the only point from which suddenly appears so clear the "divine truth", the point from which the strange shapes of the painting are recomposed in the perspective of an illusory space (fig. 3). The observation of the subject through consecutive panoramas favours in this case, as in many other cases, this double reading of space: one in which the perception of the room's real shape prevails; the other one in which the viewer is totally and intensely immersed in the illusory space, thanks to the painter's scientific and technical abilities.

3. Survey trough spherical panoramas

[1] The lateral walls are respectively about 15 and 18 meters long; the corridor is about 4 meters wide and, at the top of the vault, is about 4.5 meters high.
[2] The architectural subjects painted on the different surfaces, if viewed from a point of view far from the center of the corridor, appear strongly distorted and destabilize the viewer.

To represent the chosen subject, we have first conducted a photographic campaign, in order to make some 360° panoramas in Ultra-High Resolution.
A panoramic image derives from the combination of several pictures taken from a single center of projection. In fact, it represents the subject viewed from a particular point of view and the individual shots are combined identifying many pairs of homologous points in contiguous photos. Therefore, to make a spherical panorama is necessary to take a series of photos at regular intervals covering horizontally and vertically an angle of 360°, providing an appropriate overlap of the individual shots for the recognition of homologous points. The quality of the panoramic image depends on two main factors: sharpness and metric reliability. The overall sharpness of the image is conditioned by the sharpness of the camera's sensor (in terms of resolution and micro-contrast), the type of used lens[3], the distance from the subject and the overall quality of the shot (focus, noise, vibration reduction, etc.). The metric reliability of the panorama depends by other factors, such as the quality of the used optic and the correction of the distortions due to the lenses, the identification of the lens's nodal point – around which the camera must rotate during the shooting in order to eliminate parallax errors – and the quality of individual shots union.
In the case considered, we decided to realize three spherical panoramas acquired from three points of view aligned along the longitudinal axis of the corridor, according to a logical fruition of the work that put in evidence the main features previously mentioned. We made first a panoramic shooting from the perspective center of projection and two other from areas close to the entrance and the oblique wall at the end of the corridor.
The used camera (a full frame digital SLR Nikon D800E) was combined with a 50mm lens, sufficiently short to limit the number of shots required to make the entire panorama but not so excessively to reduce the image resolution.
As regards illumination, we decided to use natural light of the room, because it was the same light source the author has considered painting the *chiaroscuro* of his perspective. Because of the strong variations of exposure of the different surfaces, we decided to take HDR images, capturing three photos at different exposures (0, -1, +1) for each position of the camera.
As we said, the camera settings related to exposure and focus are of fundamental importance for the panorama quality. In a panoramic view, especially if it is spherical, it is necessary that each framed area appears clearly focused. The lack of lighting in some portions of the corridor has made difficult to use camera's autofocus and it was therefore necessary to lock the focus at an average distance between the minimum and maximum distances measured from the subject. Therefore, to ensure the depth of field – in relation to the focus distance – that is essential for a clear representation of the different areas of the subject, it was necessary to find an appropriate aperture value[4], not too high in order not to compromise the image sharpness[5]. The exposure time was then calculated – according to the aperture – at the portion of the wall most exposed to the light.
For panoramic shooting we used a motorized head[6] in order to maintain the position of the camera's center of rotation, which coincides with the nodal point of the lens. The identification of this point is the most delicate phase of panoramic shooting because it influences the geometric reliability of the panorama. Each lens has a nodal point located along its optical axis, which varies depending on the focal distance: set the parameters of the camera, we have identified this point thanks to the parallax method. Once correctly positioned the camera on the motorized head, we have programmed the panoramic shooting: according to the panorama field of view, the lens's focal length and the percentage of overlap between contiguous frames (in this case 25%), the motorized head's software has automatically calculated the quantity and the disposition of the required shots[7]. For spherical panoramas, there is finally a specific problem to solve, concerning the shooting of the floor portion below the used equipment, which partially obstructs the vision of it. After removing the equipment, we photographed the portion of the floor previously inaccessible to the camera and then we manually integrated this shot in the composed panorama.
Afterwards, in order to represent specific frescoes details at a higher resolution, we took many photos by the same point of view of the panoramas using a 200mm telephoto lens.

[3] Maintaining the same position of the camera, the use of a telephoto lens allow to make a higher resolution panoramic image: in fact, reducing the field of view of the lens, we should increase the number of photographs to compose the entire panorama.
[4] To calculate the value of the aperture in relation to the average distance from the subject and the necessary depth of field we have used an application available at the site www.dofmaster.com.
[5] When the diaphragm is too close the sharpness of the image is lower. Each lens reaches maximum sharpness at a given value of the aperture.
[6] Gigapan Epic Pro.
[7] The photos needed to cover the entire panorama were acquired in a matrix, calculated by the software installed in the motorized head, of thirteen column and eight row. Each panorama is a composition of 312 photos taken by 104 positions at three different exposure values. The photos were taken in RAW format, which allows to control the images parameters in post-production.

In addition to the panoramic shooting we did a metric instrumental survey[8]. First we detected spatial coordinates of the remarkable points that determine the geometry of the corridor, also performing selective scans that allow to identify the main sections of the room (an horizontal and two vertical sections, one transversal and one longitudinal). After we took a series of significant points belonging to the frescoes, evenly distributed on the different five surfaces. Later, overlapping the detected points to the panoramic image, properly scaled, we have verified the correctness of the merge of the individual shots during the stitching phase.

4. Normalization of data

The union of the individual photos, for the three different panoramas, was performed using the software Autopano Giga. This software, using the camera's data, has made a correction of the photos deformations due to the specific lens used and then has identified – comparing pairs of images – the homologous points needed to reconstruct the location of the shots in the space relative to the center of projection. The software, recognizing sets of shots at the three different exposure values, also calculated the fusion of exposures in order to obtain a final image equally exposed. To get planar representations of the different panoramas, they were projected in equirectangular Gigapixel images (about 66.560 x 33.280 pixels), on which it was possible to intervene later to control white balance and exposure (fig. 4).

The equirectangular image created for this research activity is easily viewable in stand-alone mode as a single user operating on a local computer.

However speak today about use of data outside of the Internet is an activity anachronistic, but to make available the panoramic image on the network it is necessary to further processing, which facilitates the transfer.

To solve this problem we use pyramidal images.

This type of image is organized in several levels, each with a copy at half resolution of previous level. The image in each level is also divided into many small pieces (256x256 pixel).

When the user requests a view of the whole, the system responds with a low-resolution image, however, suitable for displaying on the screen.

However, when the user requests a detail view, the system responds with a high resolution single piece image, which is related only to the small portion of observed image.

To display an image equirectangular within a web browser, we can use the WebGL technology, which provides software tools for the representation of three-dimensional spaces.

A multi-faceted sphere - whose faces are sized on the amount of blocks in the maximum level of detail - is initially mapped using the equirectangular image as a texture, then it is rendered within the browser window through a special shader.

The ability to enjoy the panoramic model, by geographically distributed users has prompted the reflections which led to this trial.

The question that we wanted to answer is whether the giga-panorama could be used as a model to integrate and view easily the various kinds of information that can characterize a survey campaign.

As an example, the display system has been developed to integrate and visualize, in three dimensional space, the panoramic image in conjunction with other information, so to increase the accessible content.

In particular, for purely experimental, the panorama model has been expanded, associating to it some other information as study documents, already present in the laboratory and collected over time in the corridor frescoed by Andrea Pozzo:

- the three-dimensional model of the control points measured in the survey with a Leica 3D Disto;
- the three-dimensional vector model, designed to highlight some peculiarities of the apparatus prospective of the illusory architectural space that characterizes the wall painting;
- the panoramic image of the virtual model, reconstruction of real space, stripped of its painting and materials that characterizes it;
- images related to a recent restoration operation (fig. 5);
- a selection of textual and iconographic information of the parietal opera .

The set of aggregated information in this specific application, do not want to configure a documentation organic, much less describe the object identified for testing - an operation that would have required a specific project selection, acquisition, study and integration of the data - but only evaluate the possibility to integrate and make use of data of a different nature within a spherical panorama.

The control points were included in the model after they have been normalized. This operation has served to correct the orientation problems of the panoramas acquired.

[8] To detect the points we used a Leica 3D Disto laser. The data were automatically and progressively stored in a handheld computer connected to the 3D Disto and saved in a DXF file.

The same type of normalization was required for the insertion the vector model used for the study of the apparatus prospective.
The overlap between the vector model and the panorama model can be performed easily in the three-dimensional environment by setting a coincidence between the projective points of the two models.
The analysis of images, which result from the restoration, have been carefully assembled into a single panoramic image. Representation of this image can be shown in overlay with the panorama of the surveyed space.
The panoramic image of the virtual model, conceived as reconstruction "naked" of the real space, was displayed in a secondary window, in which the representation is synchronized with the first.
The reasons for this choice are derived from specific considerations about the surveyed object.
We wanted to create a representation that highlighted the distribution of illusory architectural form over the real architectural space.
The other textual and iconographic information, that experimentally we associated with the panoramas, are accessible by selecting "tag" that become visible during navigation, when the user aims them.
The simultaneous representation of the captured panoramas, realized in a single window or multiple windows, has provided several aids to the study of the data surveyed.
For example, we created a visualization in which two windows were displayed panoramas of the architectonic space, observed from two different points of view.
In this way, if the views are properly oriented, we have available a pair of virtual theodolite with which we can aim and measure, with good accuracy, the three-dimensional coordinates of points in space.
This is particularly evident in the sample space used in the experiment. Here the illusory architecture is revealed and understood, in his wonderful occurrence, thanks to the possibility to observe the same part from two centers of view.
A final deepening was directed to the study of how navigate within the virtual model, passing from one center of projection to another of multiple spherical panoramas.
Developing some considerations of perceptive character, about central perspective, we have developed an algorithm that allows the user to move through space, moving from one panorama to another, reducing the perception of discontinuity.

5. Conclusions

The experiment has produced several results both in terms of gathering information in the survey phase, and on the next phase of sharing and dissemination the information.
As regards the phase of survey, we have identified several precautions methodological, that are necessary to acquire spherical panoramas, operating within confined spaces and with adverse illumination.
The information collected will help to improve this detection technique.
The union of information with spherical panoramas and the relative techniques designed to show them in integrated mode, shown that it is possible to make tools, both for sharing scientific data acquired (aimed at further investigation) and for the dissemination of the cultural heritage surveyed.
Under these aspects, research has also shown considerable potential for further exploration, for which we hope to cooperate with transversal competences.



Fig. 1: **View of the corridor from the entrance. The shape of the real space is evident.**







Fig. 2a, 2b, 2c: **Views of Pozzo's perspective from the center of the corridor. The Architectural Perspective completely hides the real shape of the room, wherever we look. Images taken from the central panorama.**



Fig. 3: **The same painted subject viewed from the consecutive points of view chosen the panoramas.**



Fig. 4: **The equirectangular projection of the central panorama.**



Fig. 5: **The overlap of survey drawings on the spherical panorama.**

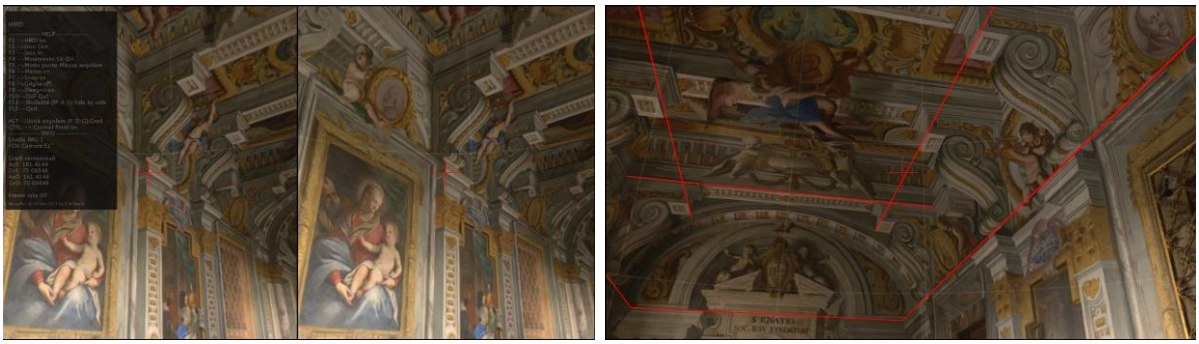

Fig. 6a, 6b: **Measure and overlap of information on the spherical panorama.**



Fig. 7: **Stereo vision of the central spherical panorama.**

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Bibliographical References

[1] Fangi G. *Block bundle adjustment for theodolite stations in control networks - The case of the Guggenheim museum in Bilbao*, - ISPRS Archives, 2004,vol. XXXV part B5, pg 372-376 – ISSN 1682 - 1750

[2] Fangi G. *Investigation On The Suitability Of The Spherical Panoramas By Realviz Stitcher For Metric Purposes*, ISPRS Archive, 2006, vol.XXXVI Part 5

[3] Haggrén H., Hyyppä H., Jokinen O., Kukko A., Nuikka M., Pitkänen T.,.Pöntinen P, Rönnholm R. *Photogrammetric Application of Spherical Imaging* - ISPRS Archives 2004Vol. XXXIV, part 5/W16

[4] Luhmann T., Tecklenburg W. *3-D Object Reconstruction from Multiple-Station Panorama Imagery* - ISPRS Archives, 2004,Vol. XXXIV, part 5/W16

[5] Pozzo, A. (1693). Perspectiva pictorum et architectorum Andreae Putei, Roma,: J. J. Komarek.

[6] Pozzo, A. (1700). Perspectiva pictorum et architectorum Andreæ Putei ... pars prima[-pars secunda] in quâ docetur modus expeditissimus delineandi opticè omnia quæ pertinent ad architecturam, Romæ: Ex typographia Antonii de Rubeis.

[7] Szeliski R.and Shum H. *Creating full view panoramic image mosaics and environment maps*. In Proc. of SIGGRAPH, 1997,pages 251-258.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Environmental degradation and urban design: nature as starting point for regeneration

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Abstract
In the scenario of territorial rarefied systems constituting city in extension, urban regeneration projects often work in areas characterized, not only by compromised spatial configurations and social decay, but also by strong environmental degradation.
This contribution, referring to applied research experiences conducted on PIP areas in Sarno river valley (Salerno) and on Patria Lake (Napoli), tries to develop a reasoning about a possible role for nature in urban projects aimed at regeneration of problematic areas through environmental requalification interventions. They should have the capability of converting natural compromised situations into value elements that can be assumed as structure of new spatial configurations and can be thought as territorial polarities. These areas can host collective facilities, they can become energy infrastructures or places for sustainable productions. This design possibility starts from the idea that natural spaces of urban sprawl, that are unbuilt areas and abandoned agricultural fields standing as fragments in urbanized continuum, need to find a new role in territorial dynamics and a new identity in a general idea about nature intended as a complex entity. In this perspective open space can be thought both as a contemplative place and as productive area. The theme of production must be intended from the point of view of sustainability and it can guarantee the survival of open areas during the years.

Keywords: Urban regeneration, environmental regeneration, urban design, nature, agriculture

1. Urban development and environmental degradation
The urban design, conceived as a tool for territorial re-balancing, must confront itself with environmental and ecological issues. Indeed, there is a strong correlation between problems related to urban super-development and environmental problems generated by pollution.
The context in which urban design works is characterized by a widespread deregulated urbanization that has transformed the entity we used to call periphery in a sort of *weak urban entity* characterized by an unrecognisable urban structure connected with a clear idea of the city and by the absence of strong polarities and places for people meetings. The countryside has turned into a rather ambivalent context in which the low-density urbanization is gradually devouring portions of agricultural land.
The unprecedented soil consumption which has affected Italy during the last thirty years has produced also serious and often irreversible changes in ecosystems. The undergrounding of water channels in situations of hydrogeological risk, the indiscriminate construction on coasts or in protected natural areas, the phenomenon of illegal construction, the spread of quarries for the extraction of building materials, the construction of infrastructure with high environmental impact (often with a dubious value), are just some of collateral phenomena connected with the recent uncontrolled growth of urbanization. These circumstances have determined and they are continuing to determine some significant changes in the landscape of the Peninsula, altering irrevocably the ecosystem's balances in numerous local contexts and putting at risk the safety of inhabitants. The serious events associated

with floods of Messina in 2009, in Genoa in 2012, define a focus on fragility of Italian territory and insecure living conditions of many people in the Country.
In different geographical areas of the Country the health conditions of the environment are aggravated by heavy pollution determined by diffusion of polluting productions and by development of eco-mafia's illegal activities. We can mention as an example the destruction perpetrated for years in *Ager Campanus*, the plain situated between the provinces of Naples and Caserta, which has been the object of illegal waste spills and waste landfills, determining the infamous name of *Terra dei Fuochi*, or high mortality levels associated with noxious emissions produced by ILVA steel plant in Taranto.

2. Nature and urban design

In the territorial scenario, as we described in the last paragraph, nature often takes a side role and its function in urban and territorial dynamics appears absolutely irrelevant.
We want to clarify that, in this paper, when we use the term "nature" we are referring contemporaneously to entities strictly definable as natural (situations in which the human presence is marginal) and to entities defined as "second nature" in which, the human presence is important and contributes to the maintenance of spatial conditions as in the case of agricultural fields and protected natural areas or urban parks.
Urban design, that seriously wants to operate in the context of contemporary polycentric city, must necessarily examine the role of natural areas in development of a new idea of city-region. The opportunity to give a new sense to natural spaces, putting them in the middle of reasoning about urban development, passes through the possibility of considering nature as an useful, productive and necessary entity.
The concept of environmental sustainability clearly expresses the idea of nature as a resource and reflects on the need of preservation and growth. To bring nature to a new centrality, however, contemporary culture must overcome the idea of tout court conservation opening a dynamic perspective in which the resource can be implemented through the possibility of intervening respectfully on it. The de-marginalization of production activities related to natural resources, such as agriculture, forestry, farming or fishing, in association with the possibility of conceiving natural resources as energy resources to be used in a sustainable way, could allow to contemporary culture to look again at the nature as a productive reality. In fact, the energy crisis, the end, at least in the West, of big industrial production and food problems connected with the exponential growth of the world population, put agricultural production and renewable energy at the center of the debate about life of tomorrow man.

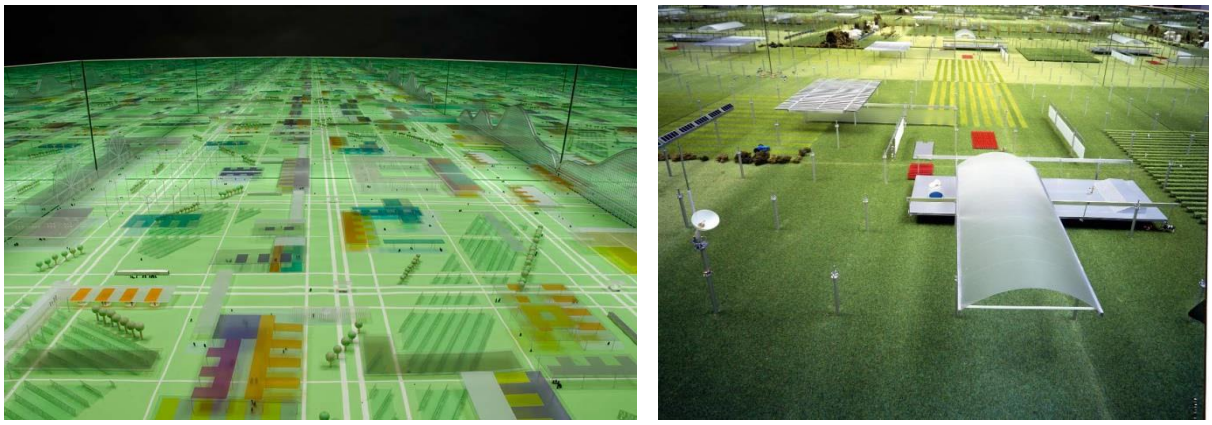

Fig. 1: Two shots for Agronica project for Philips Strijp in Eindhoven by Andrea Branzi.

Agronica project, developed in 1999 by Andrea Branzi and Domus Academy for the urban regeneration of Philips Strijp in Eindhoven, acted exactly within the conceptual framework just described, trying to postulate a possible new re-signification of green spaces within a concept of post-industrial economy. The gradual conversion of the areas formerly occupied by Philips factories provided for the realization of large agricultural areas, in which traditional agricultural activities were associated with renewable energy productions. Through a model of weak urbanization, conceived as "an experiment introducing the concept of reversibility of uses, of inexpressiveness of artefacts, of absence of urban form global meaning; of total integration between environment designed and the natural environment; of separation between type and function", the designers proposed a possible new central role for nature. This research also experimented the use of mobile, temporary, removable and adjustable building components scattered in a large semi- urbanized park with very low density of

built masses. The energy distribution and internal mobility were ensured by an infrastructural network homogenously distributed on territory that in the project is named urban tartan.
The project proposed by Branzi in 1999 can be placed in a modern research line directed to overcoming the opposition of city and countryside, aiming at an idea of urbanized nature in which the two terms can be composed. Quoting Branzi we could say that the aim is the building of a "city without architecture and architecture without city" in a disurbanist point of view that, starting from Garden City by Ebenezer Howard and Broadacre City by Frank L. Wright, passes through the proposal for Green Moscow by Moisej Ginzburg and projects for new city of Magnitogorsk by Ivan Leonidov and Ernst May, and arrives in our days. This research line postulates the end of the city as defined during several millennia of urban history, to propose a new unity between architecture and land without the mediation of urban scale.
In this paper we want to propose a different idea of urban design. It could reconcile, respecting each other's otherness, the dialectical terms of nature and city, pursuing a coexistence able to define a new identity for the two entities, in the framework of polycentric city's dynamics.
The huge natural spaces that are actually abandoned or with no role, can be conceived as territorial polarities, entities referred to a wide scale. If we rethink them in terms of sustainable production they can constitute contrast structures against increasing urbanization.

3. Integrated urban design: environmental reclamation and "urban reclamation"

This paper wants to propose an idea of urban project intended as intervention simultaneously aimed to urban regeneration and environmental regeneration. It assumes as principle of intervention the possibility of changing the environmental and urban detractors into valuable elements, using and organizing in a system the existing resources. So we can use the expression *integrated design* that must be intended as an interactive place for collaboration of environmental engineering, urban planning and architecture. Urban design, as we defined, provides for the establishment of a strategic framework in which environmental remediation must be associated with architectural solutions.
This strategy considers environmental remediation not as an emergency measure but as a stable structure for control and maintenance of ecosystems' balance within the broader framework of urban regeneration.
The environmental remediation operations, which run parallel to operations concerning spatial modification, become visible elements taking part in new urban compositions.
Heavily polluted places and difficult situations from the environmental point of view can be rehabilitated to play a focal role for territories looking for a new identity.

4. Integrated urban design: the experiences of Patria Lake and Scafati PIP area

The area of Patria Lake and the PIP area of Scafati town have in common the strong conditions of environmental degradation and the incoherent spatial asset. In both cases, there are aquatic environments in which the conditions of water pollution determine great emergencies.
Patria Lake is located in one of the most polluted geographical areas in the Peninsula, at the western edge of the Campanian Plain, just a few steps away from the big garbage dump named Taverna del Re, while the Scafati PIP area is crossed by several canals connected to the basin of the river Sarno, that is considered the most polluted river in Europe because it is interested by influx of waste water produced by near factories.
The projects are aimed, therefore, for definition of environmental and urban regeneration interventions at same time. For Patria Lake we propose the realization of a equipped territorial park and for Scafati PIP area PIP we imagine a gradual reconfiguration of industrial area in which non-polluting factories are preserved such as logistics and other light activities linked to agricultural production.
Intervention strategies for environmental regeneration require the use of phytoremediation technology for the disposal of water pollutants, and the creation of large areas for sustainable production represented by biomass.

5. Patria Lake: from abandoned place to new generation park

The project for Patria Lake regeneration has been develope by myself with Arch. Paolo De Michele and Arch. Nicola Pietrantonio between 2012 and 2013 and was presented in the call named EcoLuoghi promoted by association Maecenate 90 with the support of Ministry of Environment.

5.1 Actual situation

Patria Lake is located on the Litorale Domitio, in the northern part of the province of Naples. This coastal area, from naturalistic point of view, was once affected by the presence of a lush mediterranean vegetation and a wide beach of fine sand. The lake and its surrounding areas are also part of the nature reserve named Foce Volturno - Costa Licola, area characterized by international importance because of the transit of migratory birds (Convention of Ramsor).

Today, the widespread phenomenon of illegal construction, which has devoured miles of pine forest, coastal dune and beach, the carelessness and criminal activities related to illegal disposal of waste, have made this part of the coast particularly polluted and degraded. Near the compromised environmental arrangement there is, for disastrous coincidences, situations of high marginalization of vulnerable social groups, particularly African migrants, resulting in a situation of widespread urban and social decay.
The Patria Lake, salty coastal basin of probable alluvial or volcanic formation, extends about 2.76 square kilometers and has an average mass of about 2,500,000 cubic meters of water. It reaches a maximum length of 2 km and the maximum width of 1.5 km and the depth does not exceed 1.5 m. It also has two soft water tributary channels (Vena and Amore) and it is connected to the sea through an artificial outfall built during reclamation works of the Thirties by deviating the original estuary channel.
In Roman Age, on the shores of Patria Lake there was the city named Liternum. It has been abandoned in the Middle Age and only in the Nineteenth Century archeologists began digging to bring to light the remains. In the city there was the tomb of General Scipio the African who was exiled there and the name of the lake comes from the inscription on his tomb *Ingrata patria ne ossa quidem mea habes* (Ungrateful country, you will not have my mortal coil), of which the oldest and unsuspecting explorers viewed only the word *patria*. Currently only the remains of *foro* are visible, while the archeological area, in which the experts think there are other buried remains, is used as a public park.
The eastern shore of the lake is affected by a strong urbanization. The settlement, grew up in a spontaneously, is characterized by an incoherent road system, by poor spatial quality, by total absence of public spaces and public facilities and by insufficient underground utilities.
The lake waters are highly polluted and this situation should be managed with a specific intervention strategy. Among the causes of this situation, according to various studies conducted over the last twenty years, there are: direct disposal of domestic waste water due to the lack of a sewage system; the pollutants resulting from agricultural activities of surrounding areas that arrive into the lake through tributary canals; the illegal waste disposal by criminal organizations.



Fig. 2: Photos of actual situation of Patria Lake. From left: wooden piers on lake, the pollutants on lakeshore, ruins of ancient town of Liternum, birds on lake, a spontaneous Arundo Donax bush, spontaneous plant species on lakeshore

5.2 Design criteria

The project actions are addressed to environmental restoration of the lake and its surrounding areas as a unique complex ecosystem and to urban regeneration of the settlement developed on the eastern shore.
The project uses phytoremediation technology because it is the best possibility of intervention for an ecosystem already compromised. Phytoremediation allows the disposal of pollutants present in water and soil, through the action of specific plant species. The planting of local plants or species compatible with the wetland ecosystem of the lake, becomes an opportunity to identify specific points where it is possible to concentrate not only purification systems but also the main facilities serving the park. The environmental reclamation is a visible fact, an architectural episode, and it is inserted in spatial systems forming polarities of the park.
Specific design actions-interventions are defined as follows:

1. WOODED STRIP to absorb fine dust and noise produced by vehicular traffic of near suburban freeway
2. PHYTOREMEDIATION SYSTEM to stop pollutant flow from tributary canals Vena and Amore. Sub-surface vertical flow phytoremediation systems are organized along the final parts of the canals; while systems with hydrophyte plants are located at the mouths of canals creating nymphs.
3. RIPARIAN PHYTOREMEDIATION SYSTEM. The spontaneous growth of particular plant species such as Phragmites Australis and Typha Latifolia along the shores of the basin is encouraged to induce natural phytoremediation processes.
4. FOREST consisting of trees for aquatic environments such as holm oak, pine and mastic, capable of lowering the moisture level.

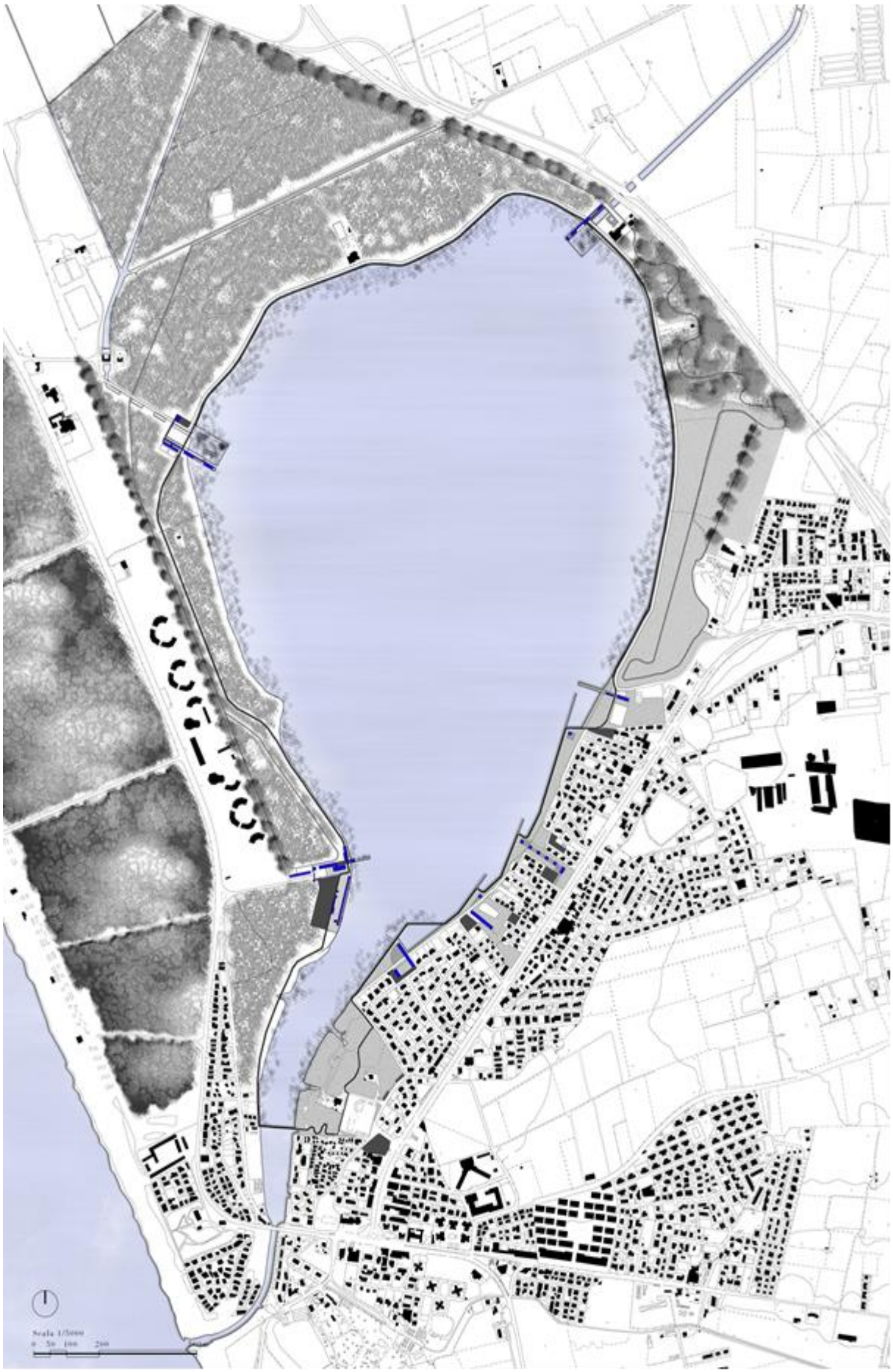

Fig. 3: Plan of Patria Lake with urban regeneration and environmental regeneration interventions.

5.PEDESTRIAN AND CYCLE PATH along the lake to connect to future cycling routes of Domitian way. It crosses the Biomass Park, the urban area interested by urban regeneration located along the eastern shore of the basin.
6. HORSE PATH running through the biomass park and the oak forest and finishing in two circuits connected with two equestrian activities facilities.
7. ACCOMMODATION. The buildings situated on lakeshores, outside of town (that in part host hotels and restaurants) are regenerated and used for tourist activities.
8. PHYTOREMEDIATION SYSTEM FOR DOMESTIC WASTEWATER that actually, because of there is no sewage system, go directly into the lake. The project proposes a system of horizontal sub-surface flow phytoremediation basins with IMHOFF pre-treatment. This system is organized in special tanks that qualifies new eastern lakefront.
9. Regeneration and expansion of ROWING CLUBS through the construction of new parking areas and facilities for athletes and visitors.
10. REGULAR COMPETITION FIELD FOR ROWING ACTIVITIES.
11.BIOMASS PARK. The western and northern lakeshores are converted into a park consisting of Arundo donax, which is a particularly suitable species for bio-fuels production.
12. ARCHAEOLOGICAL PARK. Ancient Liternum archaeological site is used as an urban park where the system of internal routes is connected with new pedestrian and cycle path around the lake.

5.3 Phytoremdiation

Considered the high pollution level of the lake the project uses a local resource to purify the waters of the lake. The Phragmites Australis is a plant species used in phytoremediation systems and it is widely present on the lakeshores.
The project proposes a system of vertical sub-surface flow systems arranged in series, with rooted macrophytes (Phragmites Australis and Typha Latifolia), along the final parts of tributary canals. At tributaries' mouths, the project involves the construction of basins with floating hydrophytes, such as water lilies, which complete the purification of canals water. These basins, designed as nymphs, are an integral part of spatial systems hosting the service facilities for the park.
Along the shores, the presence of Phragmites Australis is implemented to induce natural phytoremediation processes, contributing to the purification of lake water.
Domestic wastewater coming from adjacent settlement is treated through horizontal sub-surface flow phytoremediation basins with IMHOFF pre-treatment. The tanks are designed like real flower beds becoming an integral part of the new spatial configuration of the eastern lakefront.

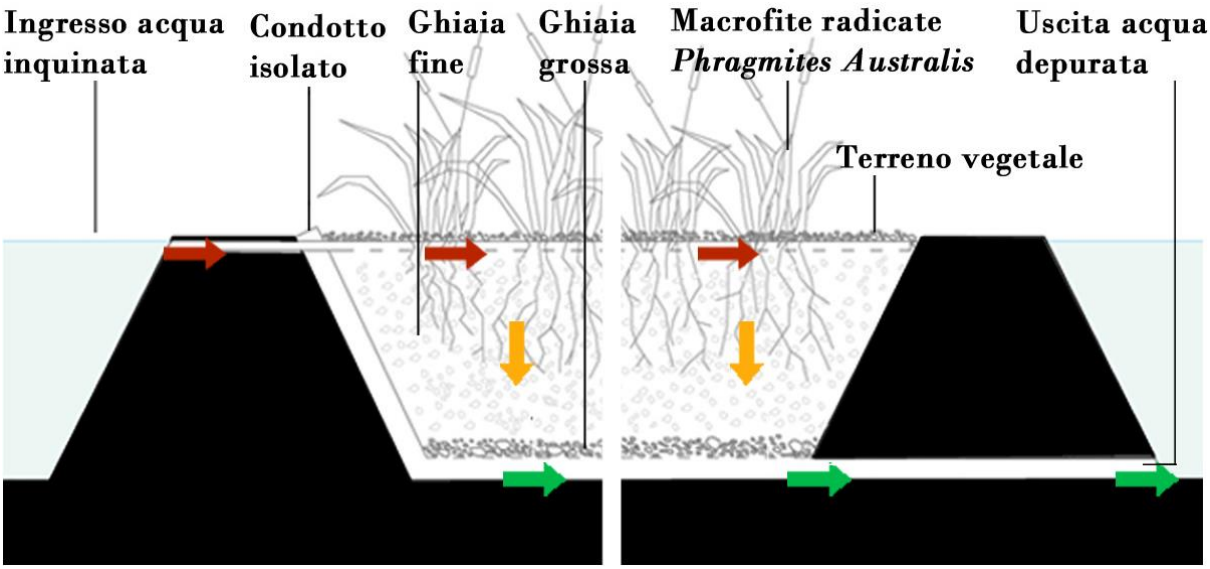

Fig. 4: Functional scheme for a horizontal sub-superficial flow phytoremediation basin.

5.4 Biomass Park

Within the global debate about energy resources, production of ecological timber and dry biomass is gaining an increasing importance. Patria Lake area of is rich in Arundo Donax plant. In fact, they grow on soils rich in water in riparian environments, forming dense bushes along the banks, on the edges of fields and sand dunes.

The species Arundo Donax is an excellent candidate for the production of high quality biomass and biofuels, because it grows very quickly. Arundo Donax is a large size perennial plant producing more biomass than any other grass species. It reaches maturity in about 1 year and, depending on the climate, can be cut and collected from one to three times a year. A field of Arundo Donax can be used for 20-25 years without the insertion of new individuals and without using pollutant fertilizers and herbicides.
For these reasons, the project proposes to increase the Arundo Donax presence on the western and northern shores in order to establish a park producing biomass. The features of a sustainable Biomass Park are the rational exploitation of plants and ecological processes. The cut takes place twice a year, cutting every time 25% of individuals in order to complete a cutting cycle in two years. The cuts can also be made following to specific shapes (parallel strips, concentric circles, etc ...) in order to change the aspect of the park continously.



Fig. 5: A view of pedestrian and cycle path in Biomass Park.

5.5 Facilities

The project framework identifies a series of significant points to place small facilities serving the park. These buildings can be built *ex-novo* or they can be obtained rehabilitating existing volumes.
At the main entrance to the lake from the Domiziana, we realize, integrating existing rowing club and restaurant, a small horse riding field with stables and offices, a porch for trade fairs, new piers for rowing activities and a small building for bike sharing.
At the two mouths of tributary channels there are two small facility buildings, one for sports (multipurpose outdoor playgrounds and spaces for indoor fitness activities) and the sale of goods produced in the park, and the other for didactical activities for children.
Near the access from Via Lago Patria, in the lot occupied by an abandoned rowing club, the project localizes buildings for rowing activities, horse riding stables and a bike sharing.
The buildings (or the building systems) are always perpendicular to lakeshore and they stands for large wooden piers resting partially on the shore and partially on the water. The buildings situated at the mouth of Amore Canal and Vena Canal integrate square nymphs basins. They are designed according to the concept of minimal environmental impact: they have wooden structures and coatings constitutes by ecological materials. The wooden technology allows an easy and fast construction and ensures the reversibility of the building process.

5.6 Urban regeneration for settlement situated on eastern lakeshore

Urban regeneration acts primarily on the existing incoherent road network formed by a system of neighborhood streets (sometimes private) with perpendicular direction respect to the axis of Via Lago Patria. They almost always end in cul de sac and from them it is often impossible to see the water

basin. The project proposes the transversal connection of these roads with two driveways parallel to the lakeshore. The whole system of phytoremediation basins for domestic wastewater, to be realized close to the shore, reconfigures the riparian line setting up a green system and so a new lakefront. The pedestrian and cycle path closes the new waterfront on the west side providing a new opportunity for fruition of eastern shore. The lakefront is also connected to the archaeological site, which is currently hosting an urban park.
Excluding expensive and complicated demolitions of existing buildings, it was decided to act on landlocked free lots and on residual agricultural lands to build transversal green strips connecting functionally, spatially and visually Via Lago Patria, the main access road to the settlement of Patria Lake, with the lake itself. In these green wedges there are, in the form of isolated buildings, collective facilities and small retail spaces with associated parking areas.

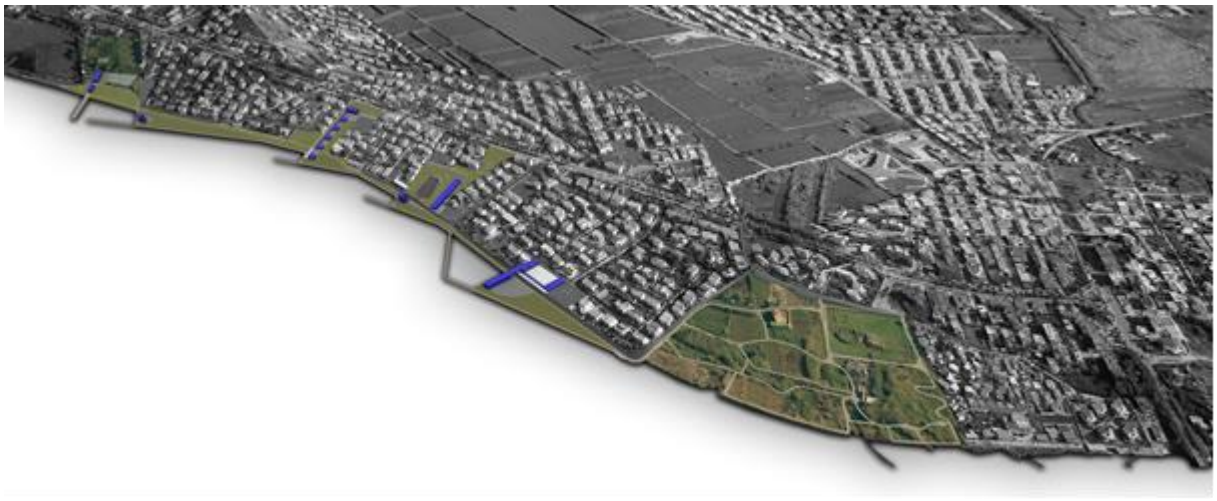

Fig. 6: Areal view of eastern lakeshore with urban regeneration interventions.

6. Scafati PIP area: from inefficient productive site to model in sustainable productions

The project for the reconfiguration of the Scafati PIP area has been developed for research PRIN 2009 named From urbanized countryside to "city in extension": the composition rules of architecture, of territory, of small towns (national scientific coordinator: prof . L. Ramazzotti) and in particular by Prof. F. Costanzo, with whom I collaborated, Research Unit of the Second University of Naples (unit coordinator Prof. C.A. Manzo).

6.1 Actual situation

The Scafati PIP area is cut diagonally by A3 Napoli-Salerno highway, which represents a real physical barrier, and by a water system consisting of three canals of Sarno basin, built for water supply of agricultural fields and for flooding containment. Close to this area is located one of the many water treatment plants built in the last 10 years for the reclamation of Sarno river.
The settlement's urban structure is incoherent and there are a lot of problems about accessibility. The production lots are organized along a main axis in North-South direction. It should be noted that within the boundaries of the PIP area there are many residential volumes.
The plan for PIP settlement was drafted in 2010. It follows, in lots distribution, the boundaries of existing lots and implements the infrastructural facilities but does not realize a clear and recognizable urban structure.

6.2 Design criteria

The project aims to optimize the PIP area providing a new planimetric organization of industrial lots and improving the infrastructural network. In this organization, canals, regenerated and placed in larger strips used as a park, assume a new role in urban dynamics and become structural elements of the system.
The project strategically acts trough phases determining a gradual spatial reform of the settlement, pushing out residential units and re-configuring lots and roads.
The main axis is maintained in its existing split shape and it is flanked by a road system with a parallel direction to suburban road linking the town of Scafati and the town of Sant' Antonio Abate; the free strip identified by these two roads is defined as a green esplanade hosting facilities for agricultural coperatives.

Between the two internal axes arranged in North-South direction, the project organizes new production lots served by a secondary distribution roads network.
Because of its adjacency to Scafati's historical core, the area lying at north of the A3 is transformed into an urban park and can be used as a relational space for the entire city. The new park is in continuity with the great territorial park of Sarno river. The existing factories adjacent to the new park (some of which are now abandoned), are changed into leisure buildings serving the entire city.
The improvement of PIP area also depends on the definition of a modular building-type that can increase using structural steps of 5m. It is designed as an alternation of built and unbuilt bends that host productive spaces, administration and services. This type reinterprets the conventional industrial artifact through the assumption of typical constructive-technological solutions (modularity, prefabrication, expandability, etc ...).



Fig. 7: Actual situation (left) and project plan (right) of Scafati PIP Area. Areas in grey represent park and green spaces.

6.3 Canals as energy infrastructures

Canals, as axes cutting the settlement transversally, are included in park bands 100m wide that represent the boundaries of flood area, as defined by the Basin Authority of Sarno River.
The project uses phytoremediation technology (paragraph 5, subparagraph 5.3) in order to contribute to the purification of Sarno water. It proposes a series of vertical sub-superficial flow tanks along the canals, forming a group of thematic flowerbeds. The surrounding park, set at a lower level than street's level, works as big lamination basin in which, in case of flooding, the water can flow without generating damages for factories. The park is also completely planted with Arundo Donax in order to form fields for biomass production (paragraph 5, subparagraph 5.4) that can be used by people as a sort of productive garden.
Canals, because of polluted water, are currently configured as dangerous environmental detractors, the project, providing for their rehabilitation, aims to build a new urban scheme in which they stand as structuring elements of spatial configuration.

Bibliographical References

[1] Curated by GANGEMI Virginia. *Recupero ambientale del Lago di Patria. Una straordinaria risorsa in abbandono.* Napoli, Luciano Editore, 2007. 160 p. ISBN 978-88-602-6049-9

[2] Curated by CILLO Biagio. *La Scuola di Maratea per il paesaggio*. Firenze, Alinea Editrice, 2011. 108 p. ISBN 978-88-6055-608-0

[3] Curated by MOCCIA Francesco Domenico. *Abitare la città ecologica / Housing ecocity.* Napoli, Clean Edizioni. 2011. 227 p. Collection *Abitare il futuro / Inhabiting the future.* ISBN 978-88-8497-217-0

[4] FIGINI Luigi. *L'elemento verde e l'abitazione*. Milano, Libraccio editore, 2012 (reprint). ISBN 978-88-977-4820-5

[5] Curated by TODARO Benedetto, DE MATTEIS Federico. *Il Secondo Progetto, interventi sull'abitare pubblico*. Roma, Prospettive Edizioni, 2012. 705 p. ISBN 978-88-89400-80-7.

[6] COSTANZO Francesco. *L'Architettura del Campo*. Napoli, Edizioni Scientifiche Italiane, 2007. 179 p. ISBN 978-88-495-1478-0

[7] Referring Web Pages Web: http://architettura.it/architetture/20020219/

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How to manage a urban color plan which takes in account the supporting materials and the conservation state of the buildings

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Abstract
The contribution deals with conservation of the external surfaces and analyses two case studies in which this issue has been addressed through a "proactive" approach, leading to an advanced management tool. While the traditional "piano del colore" regards plasters as a "skin" to be replaced and provide a selection of approved colours and patterns without taking into account the actual state of conservation, in both these examples, preservation is the first choice: the need for a complete replacement has to be justified and a thorough analysis is required to design any intervention (which means choosing the colour, but also the materials and application techniques).
Coccaglio has set up a "conservation plan" to manage the renovation of the facades of the historical center and promote best practices. A web-based platform dedicated to conservation and management of historic buildings has been tested, to manage both private and public interventions and solve critical issues at building and urban level.
Crespi D'Adda was inscribed in the UNESCO List as an exceptionally well-preserved 'company town'. Uniformity should be one of the characters of the site but actually there is a range of different situations: the original plasters are well preserved but over half of the buildings has been compromised with either modern plasters or painting. A "soft rule", that is currently being tested, has been proposed as part of the management plan (currently being drawn), consisting in a set of tools and guidelines.

Keywords: planned conservation, guidelines, management, historic centre, company town

1. Introduction

As is common knowledge, interventions carried out on building exteriors are those most capable of determining the image of a place, leaving a mark in the memory of the community and providing an identity to which it relates, and until recently, exterior surfaces has often been regarded as a matter of "urban quality", without any real attention to the preservation of the existing layers of plasters and finishes [14].
Nevertheless, that idea has been widely revised over the years and today there are many who consider that to be a subject of the field of architectural restoration [8] [11] and a greater attention is paid to existing surfaces in the latest urban planning tools (on this subject, see Regione Liguria, L.R. 26/2003 [1] [13], the experiences carried out in the historic centre of Chiavenna [12] and the so-called "second- generation" urban colour plan, who have given more attention to the material of the technical elements, including coatings [5]).
However, managing conservation in an historical urban context is still a challenge, because of the presence of different situations and different degrees of damage and authenticity. Besides, it is difficult to combine the case-by-case approach established in the field of architectural preservation and currently applied on listed building with the need to find generally applicable rules, that can work in a

complex system, characterized by a myriad of owners who act in different times and often without any awareness or statutory obligation.
The paper presents two different case studies in which a very similar approach has been tested, in order to demonstrate the feasibility (and cost effectiveness) of conservation, even in a broader and more complex context.
Coccaglio is a typical town of the Lombardy plain: a settlement of ancient origins that underwent huge changes as an accidental and uncontrolled urban sprawl and a large amount of rebuilding and renewals. However the inner city conserves several historical evidences, including some listed building.
Crespi d'Adda is a company-town and is as such characterized by the substantial standardization of the workers' houses: none of these was supposed to be more visible or different from the others as well as no worker had to differ too much from the others. None of the residential buildings is listed (despite the UNESCO label achieved in 1995) but there have been no demolitions, new construction or replacements. At first glance, uniformity is the main feature of the site but, in fact, each building is different, due to the renovation work conducted over the past 40 years.
In both cases a "proactive" perspective is assumed since the goal is not to realize a detailed conservation project or offer some ready-made solutions, but rather to encourages good practice, through a guideline to be followed during the planning process. The guideline acts as a "operational guide" for the Building Regulations in force; it suggests a procedure to be adopted and fosters an investment in knowledge, also through the use of cutting-edge tools for data storage and organization.
A thorough analysis on different scales is required since all the interventions need to be evaluated on the entire urban system, taking into account the proximity between the buildings and the character of the whole milieu.
In both cases, we are facing a bet. It is necessary a long process and it is obviously very difficult to change widespread ways of thinking to acquire a different viewpoint and approach, not only in technical-executive terms, but first of all in terms of decision-making, evaluation, management and shared awareness.

2. Coccaglio: guidelines for the facades of the historic centre

Coccaglio is a town that has very ancient origins (castrum, pagus ...), located in the Brescia province between the plain and the Franciacorta area, at the foot of the Montorfano mountain. It was built in a strategic area for communications and trades [7]. Nevertheless, starting from the 50's, Coccaglio has undertaken the same transformations that involved many small and medium town in northern Italy, where, under pretexts as progress, industrial development and the progressive urbanization of agricultural land, has often given way to the processes of decay and neglect on the one hand and destructive processes of speculation on the other. The city experienced a great expansion and nowadays a few traces remain of its ancient past, also because of the urban planning tools, that have systematically disregarded conservation, leading to a progressive loss of the architectural heritage.
There are a few buildings protected through listing but the historical centre of the city, developed over the centuries around the castle and the parish church, has always been considered as a "sum" highlighted by some outstanding monumental buildings, rather than an integrated system, to be kept as such.
In 2011, as a result of an important turn over, the Municipality, granted by Cariplo Foundation in the call "Promoting Innovative Methodologies for Planned Conservation" decided to entrust a working group, composed by municipal technicians and qualified professionals, to set up a guideline for the whole city centre.
A first step in this direction had already been made, by integrating in the municipal Building Regulations with some requirements that the guideline integrates and explains [4].
The starting point was an accurate and analytical phase of knowledge and documentation, based on diagnostic analysis and survey activities of a significant number of buildings of the old town identified as the most representative.
First a laser scanner survey has been performed on a selection of facades, and plasters have been studied in depth in order to assess the characteristics of the layers (stratigraphic investigations, colorimetric measurements and chemical and physical surveys).

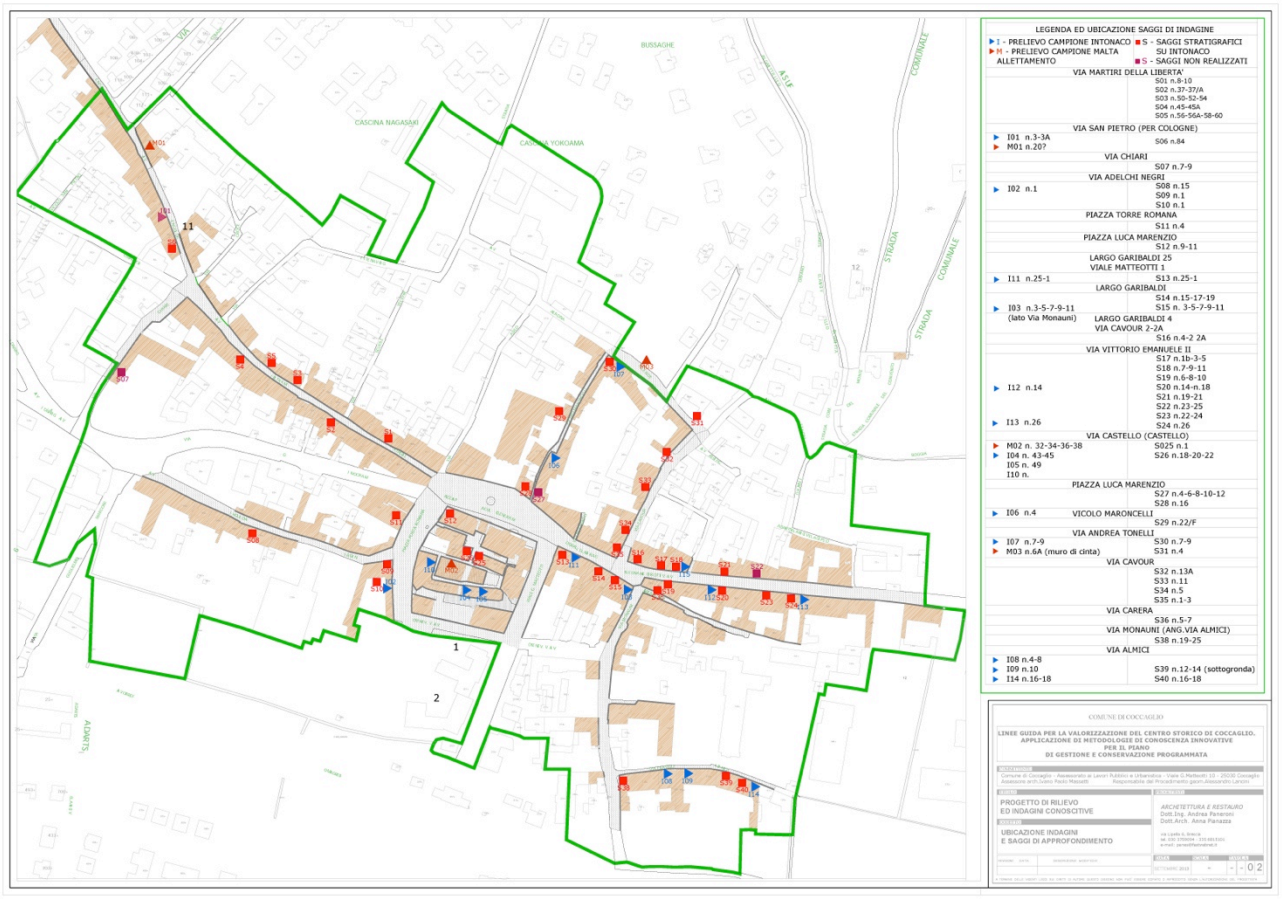

Fig. 1: General plan of Coccaglio with diagnostic analysis indications undertaken

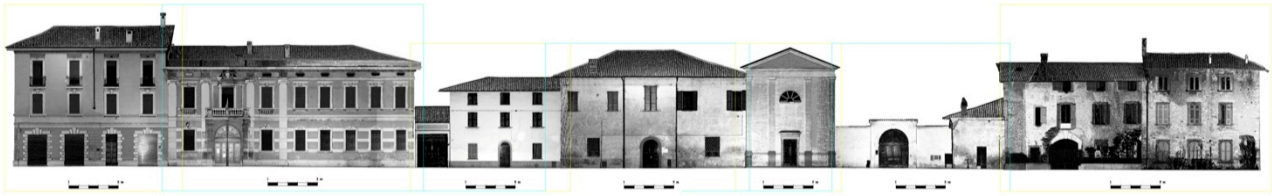

Fig. 2: Laser scanner survey of building curtain (extract)

The data collection, including both historical information about each building and the results of the investigations carried out, has been completed thought an advanced information system, which can be consulted and updated by different users. A web-based platform dedicated to conservation and management of historic buildings, subject of a recent research carried out by Politecnico di Milano-ABC Department, has been tested, to manage both private and public interventions and solve critical issues at the urban level; amongst others, the problem of defining all technical elements on the façades as well as urban furniture has been tackled.
That sample may be implemented in the future but it is important to notice that techniques and tools typically used for monumental buildings were in this case applied on a complex urban environment, allowing the Municipality to implement comprehensive “conservation plans” to manage both private and public facades.
Investigations and surveys were used as the basis for the guideline that provides strategies and intervention policy for the exterior surfaces of the whole city centre, including historic and modern buildings, with different degrees of “sensitivity”, that corresponds to different levels of care.
Four major categories of intervention are identified on the basis of three key indicators: characteristics of the facade, state of preservation and position of the building in the urban context.



Figg. 3 e 4: The fragment of fresco paintings dating from the 15th-century discovered through the stratigraphic analysis

The characters of the buildings of the historic centre can be summarized under the following points:

A. position / perception:

1. single building, in a marginal position, with limited exposure;
2. single building, part of and consistent with the continuous curtain of buildings;
3. building located on a corner, very representative, near to public and important open space.

B. level of conservation and coherence with the historical context:

1. completely replaced or heavily compromised building;
2. heavily renovated building; some elements of the original character of the building are still evident or perceivable (e.g. plaster, frames, stone slabs …);
3. simple historic buildings with authentic materials and architectural elements, already known or studied with diagnostic analysis;
4. complex historic buildings with authentic materials and architectural elements, already known or studied with these diagnostic analysis;
5. Building with very important details, listed or similar to a listed building.

Regular maintenance must be assured for all buildings and specific preventive and conservation measures are recommended for historic buildings, that require a more accurate level of design and diagnostic, while for the new constructions a greater degree of transformation is allowed although the intervention must be consistent with the urban context and the surrounding buildings. In addition, for each building the most significant elements are identified, for which the guideline sets out mandatory requirements and instructions (e.g. specific instructions are provided for the fragments of fresco paintings dating from the 15th-century, found in the stratigraphic analysis under recent layers of plaster and stone portals). Besides, some general instructions are provided, as a support for the local commission (“Commissione per il paesaggio”) in charge of evaluating the projects.
To encourage the adoption of these, an extensive analytical phase is required to be included in the project, starting from the information from the first phase of the project provided in the database, that includes the survey of the facades in a digital format, stratigraphies and samples of the historical plasters and a historical iconographic documentation. Besides, the provision of subsidies and grants is under evaluation.
At the time, the Municipality of Coccaglio is about to approve the guidelines. Nevertheless, the positive outcome of some pilot cases, that have shown the advantages, even in economic terms, of a more conservative approach, allow us some optimism about the impact of the project.

3. Crespi d’Adda, a management tool for the WHS.

Built in late 19th century by the Crespi family of cotton manufacturers to house their workers near the Adda river, Crespi d’Adda is an exceptionally well-preserved example of a ‘company town’. The village is inspired by the most advanced experiences of Saltaire and Mulhouse and combines the philanthropic ideals of utopian socialism with the need to ensure the rational management of a state-of-the-art industry.
In the '20s the huge factory employed over 3600 workers, but just over one thousand of them could live in the village, where the various typologies of buildings reflected the roles and the hierarchies within the factory. The various types of house reflected of the hierarchy within the factory (bourgeois-type houses, labourers’ houses, detached houses for managers and clerks…) and were built by using

low-cost or recovered building materials. Besides, numerous social and recreational facilities were provided to the workers and their families (a church, a school, a doctor's surgery, sports activities…).



Fig. 5 Crespi d'Adda. General view.

In 1930, the Crespi family was forced to sell the village following the worldwide economic depression; the subsequent proprietors provided housing and services to the workers until 1972, when houses were sold to private owners.
Thus, for almost one hundred years the factory owner was in charge of maintenance, and changes were few and done in a coherent way. Between 1939 and 1943 facilities were added to the workers' houses (toilets and storages), the terracotta frames were removed and the houses were repainted, replacing the original straw-yellow colour with brighter colours (red and green).



Fig. 6: Residential building; where it has been conserved, the original plasterwork is well attached to the masonry support and the original faded finishing show signs of "noble" deterioration, or rather, a progressive fading of the material that gradually brings out its transparency

Many houses are still intact but, after privatisation, building works became progressively more frequent and invasive. Refurbishments were driven by functional and aesthetics needs and a large amount of plasters were replaced with modern materials, without even considering the possibility of keeping the original surfaces and materials. Moreover, numerous houses were recolored by owners who were perhaps keen to intervene on the appearance of their house so as to distance themselves from the recurring style of workers' houses and, in addition, the modernization of the houses resulted in a number of changes, as the placement of several pipelines and plants on the facades.



Fig. 7 Recent changes; the exterior of over half of the buildings in the village has been irreversibly compromised with either the plaster being removed or new finishing being applied. These works, even in cases that have maintained colours or materials in keeping with the context, have in any case eliminated important information and have greatly altered the site's appearance.

In 2003, after a long period of hardship, the production ceased and only in 2013 an entrepreneur willing to restore and re-use it acquired the factory. Today about 400 persons still live in the village, mostly former workers and their families.
In 1995, the site was inscribed in the World Heritage List, on account of the perfect balance between landscape, industry and architectural heritage.
The Committee decided to inscribe Crespi d'Adda on the World Heritage List on the basis of criteria (iv) and (v), considering that
"it is an exceptional example of a working village of Europe and North America, dating back to the 19th and 20th centuries, and reflecting the predominant philosophy of enlightened industrialists with respect to their employees. Although the evolution of economic and social conditions constituted an inevitable threat to the survival of Crespi d'Adda, its integrity is remarkable and it has partly conserved its industrial activity".
The management plan, currently underway, is necessary to maintain label and has to be consistent with the justification for inscription on the World Heritage List [9].
In the past few years there has been a growing interest on the subject of the colors and there are many who call for a strict regulation, so as to reinforce the stereotyped and 'picturesque' image of the "ideal" village. What colour must the houses be? Is it better to reproduce (on the basis of historical documentation) the original straw-yellow or should the greens and reds introduced in the 1930s be kept?
As seen above, it would be therefore simplistic to assume that "visual integrity" is the main value to be preserved in the site and "even copying an existing colour is a design activity, just as all past colours were: so replacing the appearance is a minor problem compared to conserving historical quality" [6]; nevertheless, this is a central issue when dealing with the inhabitants, and a "Guideline" about the facades (both public and privately-owned) has been the first outcome of the management plan's preparatory activities, as part of a more complex tool that deals with other urgent issues as refurbishment of homes, energy efficiency and garages [10] [2] [3].
Contrary to people's expectations, the guideline does not indicate the "right" colour or a selection of suitable colour schemes, but propose a "methodological procedure" that helps in choosing the most appropriate materials and application techniques, taking into account the actual state of conservation of the plaster.

There are indeed many recurrent situations in the village, that have been identified through a careful and thorough survey, which covered all the buildings of the village: the original plasters (still existing in about half of the buildings) are well preserved although the rain has almost completely washed colourings away. The remaining half of the buildings has been irreversibly compromised with either the plaster being removed or new finishing being applied. Those changes had a strong impact on the site, since the colour perception depends on the different layers which constitutes the plaster, material and application technique and modern colourings tend to give a uniform and "flat" appearance to the surface and leads to a rapid decay.



Fig. 8: Saturated colour shades made possible by modern colouring tend to give a uniform and shallow appearance and also because the deterioration process, caused primarily by modern plasters, has entirely different dynamics to that of traditional materials.

The Guideline comprises two parts: in the first intervention criteria are provided, establishing both colour and technical principles, along with the practical information needed to draft and present the projects.
The second part contains scenarios, which provides a "project outline" for the most common situations:

1st case scenario: original / traditional plaster in good or fair condition, with fading and detached colour.
2nd case scenario: original / traditional plaster in good or fair condition, with colour that has been replaced recently with polymeric paintwork, RPAC or similar plastic exterior cladding.
3rd case scenario: original/ traditional plaster in poor condition, with faded and detached colour.
4th case scenario: recently replaced plaster, with polymeric paintwork, RPAC or similar plastic exterior cladding.

Each scenario have a validity time period (5 years) and can be redefined on the basis of further information found through investigations and surveys; nevertheless, as a general rule, existing plasters should be preserved and unnecessary and questionable substitutions has to be avoided.
Original plasters in good or fair condition affected by widespread leaching (1st case scenario) can be treated using traditional lime-based paintings and the guidelines suggest regrouping and colour restoration of the faded surfaces by overlaying a semi-transparent layer. By resorting to this technique, it is possible to maintain all characteristic traces of the building, in particular avoiding eliminating signs of alterations made in the 1930s that can still be seen today.
The guideline allows corrective works to be carried out on surfaces that have already been compromised by the application of synthetic materials (2nd and 4th case scenario). In those scenarios, special attention must be paid to technological compatibility, to be verified on the basis of the support conditions and of the context. Polymer paint can be removed and the new finishes (both on conserved and new plaster), should be designed according to the characteristics of the support, avoiding polymeric colouring, unless this is not reasonably practicable.

In the event of conservation not being possible due to previous interventions, loss of support or irreversible disrepair to the support (to be demonstrated through careful analysis), corrective works or the design of new colouring will be required and plasters can be replaced with compatible materials. That situation does not occur today in any of the buildings.
Technological choices must be justified by a careful analysis of the type of support and the context and the colour chosen must meet various criteria, both aesthetic and technical.
Colours are chosen on the basis of indirect documental assessments (past documents and archived evidence of the building) and direct contextual assessment (analysis of the support characteristics, the building and the context). The Guidelines guarantee compatibility of new interventions, since alterations and technically incorrect works are prevented by the initial checks of the design choices (eg, limiting the choice to natural materials too bright colours are avoided).
The analysis of the layers, required in the analysis phase, serves as an indicative reference although the colours found do not necessarily have to be repeated. On the contrary, the chosen colours must be in keeping with the surroundings.
Furthermore, the choice of colour is somewhat influenced by the technical choices. New plaster must consist of a preliminary layer of natural hydraulic lime mortar followed by a top layer of non-hydraulic lime; the non-hydraulic lime layer can be totally coloured, with earthy colours or ground stone. Where there are existing finishes, it is suggested that the existing layers of colour be regrouped and the gaps be integrated in a “film-like” manner, adapting the faded colours with traditional semi-transparent materials. The requirement of using traditional colours prevents excessively dark, saturated or bright colours.
Each design proposal will be assessed by an “advisory committee”, which evaluates the project, and decides whether the analyses are complete and that the choices made are congruent. It will also assess the samples produced on-site (each project must be equipped with samples of at least 70x100cm with the proposed colour).
Finally, the assessment procedure extends to all façade elements, to which the same criteria concerning conservation of the building materials used and compatibility of the decisions made applies.
Restoration of outer wainscoting, decorative and raised elements that are no longer present is not permitted, even if these elements are documented. A database, that can be consulted and updated, that assigns a file to each of the buildings in the village and that can be used to collect information and progressively monitor changes, inspection results, maintenance activities and alteration requests.
At the time the guidelines are being tested on a few pilot cases waiting for the final adoption.

Bibliographical References

[1] AMIR Reza Arya, DELLAVEDOVA Patrizia, POLETTI Michela, Una nuova generazione di Piani del colore, in “Progetto colore. Città a colori”, p.12-13, n.42/2008.

[2] BORGARINO Maria Paola, Il sito UNESCO di Crespi d’Adda. Attività propedeutiche al piano di gestione, in Peghin Giorgio, Sanna Antonell (ed.), *Il patrimonio urbano moderno. Esperienze e riflessioni per la città del Novecento*, Umberto Allemandi & C., Torino, 2011, pp. 115 – 120, ISBN: 88-422-2107-4.

[3] BORGARINO Maria Paola, The Crespi d’Adda World Heritage Site. Activities Leadig up to the Management Plan”, in Peghin G., Sanna A. (ed.), *Modern Urban Heritage. Experiences and reflections for the Twentieth- Century city*, Umberto Allemandi & C., Torino, pp. 115 – 120, ISBN: 978-88-422-2108-1.

[4] BOSSI Stefania, DELLA TORRE Stefano, PANERONI Andrea, PIANAZZA Anna, Linee guida per la valorizzazione del centro storico del comune di Coccaglio. Applicazione di metodologie di conoscenza innovative per il piano di gestione e conservazione programmata, in FIORE Vittorio, CASTAGNETO Francesca (ed.) *Recupero, valorizzazione e manutenzione nei centri storici*, Siracusa, Letteraventidue, 2013, pp. 110-113, ISBN 9788862420846.

[5] DE GROSSI Francesca, I piani del colore, in PRACCHI Valeria (ed.), *Lo studio delle tecniche costruttive storiche: stato dell’arte e prospettive di ricerca*, Como, Nodolibri, 2008, pp. 101-118, ISBN:978-88-7185-149-5.

[6] DELLA TORRE Stefano, Colore o spessore, in FIORANI Donatella (ed.), *Il colore dell’edilizia storica*, Gangemi, Roma, 2000, p. 45- 49, ISBN:88-492-0098-6.

[7] ESPOSITO Cesare, *Coccaglio, la sua antica strada e riflessioni sulla "militare" romana in Franciacorta*, Bornato, Fausto Sardini Editore, 1986.

[8] FABBRI Rita, Oltre *il colore. Manutenzione delle cortine edilizie nel centro storico di Ferrara*, Ferrara, Edisai, 2008, ISBN: 88-95062-56-6.

[9] GASPAROLI Paolo, *Crespi d'Adda: dal piano di gestione UNESCO alla valorizzazione culturale*, in "Il Progetto Sostenibile", n.22-23, 2009.

[10] Indicazioni normative per il progetto delle superfici esterne degli edifici e degli spazi pubblici di Crespi D'Adda, Comune di Capriate S. Gervasio, 2008, Politecnico di Milano- Dipartimento BEST, proff. Della Torre Stefano, prof. Gasparoli Paolo.

[11] MURATORE Oliva, Il colore dell'architettura storica: un tema di restauro, Firenze, Alinea, 2010, ISBN:978-88-605-5507-6.

[12] PUTIGNANO Francesca (ed.), *Qualità urbana. Recupero e valorizzazione dei centri storici: il progetto CulturALP*, *Atti del convegno, Chiavenna, 19 novembre 2005*, Sondrio, 2007.

[13] REGIONE LIGURIA, L.R. 26/2003, "Città a colori. Modifiche alla legge regionale 5 agosto 1987 n. 25"; Delibera n. 741/2004, Indirizzi e prescrizioni per le Amministrazioni comunali per la redazione del Progetto colore di cui alla L.r. n.26/03 "Città a Colori" e prescrizioni allegate alla delibera, http://www.regione.liguria.it/argomenti/territorio-ambiente-e-infrastrutture/edilizia/citta-a-colori.html.

[14] ROMEO Emanuele, Gli esiti dei "Piani del colore" in Piemonte: centri storici tra "abbellimenti" e grandi eventi, in Giambruno Mariacristina, *Per una storia del restauro urbano. Piani, strumenti e progetti per i Centri Storici*, citta studi edizioni, Novara, 2011, ISBN:978-88-251-7308-6.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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SURVEY OF 'LIBERTY' IN MILAN, 3D PRINTING FOR THE RESTORATION OF DECORATIONS

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Abstract
The survey of villa Faccanoni-Romeo, important example of Liberty architecture in Milan, designed by Giuseppe Sommaruga and built in 1912, was undertaken on the occasion of the centenary of its construction. The work was done at the request of the current users (Columbus Hospital) to create a useful digital parametric model, for long-term maintenance of the façades and decorations.
Carried out using direct and topographic measurement techniques, the survey was modelled using Revit parametric software, integrated, as far as possible, with Rhinoceros and related applications. Thus, a database useful for the management of future construction projects was also created.
Following the survey of the façade materials and the 'typing' of the construction elements, these data were transferred to the digital model for quantitative computation, where a study of the shadows during actual sunlight conditions was developed using georeferenced climatic data.
Particularly interesting was the digital modelling of the floral decorations and the transformation of the column bases into physical models.
Here we document the development of the physical model from the photographic relief. This procedure is interesting for its possible applications to restoration. The reconstruction of damaged or destroyed decorations using 3D printing is possible.

Keywords: survey, digital parametric model, 3D printing

1. Preface

This project was developed on the occasion of the centenary of the construction of villa Faccanoni-Romeo, designed by architect Giuseppe Sommaruga in 1912. This is one of the most important examples of the Liberty style in the city and one of the few works in Milan by the architect, who worked mostly in other cities in Lombardy. The building was designed by commission of the engineer Faccanoni, as a country home for his family just outside the city.
Following the latest post war urban development, the villa, being adjacent to the former Fiera di Milano convention centre (now relocated to the new Rho Fiera exhibition area, designed by Massimiliano Fucsas) has been recently involved in the City Life urban requalification project, in its completion stages of the residential and office buildings and skyscrapers designed by the architects Liebskin, Zaha Hadid, Isozaki.
Shortly after its construction, the villa was sold to the Romeo family, which had just then initiated the manufacture of Alfa Romeo automobiles on an industrial scale. In the 1950s, the family devolved the villa to a female religious congregation, the Cabrinian Missionary Sisters, who had cared for a severely ill member of the family for a long time, in order to let them continue their mission in a suitable facility. Over the years, the villa has remained with the congregation. It is today known in Milan as the 'Columbus Nursing Home'.
The different uses of the villa over the last century has caused only a few changes to its interior layout and has left its façade unchanged, as a precise reflection of the project drawings (Fig. 1).

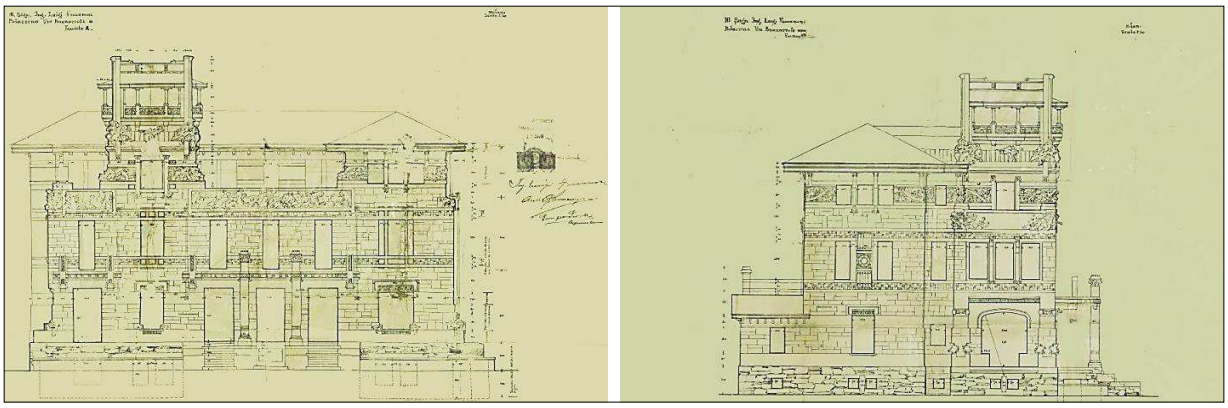

Fig. 1: The drawings in scale 1:100 of the Sommaruga design project of the main façade, (Civic Historical Archives of the Municipality of Milan, Castello Sforzesco, Milan)

The archive search, undertaken at the start of the survey, acquired Sommaruga's original project drawings, from which it was possible to check their correspondence to what was built, even in the choice of the materials and the decorations.
Indeed, the subsequent requirement for a real healthcare facility was met by the Cabrini Congregation, by building a new hospital building behind the villa in the large surrounding garden and leaving the Liberty structure for use as the sisters' residence and administration offices.
The design project for the hospital building, not included in this survey presentation, was assigned to Gio Ponti. Therefore, the complex is a unique example for the city as it is a direct record of the evolution of Milan architecture from the Liberty period to the Modern Movement.

2. Purpose

The purpose of the survey of villa Faccanoni Romeo arose from the concomitance of two factors. In the first place, the Columbus Hospital wanted to obtain graphic documentation of the building that was as complete and accurate as possible, in anticipation of maintenance operations that were gradually becoming necessary for this hundred-year-old structure. Its cultural value, protected by environmental restrictions, the peculiarity of the historic materials used and, last but not least, its public function, imposed a careful control of the works and expense planning. Hence, a survey became necessary. However, not just a 'static' survey based on traditional measurements but one that could be used to easily plan and manage restoration work on the façades over the time.
The Columbus Hospital's intentions were consistent with the educational objectives found in the Milan Polytechnic Construction Engineering Department's '3D Modelling' degree programme, which provided for the application of modelling software to the survey of historical buildings. This Liberty style building, with its complex forms and distinguished by its 'exuberant' decorative scheme (Fig. 3), not only become the subject of a particularly interesting research project but was turning out to be also quite challenging. In this context, the students, in their last year of study for the first level degree, discovered a suitably complex laboratory where they could apply and verify their learning.
The main objective was the development of parametric drawing files that would enable the setting up of a database to be used as a tool by which scheduled maintenance of the building could be planned over the time.
Given the façade's decorative complexity, there was a secondary purpose as an offshoot of the primary objectives: the verification of the possibility of the integration of the different software programs required for the survey into one parametric model.
The possibility of the use of a digital model to create a physical model of the decorative scheme was also to be explored, trying out the most appropriate techniques and tools to reproduce the decorative features quickly [1].

3. The Sommaruga project drawings

In Lombardy there are two villas designed by Sommaruga commissioned by Faccanoni. The first had been built just a few years earlier, in 1907, at Sarnico, while the second was built in 1912 in Milan and is the subject of this survey report.
Sommaruga's original project drawings for the Milan villa are preserved at the Milan Civic Historical Archives at the Castello Sforzesco of Milan.
They include plans, elevations and sections in scale 1:100 and 1:200, in addition to construction details of the wrought iron fencing, made by Mazzuccotelli, a well-known artist and smith of that era in Milan, who also contributed to the work on other decorations on Sommaruga's buildings (Fig. 2).

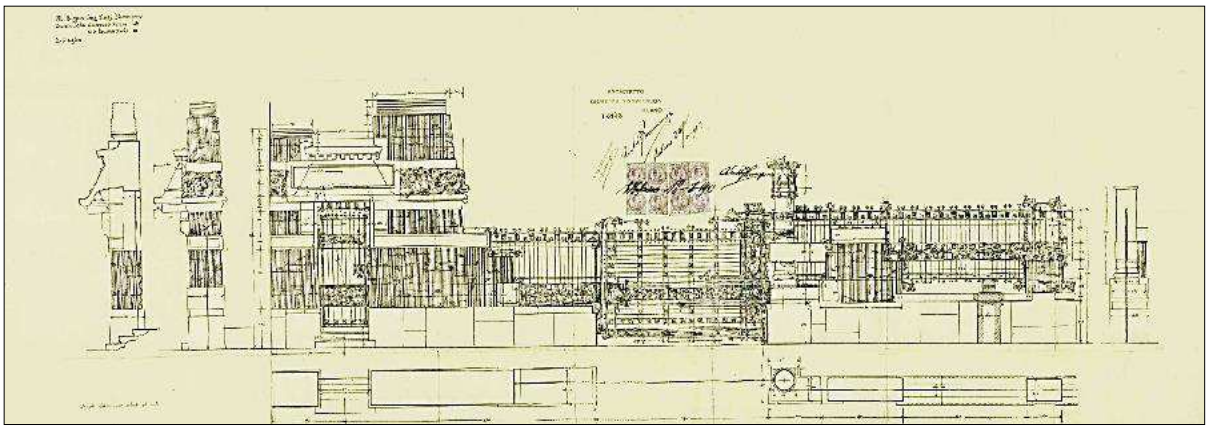

Fig. 2: Detail of the wrought iron fencing, by Mazzuccotelli in scale 1:50 (Civic Historical Archives of the Municipality of Milan, Castello Sforzesco, Milan)

The plan of the top floor, which exists only in scale 1:200, is poorly defined. Perhaps this was expecting additional instructions from the principal, and it was probably completed midway.
The cladding on the façades used stone in different colour tones coming from Lombardy quarries, combining different sized elements with different surface treatments from split to bush hammered.
Different materials were also used for the decorative scheme: bas-relief cement for the columns and balconies, horizontal strips of coloured ceramic with wrought iron used for the fencing, balustrades and parapets. One of the side elevations was subsequently adorned with two statues, previously located on the facade of another building designed by Sommaruga, Palazzo Castiglioni, Corso Venezia, Milan.
The two large figures, by Ernesto Bizzarro, symbolising peace and industry, were subject of discussion among citizens, both because of their large size (more than two metres high) not justified by any function (for example, as supports such as caryatids for a portal or a balcony) and because they were partially nude and considered too provocative. For this reason, Palazzo Castiglioni was ironically nicknamed, in dialect, 'la *Ca*' *di ciapp' [the House of cheeks].*
Therefore, it was decided to relocate the statues to the site of another of Sommaruga's works. They were placed on one of the less visible façades of villa Faccanoni-Romeo, turned toward the inner garden (Fig. 3).
All of the drawings include dimensions, which for the most part correspond to what was built.

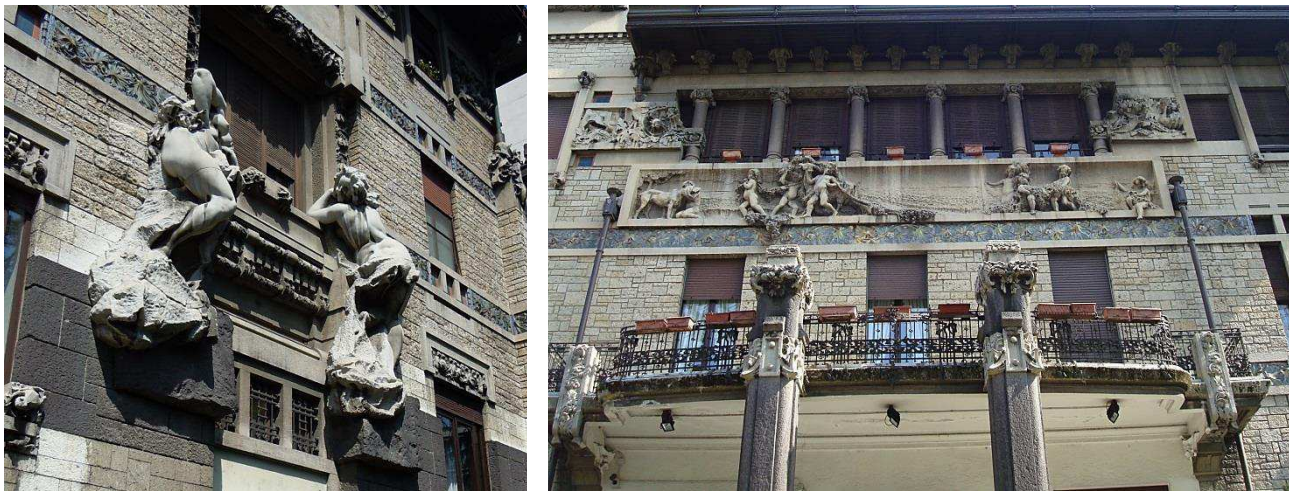

Fig. 3: The statues, initially located at Palazzo Castiglioni in Milan, and now placed on the villa's side façade. A detail of the decoration on the main façade

4. The survey parametric model

The parametric model of the building was developed on the basis of instrumental and direct measurements. BIM modelling software was used for the graphic rendering of the entire building. 3D CAD modelling was then added, for the rapid prototyping of the decorations in cement, using image treatments, for the colour studies in addition to the rendering of the building [2].

4.1 Survey of the measurements and the façade elements

The instrumental survey of the measurements was performed by combining topographic and photographic techniques. Only certain verification measurements and those in areas not accessible to the instrumentation were taken directly.

The instrumental survey, not being within the subject matter studied in the '3D Modelling' course, was undertaken by a study group coordinated by Prof. Carlo Monti [3]: "During the initial on-site survey phase, 7 laser scans were made so that all of the surfaces of the villa's two combined elevations could be covered. Those points so acquired were then imported into the dedicated software one by one and subsequently memorised, in order to obtain one single high-density point cloud (about 700 million points). The joining of the data surveyed from different angles enabled any shadow areas in the individual scans to be filled in." [4]

This way, the discreet 3D point surface could be navigated and measured: "…some orthographic projections were developed (Fig. 4) for the digitalisation of the elevation (the colour was given by the surface reflectance of the laser) of the façade. The resolution of approximately 5 mm enabled the features of the wall texture to be read" [5].

Direct survey measurements (as in all of the subsequent 3D modelling) were made by the students. In addition to the standard utility measurements, the different types of construction and decorative elements featured in the façade were surveyed and classified.

A schedule was constructed, in order to create an initial database, which included, for each type: measurement specifications, materials used, surface treatment, the colour and the location on the façade (Fig. 5)

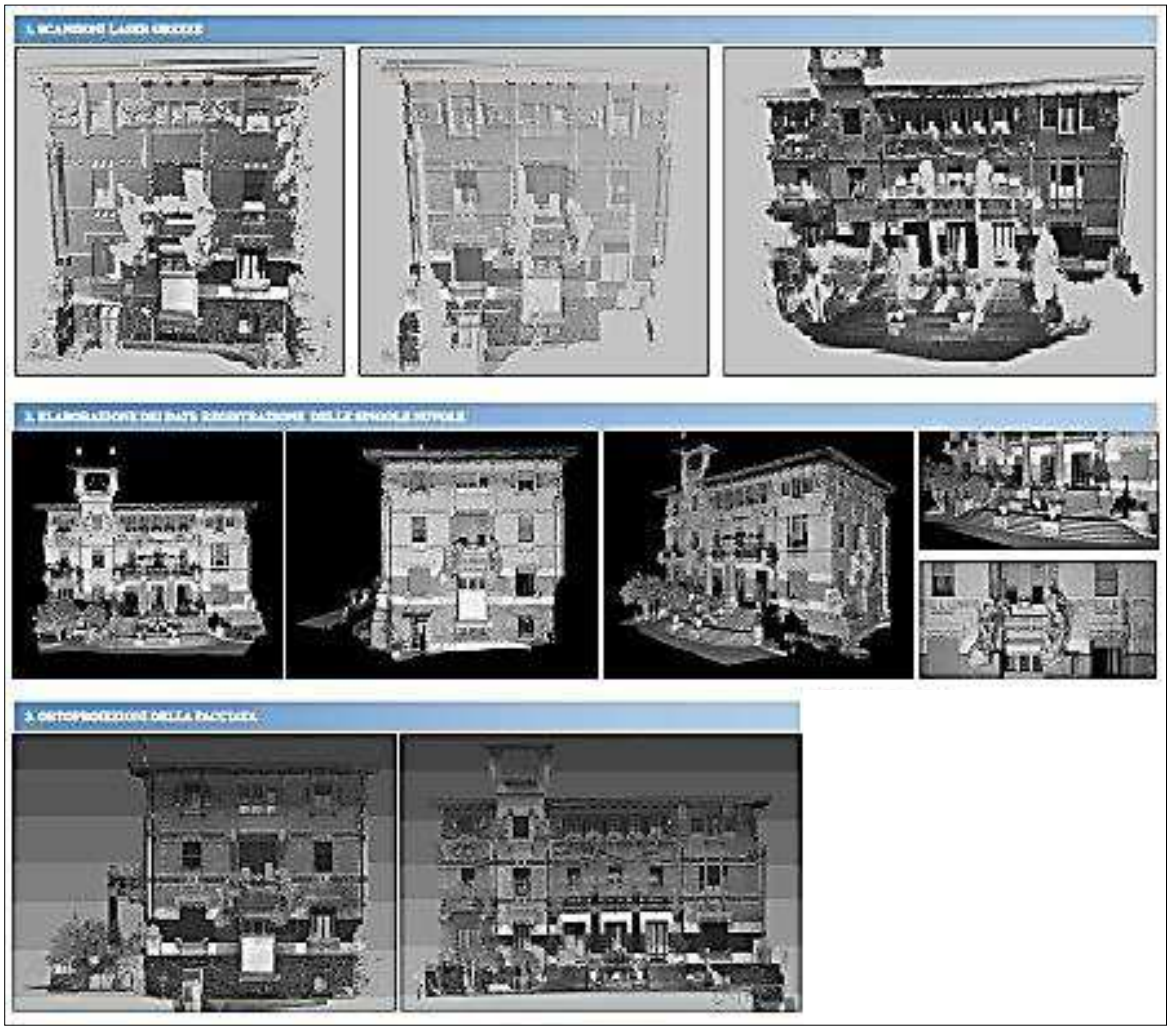

Fig. 4: Topographic survey images

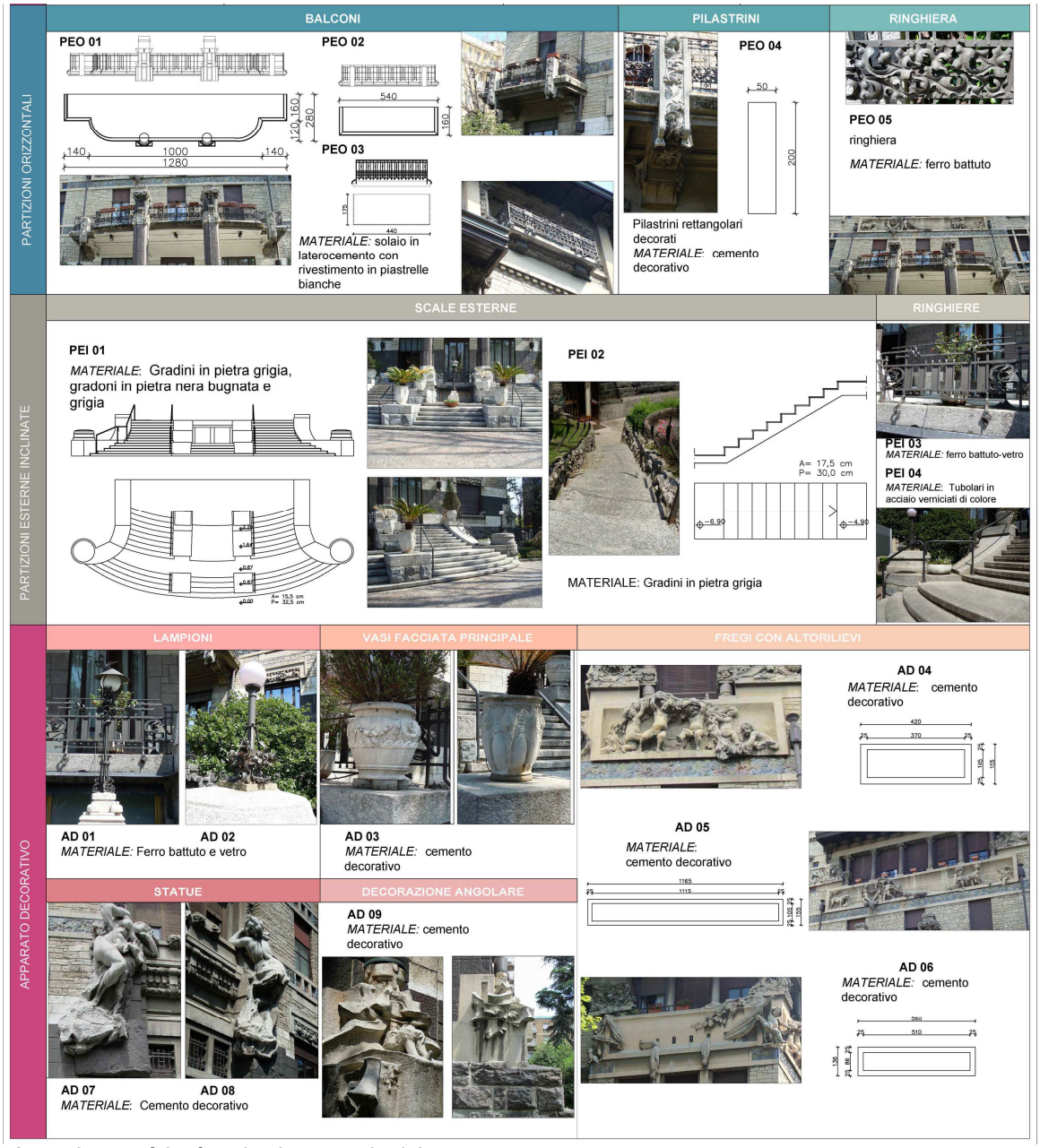

Fig. 5: A part of the façade element schedule

4.2 Creation of the digital model and the database

The measurements obtained from the direct and indirect survey were used to generate the digital model in the BIM environment.

Several families for each type of façade construction element were created. The parameters for each family were identified considering that the software's application flexibility would permit any new features that may be deemed useful to be added later. Attention was given to the more complex aspects of the Liberty façade, assessing the most recurrent maintenance needs, made up of the bill of quantities for the works to be completed.

Therefore, those parameters useful for the measurement of the surfaces and individual elements were listed for all of the families, giving special attention to the façade cladding materials and the decorative scheme. Indeed, the presence of the strips with ceramic and cement bas-reliefs introduced significant problems for two reasons: they could not be drawn in their true form due to the graphic limitations of the software available, and consequently, they could not be parameterized. The problem was solved by integrating model processing from other software [6].

For the database, the decorative scheme was represented using schematic forms to which parameters useful for the computation have been attributed. Instead, for the three dimensional model and the elevations, photographic surveys were undertaken and elaborated using image processing so that they could be integrated with the schematically represented forms for the database. With the digital model thus completed, some applications were developed.

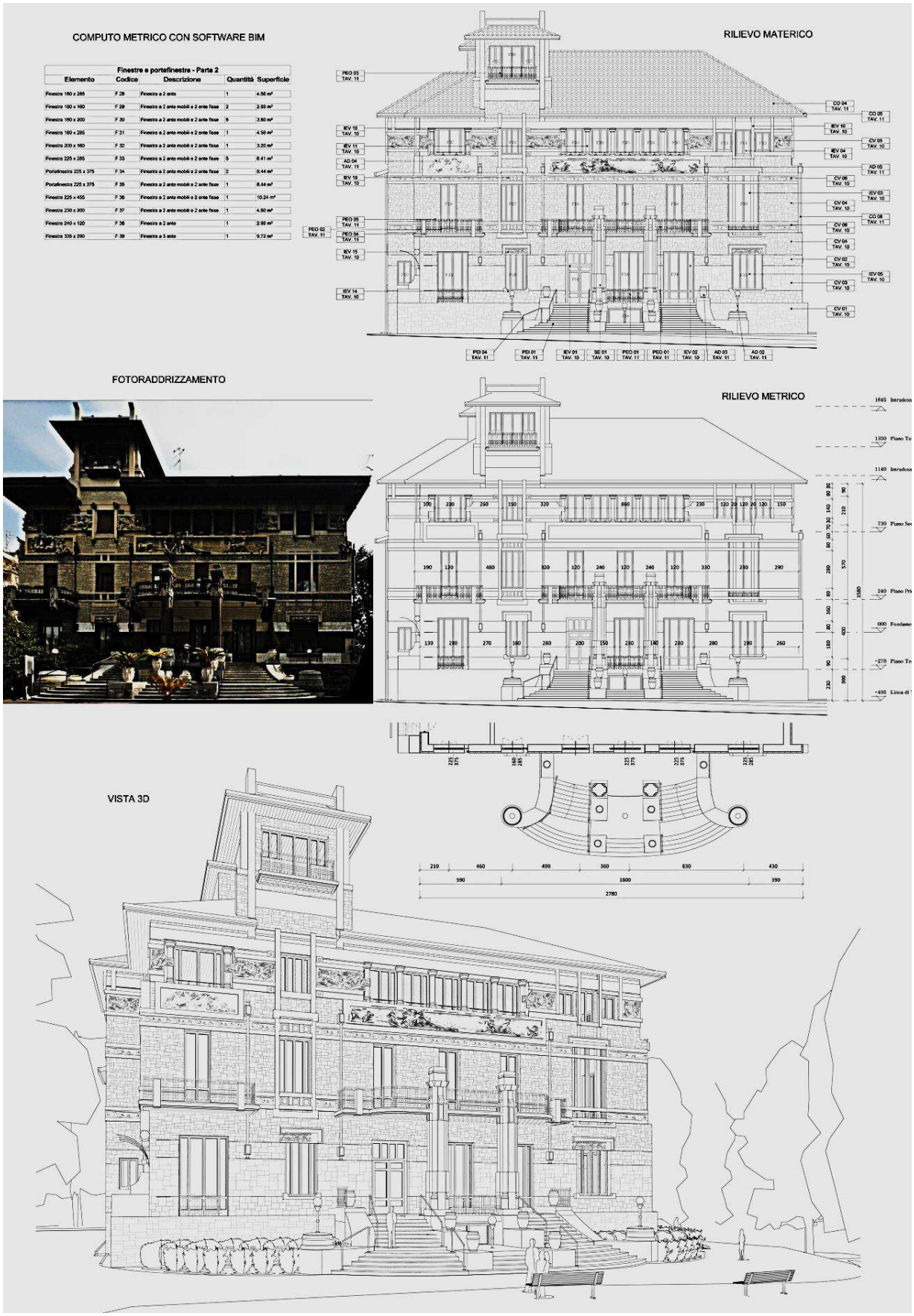

Fig. 6: Images of the digital model: in the centre, the image rectification and the simplified elevation, without the sculptural decorations, for the creation of the database. Above, the codification of each element and the computation table. Below, the 3D visualisation

5. Application of the parametric model

The aim was to check how the digital models generated in BIM might be used for different purposes and by way of suitable processing, in order to obtain results useful for scheduled maintenance of the building to be planned over the time. In addition to the transformation of the physical digital model described below, some of the more common applications were developed, in order to verify its practicability in an historical building with such a complex façade.

5.1 Bill of Quantities

The bill of quantities for the accounting of the works and the activities connected thereto was easily obtained by consulting the database previously implemented. Each material of the façade was assigned a code as an expression of the calculation parameters. As is clear in Figure 6, the codes assigned to each element were indicated in the elevation. On the left, there are the tables generated by the query, where the different parameters used and quantified can be found. In this way the total of all of the elements and the specific location of each on the façade are easily legible.

5.2 Sunlight study

The sunlight study was performed assuming the actual conditions of the context in which the building is located. By way of an automatic geo-referencing connected to the Internet, it was possible to locate the building in this context and import all of the parameters required to transfer the actual position of the sun to the database. Actually this in reality is a quite simple operation that enables the automatic display of the sun's route and the shadows of the building for each day of the year, at any time. Figure 7 shows some 'views' of the building at different times on Saturday 23 June 2012.

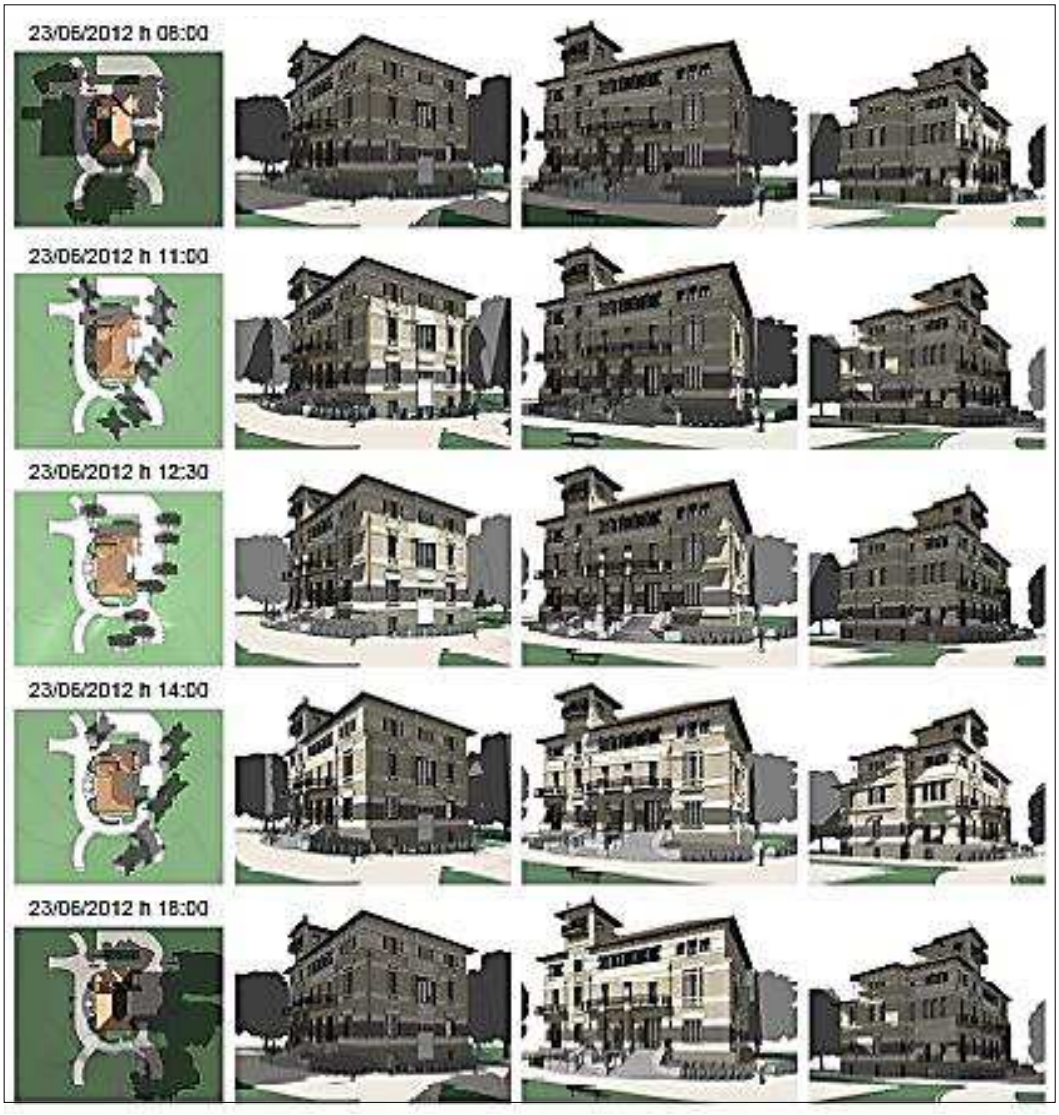

Fig. 7: villa sunlight study on 23 June 2012.

5.3 Rendering, colour and walk through

The creation of databases integrated with the digital model, processed in this manner, made the graphic rendering of the many decorations, which characterise the façade, problematic, even those in high relief, including the two large statues moved from Palazzo Castiglioni and located on one of the sides.

In terms of setting up a digital model that can also represent the Liberty style of the building, it was however necessary to be able to view all of the decorations that are featured on all the façades of the villa. Acquisition of the topographic survey required the use of expensive procedures and instrumentation, (which now, just two years later, are much more easily obtained), which were not appropriate for the course of study. A simpler solution was therefore chosen. This comprised the adoption of commonly used software, dedicated to the digital processing of photographic images. The results obtained were still much more limited and related to two-dimensional images, as the two files generated in different environments could not be integrated. To complete the rendering it was necessary to acquire the colour of the different materials making up the façade, by direct survey (Fig. 8).

The rendering thus processed was also used to create a virtual visit around the outside of the villa following a route that runs through the large garden surrounding it.



Fig. 8: Rendering of the building with a view of three façades

6. The physical model for restoration of the decorative cement

In terms of future scheduled maintenance façades of the villa, the idea to create a physical model from the digital model arose.

However a reduced scale model of the entire building was not the aim. Rather, attention was to be given to the façade decorations. In fact, their deterioration caused by environmental agents or any damage incurred over the time often requires either their partial reconstruction or total replacement. In this case, the physical model, elaborated from the digital model created from the survey of the still intact object, would be of great assistance for any future restoration work.

It is not by chance that buildings with a certain historical significance are beginning to develop their own digital model archives, generated using topographic surveys, in anticipation of maintenance and restoration works, so that the original form of the building may be brought back (see, for example, the surveys of the spires on the Duomo of Milan, performed by the work group coordinated by Prof. Carlo Monti, Politecnico di Milano, ABC Department).

Therefore, it was decided to undertake a simulated digital survey to create the physical models of the villa's decorative elements, taking as a reference point the base of a column in decorative cement used as a support for the main entrance portico. The work was developed in successive survey, modelling and rapid prototyping steps.

During the instrumental survey phase, "... 160 photographs were taken. Appropriate target points were applied, in order to improve the identification of uniform points on the images and to enable metric scaling of the model." [7] Processing of the images "... was undertaken using orientation and image-matching operations performed automatically by specific photogrammetric software.

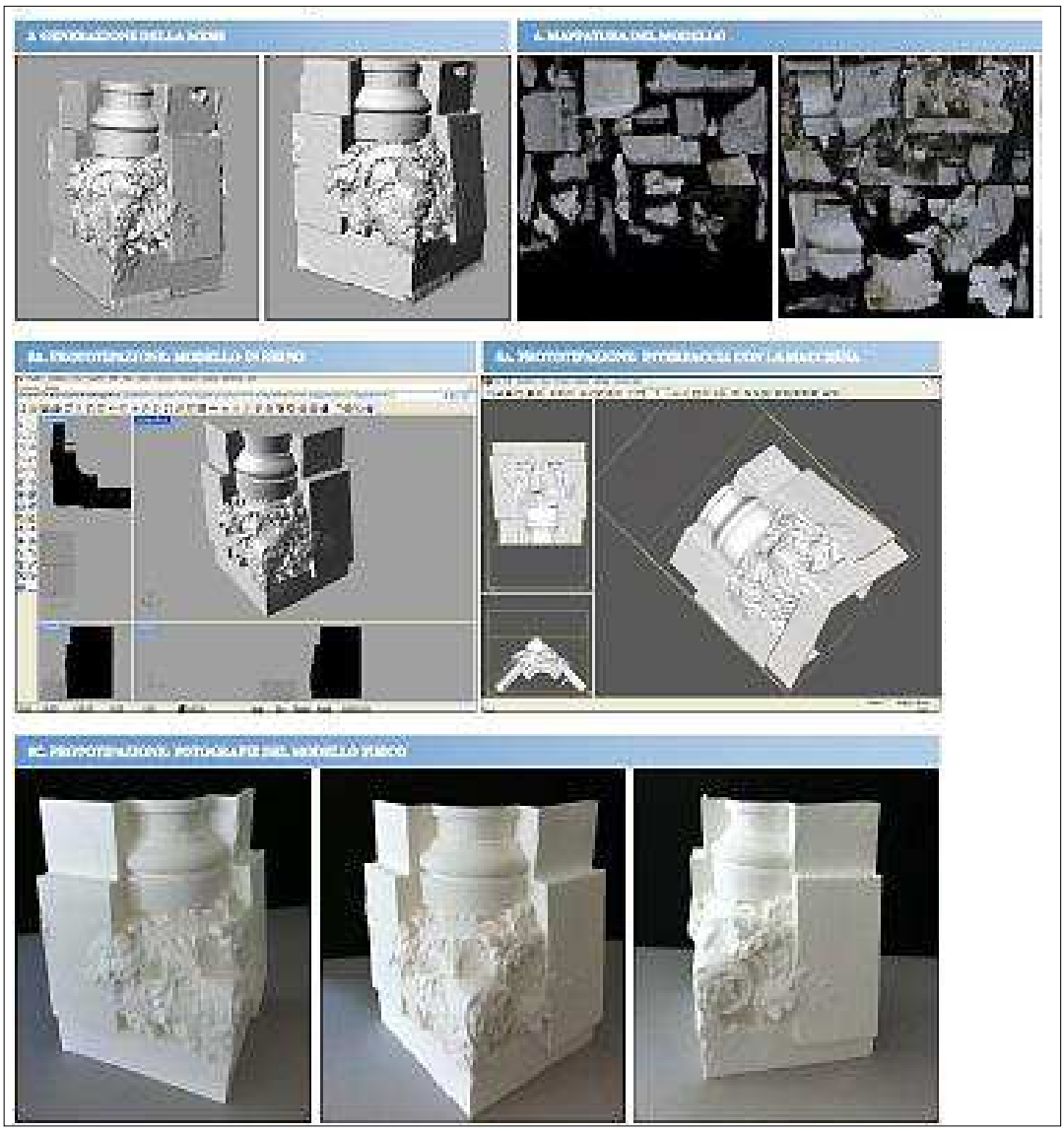

Fig. 8: The main phases of the 3D printing of the base of a column from the villa Faccanoni Romeo designed by Giuseppe Sommaruga

A 300,000-point cloud was extracted and the results obtained generated a mesh (of about 600,000 triangles), which is manageable using three-dimensional modelling programs. In addition, in order to obtain the display of realistic photographs of the model, a texture was added to the processed mesh." [8]
During the digital modelling phase, the meshes prepared were acquired by the free-form modelling software, which generated the surface of the column base chosen for 3D printing [9]. This was subsequently changed and then transformed into a solid model. For this purpose, an appropriate thickness was assigned to the 3D print out of the model. The print interface conditions required by the rapid prototyping machine were also considered.
In the final 3D printing phase, the model was sent to the rapid prototyping machine [10] for the creation of the physical model, which was created in just a few hours and was extracted ready to use.

7. Conclusions

The survey of the villa Faccanoni Romeo was undertaken, in order to verify the rendering of a digital model of an historical building. The choice of Liberty architecture turned out to be a very useful test field, because of the variety of the materials used and, above all, because of the morphological complexity of the decorations. Attention was given to the nodal points in the graphic processing and to the interoperability of the software, which was necessary to use for the representation of all of the features of that specific building. It was found that BIM environment modelling offers, even for existing structures, the possibility to create or update databases over the time: certainly useful for future scheduled maintenance procedures.
Nevertheless, at the time of the development of the work, the integration of the files generated in other environments created problems linked for the most part to the transfer of the data from the decorations surveyed instrumentally into the BIM environment, mainly due to the complexity of the methods and the equipment to be used.
The hoped solution of being able to use simpler procedures and equipment has been pursued over the last two years, achieving the objective through encouraging innovations, which can be further developed. In this, the rapid prototyping of the building or parts of it (as in the case of the base of the column) may substantially contribute to the precision and the simplification of the files, because of the simplicity of the language required by 3D printing machines, still and regardless of the manufacturing flexibility achieved by mechanical production [11].

Bibliographical References

[1] See, in this regard: PIGNATARO Maria, *Modellando-Modellando: modello digitale e modello fisico, esperienze e riflessioni sul ruolo della rappresentazione. [Modelling-Modelling: digital models and physical models, experiences and reflections on the role of representation].* Milan, Maggioli, 2011, p. 126

[2] For the construction of the digital model these software were used: Revit 2012; Rhinoceros 2012; Photoshop 2010.

[3] All of the instrumental surveys and the processing of the points cloud were performed by the researchers, Francesco Fassi and Antonio Mandelli, coordinated by Prof. Carlo Monti, Politecnico di Milano, ABC Department – School of Construction and Architectural Engineering.

[4] FASSI Francesco, MANDELLI Antonio, in *Poster* presented at the exhibition of graphic projects held at villa Faccanoni – Romeo, on 23 June 2012.

(5) See note [3].

[6] Matteo Cattaneo, certified Revit teacher, participated in seminar classes.

[7] A Canon EOS 5D Mark II digital still camera with a Canon EF 35mm f 2 lens was used (resolution 21 mega pixels, calibrated in the SITECH laboratory at the Milan Polytechnic – ABC Department).

[8] See note [3].

[9] Riccardo Gatti, certified Rhinoceros teacher, participated in seminar classes.

[10] A ZCorp machine was used, which works with a reservoir of gypsum starch and has a 25 x 36 x 20 (h) cm printing chamber. The machine is part of the equipment at the Prototype Laboratory of the Lecco Territorial Annex of Politecnico di Milano. www.laboratorio-prototipi.lecco.polimi.it

[11] See, in this regard: PIGNATARO Maria, *Freeform modelling and rapid prototyping,* in Pignataro Maria, by, *Mo.Di.Phy. Modelling from Digital to Physical. Innovation in design languages and project procedures*. Milan, Maggioli, 2013, p. 30-36.

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Armenian experiences in consolidation of ancient buildings: the study cases of Anberd, Tatev, Arudj and Ani

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Abstract
The ancient Armenian culture offers a wide number of historical buildings, that show interesting technologies and materials adopted during the construction phases.
In the least decades, some of these ancient heritages have suffered an evident structural deterioration, especially due to seismic events. In some cases, the structure has even reached local or global collapse.
Herein, four study cases are shown, analyzing some consolidation interventions proposed by the author.
The first case deals with the ruins of Anberd Castle. The ancient stone walls were subjected to a strong degradation phenomenon of washout, especially for the joints of mortar. Furthermore, some local overturns of the walls occurred due to out of plumbs and lack of material in the foundations. To prevent collapse mechanisms of the structure, among the consolidation interventions, the use of steel cable stays has been proposed.
The second case deals with Tatev Monastery. In 2002, the new use of the buildings, as well as the seismic vulnerability of the area, forced to reconsider the structural qualities of the buildings in order to assess the needed strengthening works. Some geotechnical interventions and consolidating solutions for the masonry structures have been proposed.
The third case has to do with Arudj church. Local kinematics have been detected during the survey, so that a global intervention of chaining to restore an overall “box-like behavior” has been proposed. Furthermore, the re-construction of the collapsed lantern and dome by a new steel and glass structure has been suggested.
The fourth and last case concerns the ruins of Ani, where several innovative applications of the RAM “Reinforced Arch Method” have been proposed.

Keywords: Seismic vulnerability, collapse mechanism, consolidation intervention, confinement

1. Introduction
In the last decade a *re-discovering* of the construction techniques and materials belonging to ancient buildings and heritage has grown up.
Professionals and researchers have made a strong effort to understand resisting mechanisms in masonry buildings, trying to evaluate the safety factor in presence of vertical and horizontal seismic loads. As a consequence, innovative techniques and materials have been introduced to prevent local and global collapse mechanism, increasing the safety of the overall structure.
The same interest in the historical matter has occurred in Armenia, where ancient buildings have been studied, trying to give them a new life, or simply to maintain and preserve them as they are.
Before analyzing the four study cases proposed in the present paper, it’s worth to mention some relevant principles concerning the meaning of “restoration”..
Various “restoration charters” offer a useful, but not exhaustive though. In fact, the principles they set out demand reasoned adoptions. Anyway, there is one aspect that may be considered common to all restoration projects: in-depth analysis of the constituent materials and the structural condition of the monument under discussion.

The crucial value of reference in a consolidation intervention consists in safeguarding the ancient memory as the best foundation for the future, providing the necessary resistance to the structure.
It follows that the conservation of heritages must be planned and executed on the basis of an accurate analysis of the buildings, using materials and techniques that are mainly compatible with the existing ones and adopting the well known criterion of “minimum intervention”.
Each intervention must be specific and well calibrated, remembering that each monument is irreplaceable, unique and witness of the historic memory.

2. The Armenian Architecture

The Architectural Heritage of Armenia is characterized by an astonishing homogeneity of styles, especially of materials and construction techniques. This homogeneity is mainly due to the fact that Armenians, victims of frequent invasions and wars, not being able to recognize in a politically stable Nation, identify their cultural foundations in Church and traditions, even in the artistic ones.
This strong identity is recognized in the "signs" of their culture: the spoken and written language, religion and artistic expressions. Armenians were the protagonists and creators of a wonderful season of art and architecture, which lasted through many centuries.
In the field of religious architecture, results were achieved at the highest level since the first realizations, that date back to the conversion of Armenia to Christianity in 301.
The previous architectural knowledge and the geographical position of Armenia have allowed a development of original and precocious synthesis, asserting (between the IV and VII cent.) almost all the construction schemes that have characterized Armenian ecclesiastical architecture until modern times, often anticipating the solutions adopted few centuries later in Europe.



Fig. 1: The monastery of Haghpat and the church of Marmashen in Armenia

Ancient fortifications represent another architectural manifestation of the Armenian culture. The greatest period of development of military architecture in Armenia is placed between the VII and IX century a.C., when more than four hundred fortifications were built. Today, although only a part of that huge patrimony is preserved, it has been possible to conduct researches on the building techniques of this singular type of structures.
In particular, walls were made with the traditional technique called “midis”; it consisted in a double layer of stone, filled with a mortar of lime and aggregates of various sizes, often connected by horizontal wooden beams. The corners were usually refined with high accuracy: in some cases the curtain walls were adorned with the use of stones of various colors, with geometric decorations.
The interior of the towers and gates were usually barrel-vaulted or had a stone dome set on a square plan, recalling some geometrical aspects of the Armenian churches.

The large diffusion in all the Armenian areas of churches, monasteries, bridges, aqueducts and caravanserai was strictly related to trades. Dvin, Ani and many other famous cities of ancient Armenia were, in the fifth century, a great economic, political, cultural and spiritual power in international trade, retaining their status for many centuries. Greeks, Assyrians, Persians, Jews, Georgians and many other peoples from the far Est traded with the Armenians, contributing to the most flourishing artistic and architectural period.



Fig. 2: The ancient “Silk Road” that linked Est and West passing through Armenia

3. Study cases

3.1 Consolidation interventions of ruins: some proposals for Anberd Castle

Anberd Castle represents an important example of ruined structure, especially interesting from an architectural and structural point of view.
Many events, both natural and anthropogenic, have brought the Castle to be as it appears today, so that any attempt to "erase" the signs of aging and to restore part of the former would be conflicting with the principles of a conservative restoration. For this reason, the structural intervention has opted for a specific series of operations to be performed only where strictly necessary, respecting the authenticity of the monument and its peculiarities both aesthetic and structural.
The main problems regarding the ruins of the Castle were associated to the washout of the mortar in masonry and to the lack of mortar joints. Such problems were localized in few areas and clearly identified.
In particular, two were the portions of intervention: the south-est façade and one internal wall.
Regarding the south-est façade, the stone wall was a high diaphragm, not sufficiently thick and poorly connected with the rest of masonry structures. The slenderness was not sufficient to prevent the rotation of the façade, especially of the upper portion of the wall.
Something similar happened to the portion of the inner wall, where a remarkable out of plumb was recorded. Luckily, in this case, the collapse was prevented thanks to the presence of deposit, at the foot of the wall, that acted as "struts".



Fig. 3: The complex of Anberd castle

Looking at the structural problems, one of the first task consisted the integration and injection with mortar of the existing masonry. These interventions has been proposed only at those points where the static consolidation was absolutely necessary, so that the perception of 'ruin' couldn't be compromised.
Furthermore, from a static point of view, each wall has been schematically represented as a cantilever, clamped to the ground. On the element, subjected to its own weight and horizontal loads such as earthquake and wind, axial force, shear and bending moment acted. Being the masonry a material not resistant to traction, a dangerous partialization of the resistant section has occurred due to bending.
A consolidation intervention, adopting post-tensioned bars, placed internally to the wall, has been proposed. The aim was to increase the axial load, acting on the masonry, so that the majority of the section could work in compression, limiting the tensile stresses as much as possible. In this way, the masonry could resist to higher horizontal loads.



Fig. 4: The consolidation intervention proposed for Anberd castle by adopting steel post-tensioned bars

A numerical FE analysis has been recently conducted by the author to a similar case in Italy, related to the Forte of Fuentes in Colico. In this case, the effects of post-tensioned external cables have been evaluated, confirming the beneficial effects of the system.
In the following the main results of the FE Analysis of Forte Fuentes are reported.

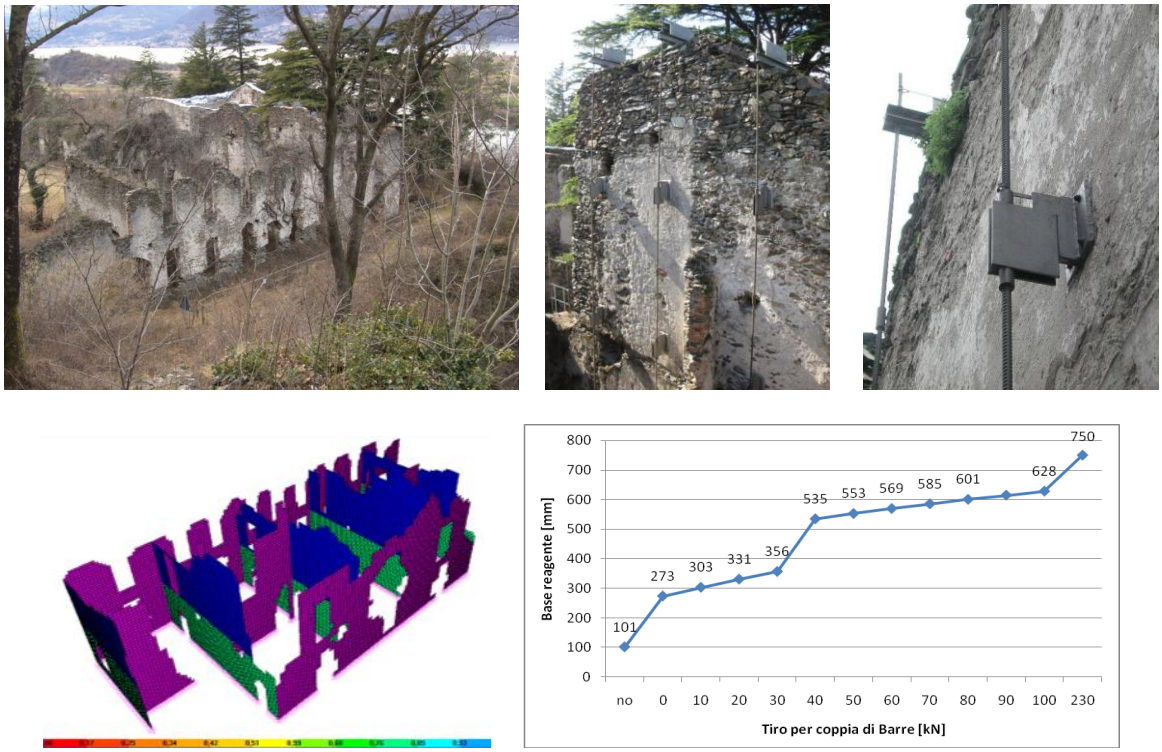


Fig. 5: The complex of Forte Fuentes in Colico (Italy). A consolidation system of steel post-tensioned bar (called EHT – Edera Hi-Tech) has been adopted. Results obtained by the FE Model show the increase of the reacting compressed section and the consequent reduction of tensile stresses, adding more tension applied in the bars.

3.2 A new life for Tatev Monastic Complex

From its construction to the disastrous earthquake that in 1931 destroyed most of the buildings, Tatev monastery has been a very important center, and for twelve centuries its cultural skills have been wildly appreciated.



Fig. 6: Plant of the complex of Tatev, the monastery after the earthquake occurred in 1931, and the monastery during the restoration works in 2002

In 2002 His Holiness Karekin II, Catholicos of All Armenians, decided to bring the complex back to its importance. The project foresaw the reuse of the existing buildings in order to lodge 50 students, the classrooms, the library and all the functions and sets that a modern institution of higher education required.
In addition, the monastery would be also able to welcome pilgrims and tourists.
The new use of the structures, the increasing tourism and the seismic vulnerability of the area forced to reconsider the structural qualities of the buildings in order to assess the needed strengthening works.
Several surveys conducted in site highlighted the areas of intervention, mainly focused on the foundations of the monument resting on cracked rock, on the damaged buildings that hosted the library and on the principal church.
From a geological point of view, the area was quite interesting, since the southern monastery buildings rested directly on a basaltic crown, that showed the tendency to slide down. The rock mass, in fact, was characterized by discontinuities that caused the relative movement of the stone blades, especially in case of earthquake. At the same time, some other buildings rested on soft soil.
Another relevant fact influenced the structural performance of the buildings; in particular, edifices were built in different periods and the complex developed by subsequent additions. Thus, the connection between the bearing walls was not always well realized, and the reestablishment of the missed links was necessary, in order to assure the three dimensional monolithic behavior and to limit the seismic damages.
Two types of structural interventions has been proposed: the first one concerned the ground level, while the second one interested the upper parts of the buildings, especially arches and vaults.
As regards the intervention on the ground, grouted rock bolts has been foreseen to stabilize and strengthen the rock mass. To locate the bolts, some boreholes has to be drilled in the rock, and steel anchor bars provided to connect two or more rock blades in order to prevent them from any slippage.



Fig. 7: The reinforcing scheme of the connection bars in the ground and a detail of the fractures rock

In the upper part, the structural consolidation of ancient arches and vaults represented a difficult task. The solution named RAM “Reinforced Arch Method” has been suggested to consolidate and strengthen the Tatev monastery’s vaults.
The main purpose of the “RAM” is to modify the distribution of loads acting on the arch so that the combination of the old loads plus the new loads can be the “right one” for the given and known geometry of the arch.
Steel post-tensioned cables can be applied either on the extrados or on the intrados (working as an “active” system), and a radial distribution of forces is immediately applied to the arch. This new load distribution induces an axial compression between the blocks and, as a consequence, the thrust line is re-centered. As shown by more than 500 experiments and calculations, the proposed technique achieves results that are equivalent, in many cases even better, than the ones obtained with the more traditional (but much more invading) method that consists in a “passive” concrete layer, poured over the arch, at the extrados. Using the RAM method, the additional reinforcing elements (i.e. the cables) do not interfere with the in situ masonry material and respect the original structural behavior of the vault.
Another interesting reinforcing intervention has been planned on the church. Although this building had been restored few years before, structural problems persisted. The simplest thing to do was to provide a sort of bandage in the upper part of the walls in order to recreate a three dimensional monolithic behavior, by means of tie rods.
A last consolidation proposal has to be mentioned: the two masonry towers were completely filled by detritus that had to be removed. To consolidate the structure, an interior bandage made by 10 thread bars, located in the tower masonry and fixed using a special anchoring mixture of hydraulic binders and fines has been designed. At the end of each bar, an “eye” trough which a stainless steel rope passes was fixed. The link between the two ends of the rope was obtained by using a turnbuckle so the structure can be tensioned.

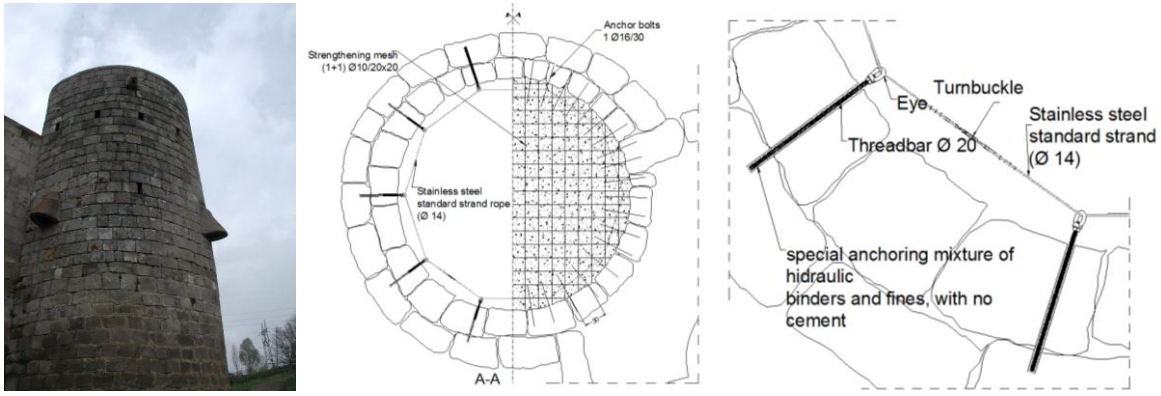


Fig. 8: The confining system for the consolidation of the two masonry towers

3.3 Arudj temple

Arudj temple is the biggest among medieval domed churches in Armenia. During centuries it had stood numerous earthquakes and invasions, which seriously affected it. An earthquake in ???? ruined the huge dome of the temple, and caused the opening of significant cracks on the façade. Although the temple has been repaired more than once, starting from the first rehabilitation initiated in 973, a new consolidation intervention has been recently proposed. The aim was to prevent local or global mechanisms of the walls, in case of seismic events.



Fig. 9: Arudj temple: the huge dome collapsed due to an earthquake

An accurate diagnosis has been carried-out, applying both in-situ tests (sonic tests, thermography, crack opening monitoring) and laboratory tests, in order to analyze the chemical and mechanical properties of constituent materials. The diagnosis has been developed by Politecnico di Milano, inside the II° Level Master for Architects and Archaeologists called “Progettazione al restauro, formazione al restauro in Armenia, sostegno alle istituzioni locali per la tutela e la conservazione del patrimonio culturale”, based on the agreement between the Italian Ministry for the Foreign Affairs and the Armenian Ministry of Culture.

The analysis of the crack pattern and of the mechanisms of collapse is an essential prerequisite for a careful assessment and effective interventions.
The safety evaluation, with respect to static and seismic actions, required a conscious reading of both the damage that the church has historically manifested, and details of the response to vertical and horizontal loads.



Fig. 10: The thermography applied to the walls has provided significant information about the masonry

The behavior (especially seismic) of churches with a longitudinal development plan, like Arudj, has been interpreted through the decomposition into portions, called macro-elements, characterized by a structural response that is substantially independent from the church, considered as a whole. Among the main macro elements, the facade , the apse , the dome, the arches and the vaults have been identified.

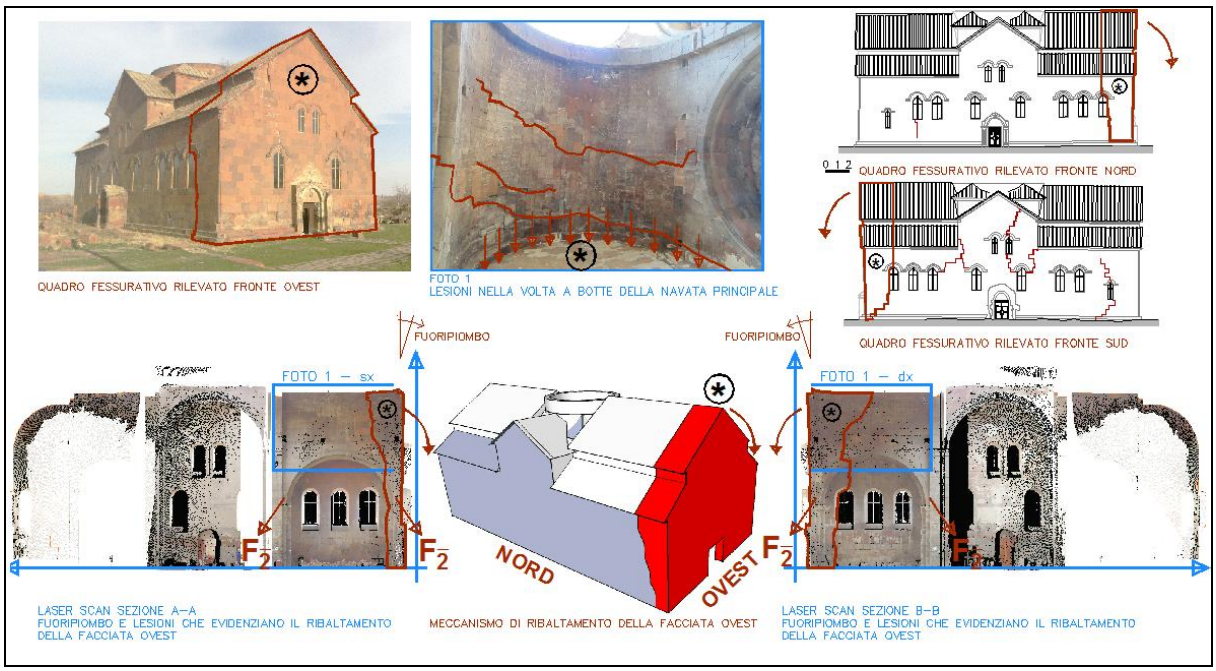


Fig. 11: Among the possible kinematic, the overturning of the façade has been detected

Based on the information obtained, several consolidation intervention were proposed.
The first solution aimed to prevent local collapse mechanisms with ejection of the stone blocks, returning a monolithic behavior of masonry.
The mutual connection of the large blocks of tufo was obtained by thin bars arranged in a "pyramid" shape and grouted inside the walls, alternately in both internal and external layer.
Compared to traditional systems, "pyramids" are three-dimensional systems that limit the visual impact, because placed in the joints of mortar.
Another type of intervention has involved the insertion of chains of containment, formed by steel bars able to connect the masonry walls in the longitudinal and transverse direction at different levels .
The main objective of the project was to ensure a " box-like behavior " of the entire building, in respect of seismic actions, increasing the resistance to horizontal loads, but at the same time maintaining a certain ductility of the structure.
To obtain such results, three different tie-orders has been proposed:
- The first order, the main and indispensable, allowed the structure to increase its overall resistance to horizontal loads, achieving a good level of seismic improvement;
- The second order led to a further improvement of the seismic structure, preventing possible failure mechanisms of local portions of masonry;
- The third order led to the achievement of a seismic retrofit of the structure, so that the structure was able to fully satisfy the maximum stresses provided by the project, in accordance with the current regulations.

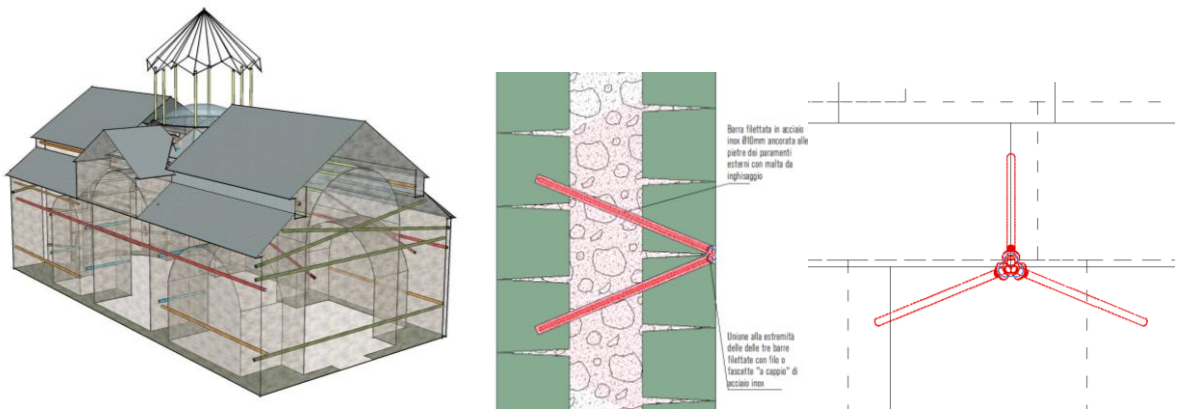


Fig. 12: The insertion of new chains and steel connections (pyramids) guarantees the box-like behavior

Furthermore, an interesting proposal has been advanced for the collapsed dome and lantern.
A new octagonal lantern in steel has been proposed, providing only the "skeleton" steel perimeter, without closures or coverage. The purpose of this solution was to perceive, in a discreet manner, the presence of a structure common to other churches of Armenia, now missing.
Concerning the dome, a new steel and glass covered has been proposed to close the actual hole, but at the same time without erasing any evidence of the past history of the church.

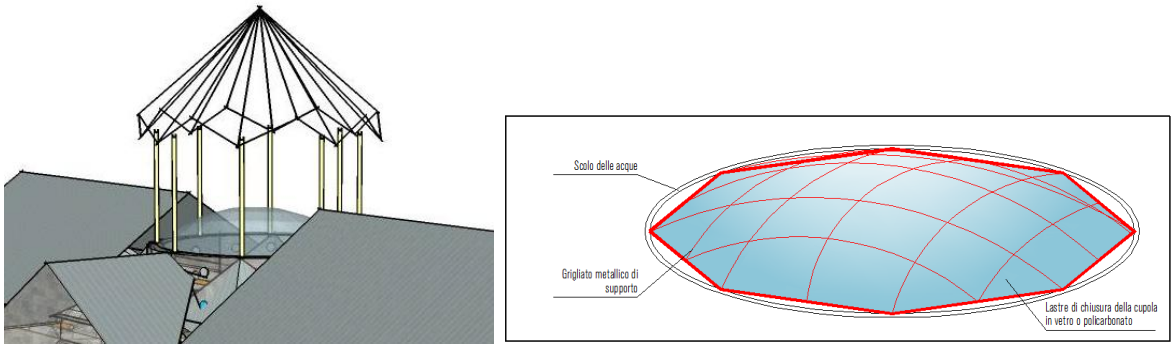


Fig. 13: A “light solution” for the reconstruction of the lantern and dome of Arudj temple

3.4 The “Reinforced Arch Method”: an alternative solution for Ani

The ancient church of S. Amenaprgitch in Ani (Turkey), represents another interesting case of “ruined” structure. The only part that is still conserved corresponds to the apse. The remaining portion of the building collapsed for a strong earthquake years before.
In order to guarantee the necessary strength to the dome and the walls, an alternative solution of the “RAM” was proposed.
The general principle of the Reinforced Arch Method fulfilled even in this case, where two different possible configuration of cables has been proposed.
In the first configuration, several steel post-tensioned cables were positioned in the horizontal direction, along the parallel. In the second case, steel cables were placed vertically, connecting the top of the dome to the ground.
In the following some sketches of the two solution are reported.

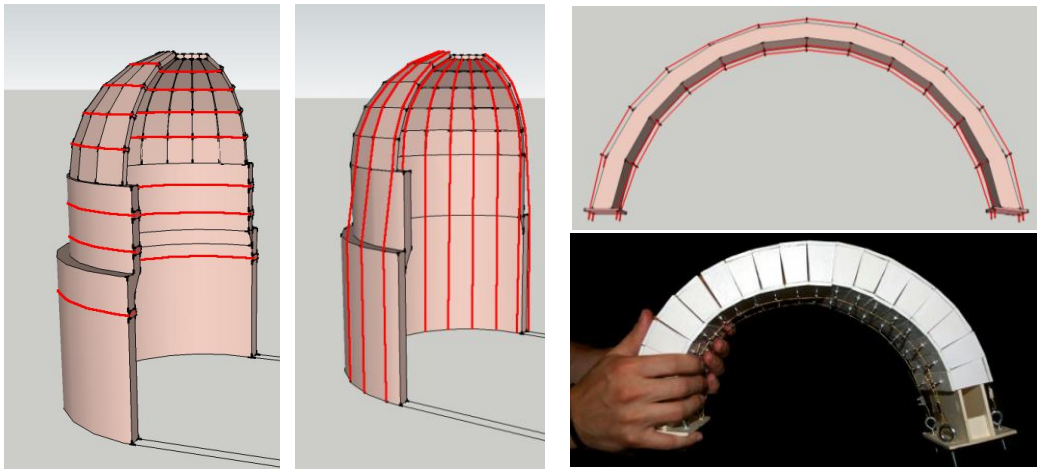


Fig. 14: The “RAM” applied to Ani apse and some small scale models of the intradox end extrados cables

A numerical FE analysis has been recently conducted by the author to evaluate the seismic response of a masonry dome of Santa Caterina Church in Lucca (Italy), where the RAM method has been applied.
Three different models have been developed: in the first one cables are placed along the parallels, in the second one cables are placed along the meridians, while the third one is the combination of the previous two models. The dome is subjected to horizontal seismic forces.
Numerical results obtained in the consolidated situations, if compared with the non – consolidated one, provide a significant reduction in terms of tensioned areas and displacements.

For example, the maximum tensile area at the extrados of the dome in the non-consolidated situation corresponds to 75% of the total area. Thanks to the RAM, the tensile are is reduce to 55%, 42% and 33% in the three different configurations analyzed.
The table below summarizes the main values obtained with FEM calculations

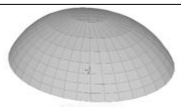
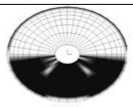
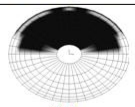
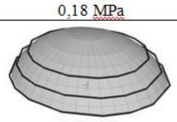
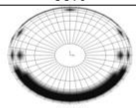
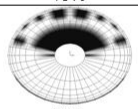
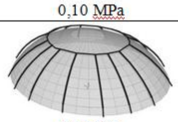
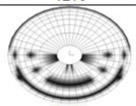
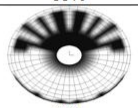
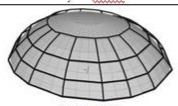
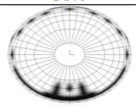
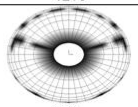
	Maximum tensile stress	Tensile Area INTRADOX	Tensile Area EXTRADOS
Non consolidate	 0,18 MPa	 66%	 75%
Cables along parallels	 0,10 MPa	 42%	 55%
Cables along meridians	 0,06 MPa	 38%	 42%
Cables along meridians and parallels	 0,05 MPa	 34%	 33%

Fig. 15: Results obtained by a numerical analysis on the dome of Santa Caterina Church in Lucca (Italy)

4. Conclusions

The city of Ani, as many other Armenian cities, were partially destroyed after II° World War, causing a huge loss of ancient heritages. Among them, the ancient bridge upon the Akhurian River, that separates Armenia and Turkey.
The author has the hope of re-building the ancient bridge, by creating an essential and light new steel structure, to re-connect Armenia and Turkey.

Bibliographical References

[1] JURINA, Lorenzo. *Strutture in elevazione* in “Almanacco dell’Architetto” (da un’idea di Renzo Piano), Proctor Edizioni, Bologna, 2012, p. 84-249.

[2] JURINA, Lorenzo. *Tecniche di consolidamento dei monumenti: una panoramica attuale*. Proceedings of IF-CRASC ’12, V Convegno su Crolli, Affidabilità Strutturale, Consolidamento, Pisa, 15/17 Novembre 2012.

[3] JURINA, Lorenzo, FASSER, Marco, RIZZI, Elena, MAZZOLENI, Massimo, ZORLONI, Filippo, BASSOLI, Andrea. *Interventi di consolidamento statico e sismico del Duomo di Cremona* – in “Cattedrale di Cremona: i restauri degli ultimi vent’anni (1992-2011)”, Skira, 2012, pag. 295-303.

[4] JURINA, Lorenzo. *Tecniche di cerchiatura di colonne in muratura*. L’Edilizia-Structural, n.164, anno XVIII, p.38-49, DeLettera-Editore.

[5] JURINA, Lorenzo*. Prove a collasso su archi in muratura consolidati con la tecnica dell’arco armato: risultati di una sperimentazione*. Proceedings of IF-CRASC ’09, IV Convegno su Crolli, Affidabilità Strutturale, Consolidamento, Napoli, 2/4 Dicembre 2009.

[6] JURINA, Lorenzo. *Prove a collasso su colonne cerchiate in muratura*. Proceedings IF CRASC’09 I convegno di Ingegneria Forense, IV convegno su CRolli, Affidabilità Strutturale, Consolidamento, Napoli, 2-4 dicembre 2009.

[7] Web: http://www.jurina.it

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Dynamic identities for the Cultural Heritage

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Abstract
Today the rigid hierarchy of visual identity, which has been consolidated over time, has been placed into question. Various factors have contributed to this remix: the technological factor above all, but also others associated with the critique, aesthetics and ethics of communicating.
The world of cultural heritage has certainly not remained immune to all of this, and may even be considered fertile testing ground. In this regard, Nick Bell [1] questions the efficiency of an identity based on its branding which maintains that cultural heritage graphics must be determined by their content, and therefore suggests that we should accept the differences and incoherence that this approach may generate.
Sergio Escobar [2], attributes a fundamental role to communication in the process of legitimising and enhancing the value of cultural heritage places, however in order for this to occur it is necessary to resolve the problem associated with the impoverished language of communication. On one hand, that means that new forms of relations and communication are therefore necessary as well as new ways of establishing relationships with their public, on the other hand there are new ways of thinking and new approaches to design which similarly lean towards innovation.
This paper, starting from the observation of a series of case histories, wants to reveal those new approaches and directions in the field of visual and communication design, which we can name as post-logo, in the own area of cultural heritage.

Keywords: Visual Identity, Communication Design, Corporate Identity

(1) Identity as a multitude
The distinctive and peculiar trait of new forms of visual identity applied in particular within the context of cultural heritage places and assets, is that these seek to interpret a system of values and contents in a variable, dynamic, manifold manner, in order to communicate with a diverse range of publics, assuming different tones of communication.
The traditional logic of visual identity can be referred to the philosophical definition of identity, attributable to Aristotle, according to which this represents a unit of one or more things, provided the definition of their substance is identical, therefore making the logo the distinctive element; if this is true, this new form can therefore be referred to the definition by Waismann, which states that when speaking of identity, the important thing is to “declare the criteria adopted or to which reference is made” [3 p. 445], and therefore a base code or a method of managing a process. However, at the base of an identity there is always, in any case, one unit, a common factor amongst different elements belonging to the same group, to the same context.
The identity of a subject, its own unit, is reinforced by the differences in its attributes and methods of expression: a multitude of visual elements, their expressions, and therefore a richer visual language, is more likely to better express the diversity of contents and values which cultural heritage places now need to transmit. Althought expected to be firm and confident, the overall institutional voice must be ready to modulate in pitch and volume, that means having at disposal a wide range of choises in terms of communication [4 p. 6].

2. Identity, image and communication design

Within the realm of the discipline of visual communication design, the term identity refers to the notion of image, or rather the representation of an organisation, or better still, a subject (defined as a personality), based on a certain code. According to Henrion & Parkin [5] and Anceschi [6] The system of reference is that of corporate identity, therefore the representation of a subject through a series of primary and subsidiary elements, whose normative expression is found in the corporate manual.

For cultural assets, in reality this means effecting a transfer, at least historically, from one world, predominantly consisting in goods, to another. About that Klanten, Sinofzik & Schulze wrote [4 p. 6]: "cultural institutions and organizations rarely focus on selling goods. Above all, they produce ephemeral constellations, intersubjective structures of experience and information (cultural approaches and exhibitions, directorships, ensembles and programs, heritage, site). Istitutional identity, or cultural branding, in a more generous sense of the term, evolves from these structures".

The identity of a cultural place, or a cultural asset, is no doubt constituted by the extent to which that asset represents something in a given context, as well as by its intrinsic and recognised value, and that which is attributed to it; or, reasoning from the point of view of communication, by that which the observer, (therefore the user or beneficiary), gains in terms of experience, memory, emotion, or in other words, in terms of image. But image is constituted by a variable number of elements: by a network of communicative artefacts, all coordinated with each other in the best of cases, and by numerous tangible and intangible elements. Image is also the user's impression and their experience with the efficiency of the channels or instruments which are the carriers of knowledge. In this sense, we once again find ourselves in the disciplinary context of visual communication design, which deals in particular with designing those artefacts and relative interfaces (traditional more so than digital), which will allow the suitable fruition of the asset itself. It is clear that when reasoning in terms of the asset's fruition, we are reasoning in terms of its identity.

Translating visually this identity is the role of visual communication design. That means – according to Baur [7] – constructing a unitary system (that of the visual identity, therefore reasoning in terms of language), which, through the linkage of the contents and their container, generates a cohesive image of the asset. Contents imply both recognised values, attributed in terms of relation and exchange [8 p. 42], and those intended by the strict sense of the word: objects, findings, signs – according to the definition provided by Eco [9 p. 22] –. These must be capable of transmitting the emotion and knowledge sought by the user, just like all those superstructures of an informative nature (and here the term is used in its most noble form as a carrier of knowledge, and not as a trivialisation or exemplification) and interpretive nature, without which the asset would not be understood.

It is therefore possible to identify various specific categories within the broad realm of communication in cultural place contexts. These include communication with the public (editorial products, services or events), object-user communication, communication as a form of orientation, educational communication and that transmitted via the new media. This system of elements, which can be defined as points of contact, is nothing more than a coordinated communication system where these points in fact contribute to defining the asset's identity, and subsequently from the point of view of the user, its image. It is not the asset itself, but rather the superstructure, the second skin, which allows, or in any case facilitates, knowledge and fruition.

The system must be consistent with the asset, or rather must reflect the true values carried by the asset, but also the expectations set by those responsible for its protection and management. Such expectations should be the same as those of the public which enters into relation with the asset (or perhaps it would be better to say the types of publics, from expert to generic types). That confirm the need of a dynamic form of communication, able to change tone and voice referring and appealing to different types of target [10 p. 222].

3. From static-logo to post-logo

In the corporate identity system the central element is traditionally the logo. At the beginning of the 1990s, this may have been the case for the identity of the renewed Louvre, for which the label-logo, superbly conceived by Pierre Bernard, is still invariably used today with a few dimensional modifications, in its various applications.

It is necessary to say that through time – since the 1960s, when the corporate design culture established – designers have affirmed the difficulty of manifesting an institutional identity for a cultural place through a singular logotype or graphic system. This was the case of Chermayeff & Geismar who were charged to design the Museum of Modern Art of New York logo. They had to admit that for such kind of insitution was in no position to establish a symbol that was meaningful or not [4 p. 5].

Nowadays the traditional rigid hierarchy of visual identity – that we can name as static-logo attitude –, which has been consolidated over time, has been placed into question. Various factors have contributed to this remix: the technological factor above all, but also others associated with the critique, aesthetics and ethics of communicating.
The world of cultural places and heritage assets has certainly not remained immune to all of this, and may even be considered fertile testing ground [10 p. 218]. In this regard, Nick Bell [1 p. 16] questions the efficiency of an identity based on its branding, observing in particular the panorama of identities of various art galleries and museums in London. He in fact maintains that cultural places graphics must be determined by their content, and therefore suggests that the differences and incoherence that this approach may generate should be accepted. A tempting idea which presumes a higher level of public intelligence than that needed for the application of more homogenous systems. Clearly, as Bell himself admits, this idea about the post-logo does not belong exclusively to the cultural heritage sphere but is rather undoubtedly congenial.
Felsing [10 pp. 217-218] declares that one of the main reasons that dynamic or flexible visual identities appear predominantly in the cultural or public sectors undoubtedly lies in the transfer of basic content to the form of visual identity. And it is possible to add that the adoption of flexible visual languages is considered consistent to the contents and the activities of some kinds of organizations particulary devoted to contemporary arts, althought not uniquely.
In an interview with Sergio Escobar [2 pp. 417-425], he attributes a fundamental role to communication in the process of legitimising and enhancing the value of cultural heritage places, however in order for this to occur it is necessary to resolve the problem associated with the impoverished language of communication. Escobar strongly highlights the different interpretations of the definition of public interest, previously attributed to cultural heritage places in an entirely spontaneous manner. During the laste fifty years the meaning and sense of such kind of institutions and organizations has changed, and new forms of relations and communication are therefore necessary [4 p. 5].
Whilst on one hand institutions, in particular cultural heritage ones, need to find a new way of establishing relationships with their public, on the other hand there are new ways of thinking and new approaches to design which similarly lean towards innovation. About that Shaughnessy [11] affirmed “a brand is no longer simply a nice, clean logo that is attached in the same place every time. A brand is a platform, a brand is flexible, a brand is a place for exchange, it is not fixed, and therefore there is no such thing as a single brand. Methods exist which allow a shape to form, which allow communication and recognisable behaviour, but this is no longer about something inflexible and permanent”. In some spheres of visual communication design, the idea of imposing strict rules has been renounced in favour of more fluid and expressive languages, characterised by “variability, reference to context, process, performance, non-linearity, coherence and variety” [10 p. 13] that we can name with the term post-logo.
New technologies offer wider ranging possibilities for the design’s control, structure and development with respect to the past. These offer the designer the possibility to programme not only the second and third dimensions, but also the fourth, the dimension of time, which modifies the manifestation of an image, no longer in a simply controlled, but rather programmed manner. All this according to paradigms which are not necessarily new, but rather extremely current (cases of flexible visual identity can already be found in the second half of the 1960s [12 pp. 96-109]), which are more likened to diverging methods “focusing on the production of a multitude, of variety” and more removed from a converging, operational and pragmatic way of thinking. More likened to the Behrens house-style soft approach, where the designer often becomes jointly responsible, or at least the manager’s right arm, and more removed from the manual, intended as a technical and bureaucratic tool [13 p. 174].

4. Looking to the practice

Observing the panorama of international production, it is possible to identify two groups of cases where logo or visual system designs better interpret the idea of the multi-dimensional nature of cultural places and cultural heritage branding.
One group in which the logo, or rather the central element of the visual system, changes over time and in the various situations in which it is applied, according to established parameters of control (shape, colour, font...) and in any case according to a logic of controlled variations, with predefined limits of expansion, as may be the case for the British Tate Galleries, the Brooklyn Museum, the New Museum and the Museum of Arts and Design (MAD) in New York or the Historiska Museet of Stokholm.
The other group in which the design is aimed not only at defining a group of variations, but essentially at managing the process which manages such variations, and therefore the formalisation of a visual code, which when used becomes a genuine language, as may be the case for the Casa da Musica in Oporto, the Walker Art Center in Minneapolis or the new brand for the city of Bologna. Those cases

use a specific and personalized software to manage and generate the visual code. Can be part to this second group the visual identity for the Musée d'archéologie et d'histoire de Le Mans in France too.

4.1 Logo variations

In the first group we therefore encounter those cases where modifications are made to a basic sign, the intention of which is to communicate the new idea of a museum or cultural heritage place, transmitting the sense of the diversity of contents, initiatives, and tones, aimed towards specific targets of publics. In this regard, the director of the Brooklyn Museum, Arnold L. Lehman, in the press release issued during the presentation of the new visual identity programme, declared to be convinced that a flexible graphic identity and logo “best reflect the objectives of the Museum focused on the visitor” and “emblematically represent the diversity of our collections and our public” in a new way.

The new logo is composed of a fixed capital ‘B’, behind which eight different seals or sketches in a brilliant blue colour (defined as electric cyan) continuously change. These eight seals are randomly used in order to emphasise the uniqueness of the Museum. The visual identity designed by studio 2x4 is used in all print material and is adapted to all promotional and web applications. Michael Rock, the creative director of the design, presented the logo in this way: “the new logo has been designed to reflect flexibility, change, surprise and accessibility.

The dynamic seal has been designed to represent a museum willing to scrape off the mould from a familiar and existing concept, in a process of continuous experimentation, open-mindedness, and most importantly of all, reinvention”. The continuous mutation of the seal depicts various forms each time: a stamp, a flower, something strong, a bubble, a spurt of water, leaving the possibility open to broaden the repertoire.

This is therefore a design based on a strong, shared objective, between the client and the designer, aimed towards renewal. Though not spectacular renewal, also because here we are dealing with an institution strongly tied to a specific context, rather than a process of reeling in a target public. In fact, the Brooklyn Museum is not a traditional tourist attraction, but is rather family-oriented and facilitates processes whereby visitors can easily form their own interpretation of all the history and art on display through a series of different, yet simple paradigms. A combination of intellectual authority and an alternative approach, insofar as it is intelligent and people can relate to it. When defining the image of the institution, Rock speaks of solidity destabilised, in the sense of a non-monolithic institution, open to change and comparison, therefore continuously placing itself into question.

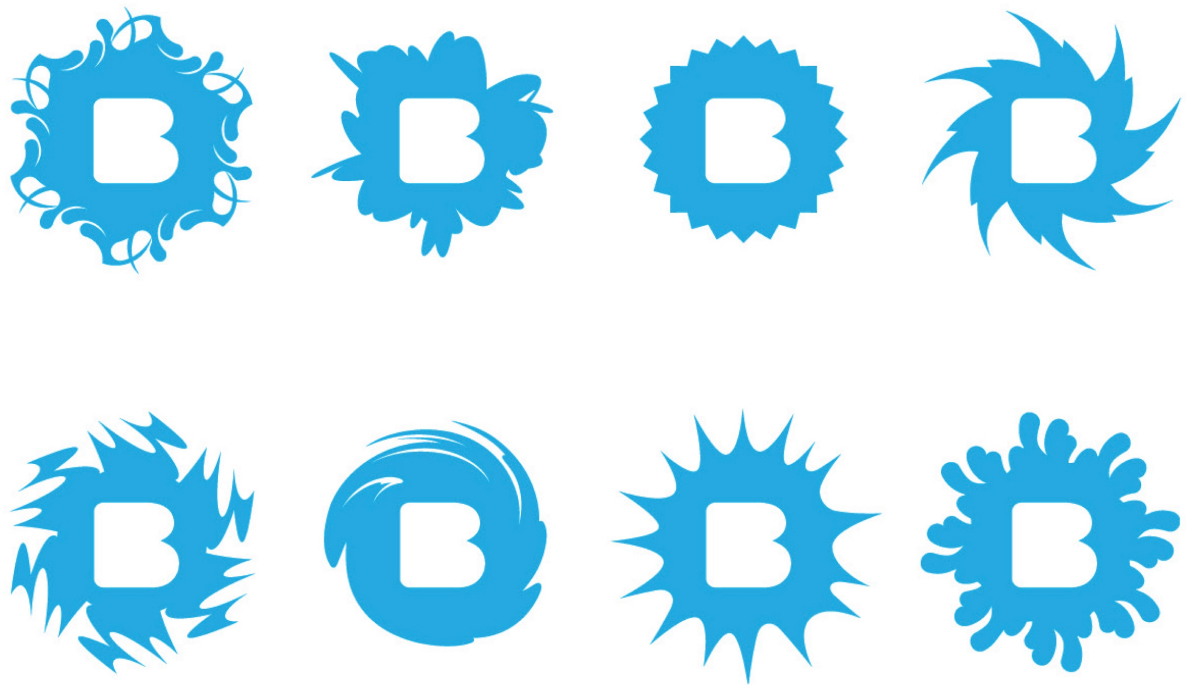

Fig. 1: Brooklyn Museum (New York), logo variations, design by 2x4, 2004.

This approach influenced during the last years a certain number of designs alike the one for the swedish Historiska Museet, one of Sweden's largest museums with collections that include more than 10 million individual objects from a history spanning thousands of years. The museum is also a venue for lectures, concerts and activities for all ages. The new visual identity is based on a new

communication strategy that aim to make the museum Sweden´s number one storyteller, arousing curiosity and interest in Swedish history and revitalise the museum. The Stokholm based design studio Bold created a dynamic and playful identity inspired by the museum's mission: to create curiosity and interest in history and to get the visitor to reflect on the link between past and present. The logo is a combination of a classic serif font (the past) and a modern sans-serif font (the present). The interesting aspect is that the serif part can be replaced with historical artifacts giving the museum an opportunity to be playful in their visual expressions and display the museum's breadth of exhibitions and activities. The result is a basic so far as an open system that allows for endless communication possibilities [14].



Fig. 2: Historiska Museet (Stokholm), logo variations, design by Bold, 2012.

4.2 Multitude based and flexible visual codes

The visual identity of the Casa da Musica conceived by Stefan Sagmeister allows us to introduce the second group. This design is in fact based on a software (Logo Generator) which allows the management of the logo, clearly inspired by the shape of the building designed by Rem Koolhas, from different perspectives (six in total). The logo is transformed in its various applications, changing from media to media, and similarly its colours can change. As this is an institution whose objective is to host different initiatives tied to the world of music (from jazz to classical music and more contemporary expressions) which are each aimed at different types of audiences, its visual identity cannot be static. The system in fact allows a palette of personalised colours to be selected from thematic images, for each specific event or initiative. Various institutional applications are similarly managed: for internal staff for example, business cards are personalised with a logo whose colours are taken from a photograph of the individual person. The system therefore offers a variety of solutions for both those responsible for managing identity on a daily basis, and those who benefit from it.

A similar approach we can find in the visual identity design for Walker Art Center, a true container of initiatives and events open to a range of different publics, a generation utility of visual identity was designed. This is represented by a type of font or typographical character which makes it possible to compose a string of keywords relative to the Center’s activities and its contents, accompanied by decorative graphical elements, making it recognisable. These “words” define the matrix of intonation with which the institution communicates with its public, tones selected on a case by case basis as the most appropriate for dialogue on one level as opposed to another, or for channelling one type of initiative as opposed to another.

The same concept of variations has been developed for the city brand Bologna. It is possible to include this case as visual identity for cultural place looking to it in a wider perspective considering a city like a complex systems of values, concepts, heritage, activities that through their interconnetion are perceived like a unique cultural image. The context of visual identities for places or territories and the one of culture assets are both experimenting and experiencing flexible and dynamic visual languages. For Bologna the italian designers Matteo Bartoli and Michele Pastore designed a software that generates the basic code inspired to signs and attractive elements taken from the city's material culture. This code allows to construct a visual narration that has the aim of narrating the multiple aspects of Bologna's personality.

Those are therefore examples of cases where the visual code is centred around a dynamic logo, whose variations are managed according to a markedly meta-design approach. The design of the

process is given priority in order to guarantee control of the overall identity and those “control knobs” which generate variety and guarantee the identity’s constants [15 p. 12].
Finally, in the case of the Musée d'archéologie et d'histoire de Le Mans, the visual language explores and shows the variety of the collection to present the Museum in a new and fresh manner developed on the idea of multitude. Contents inspired the signs, that allow to identify the different sections, the evidences, the different objects. At the same time this family of signs defines a unique visual language together with typography and colors. The visual code is the applied all over the information plan, from orientation signage to punctual identification, defining a continuous disposal that facilitate access to knowledge.

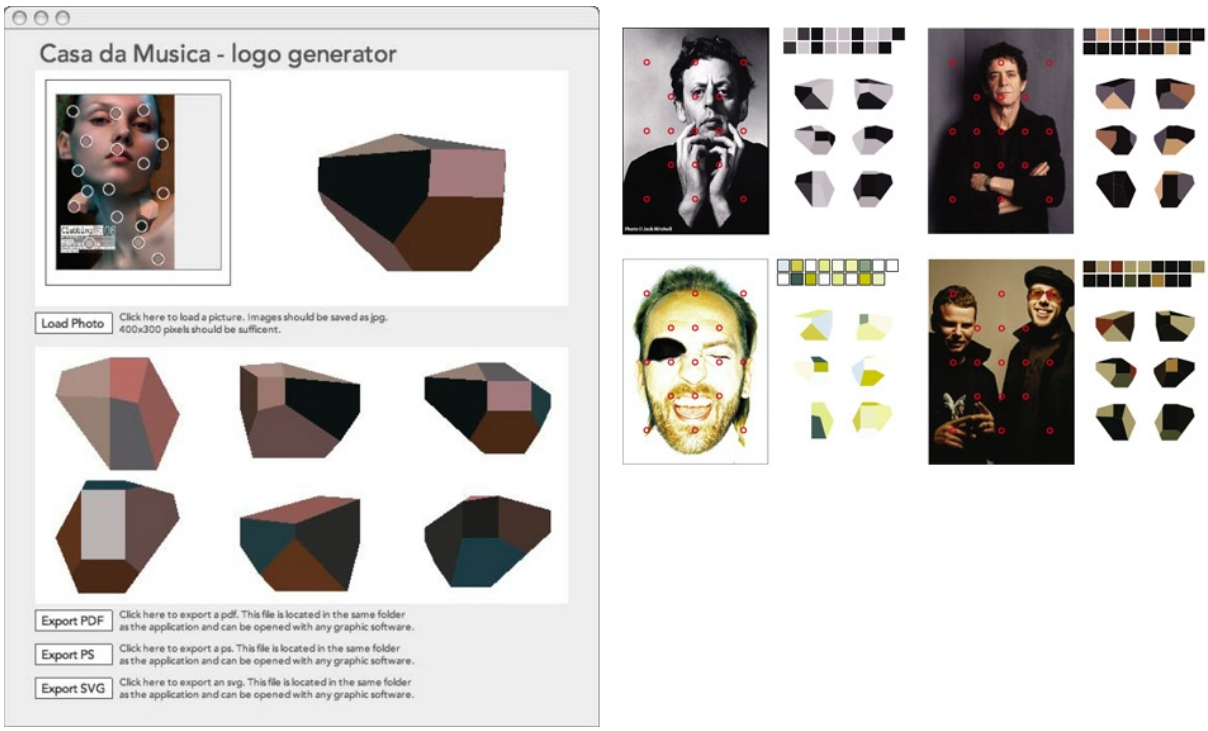

Fig. 3: Casa da Musica (Oporto), logo generator, design by Stefan Sagmeister, 2007.

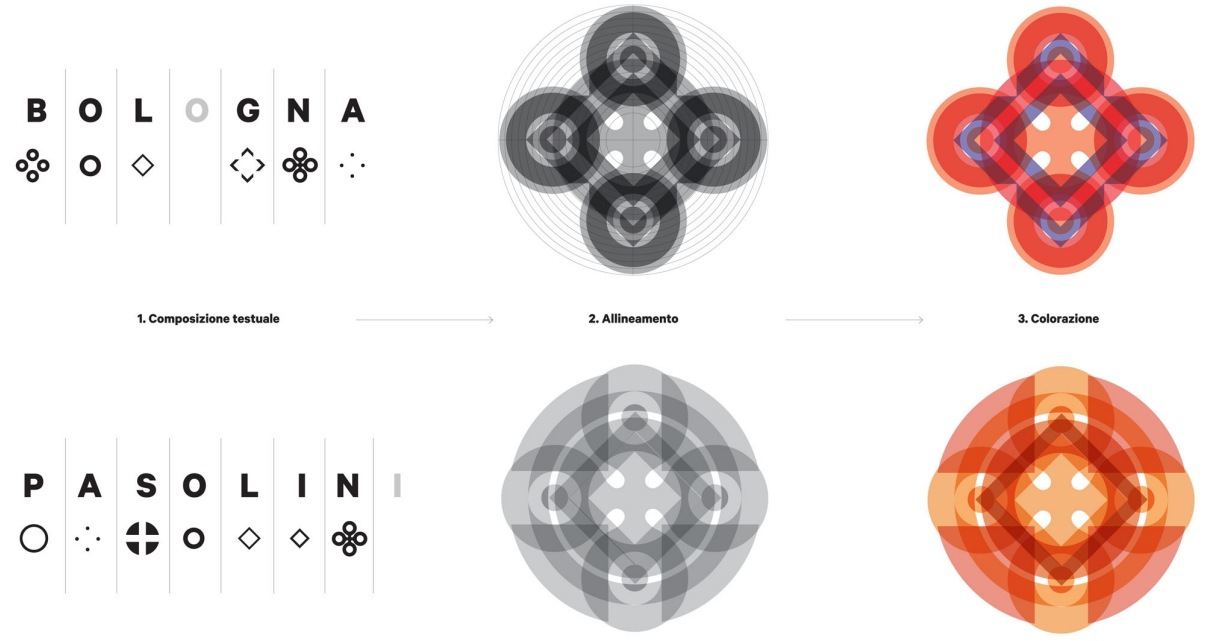

Fig. 4: Bologna City Branding, visual code, design by Matteo Bartoli and Michele Pastore, 2013.



Fig. 5: Musée Archéologique e d'Histoire de Le Mans, visual code, design by Voiture 14, 2009.

5. Conclusions

What both groups have in common is this strong sense of arranging a style, and therefore pre-organising a language according to controlled morphologies. When applied to communication or branding design, this approach in fact acquires information about the brand linked to its complexity and the fact that it has been generated through relations and interactions with the public (with interfaces intended as communicative artefacts or points of contact), and with the context. The invariable is nonetheless a common feature, even in stylistic variations, the idea of an open system which can be amplified, having clearly defined the constant elements which assume the role of ensuring the organisation, the personality, is always recognisable. When visions and concepts are formulated with genuinely and significant content of the cultural assets, places or organizations rather than attributes, general values, or clichés ideas, a differentiated visual identity emerges.
According to Felsing [10 pp. 220-225] what appear evident is that static visual identities have less potential to reference changing contexts because they run the risk of losing the coherency of the visual identity; the prevailing singular logo cannot refers to changing contexts but remains identical. With flexible visual identities, coherence is maintained as the constant aspects provide stability and only the variable aspects generate dynamics.

Bibliographical References

[1] HYLAND, A. KING, E. *Identités graphiques & culturelles*. Paris: Pyramyd, 2006.

[2] ZISSIMOS, I. La comunicazione dello spettacolo. Contro la banalizzazione dei linguaggi. In ROLANDO, S. (ed.). *La comunicazione di pubblica utilità. Società, economia, cultura*. Milan: Franco Angeli, 2004, vol. 2.

[3] ABBAGNANO, N. *Dizionario di Filosofia*. Torino: Utet, 1964.

[4] KLANTEN, R. SINOFZIK, A. SCHULZE, F. *Introducing: Culture Identities. Design for Museums, Theaters, and Cultural Institutions*. Berlin: Gestalten, 2013.

[5] HENRION, F.H.K. PARKIN, A. *Design coordination and corporate image*. London-New York: Studio Vista - Reinhold Publishing Corporation, 1967.

[6] ANCESCHI, G. *Image: il corpo mistico dell'organizzazione*. In *LineaGrafica*, n. 1, January - February 1985 and ANCESCHI, G. *Etologia dell'image*. In LineaGrafica, n. 2, March - April 1985.

[7] BAUR. R. *Intégral Ruedi Baur et associés. Identité de lieux*. Paris: Pyramyd, 2004.

[8] CELASCHI. F. Il bene culturale come paradigma. In CELASCHI, F. CAPPELLIERI, A. VASILE, A. *Lusso versus design*. Milan: Franco Angeli, Milan.

[9] ECO, U. *Le isole del tesoro: proposte per la riscoperta e la gestione delle risorse culturali*. Milan: Electa, 1988.

[10] FELSING, U. *Dynamic identities in cultural and public contexts*. Baden: Lars Müller Publishers, 2010.

[11] SHAUGHNESSY, A. *Wolff Olins' intuitive branding*. In *Business Week*, 6 February 2008. Available at http://www.businessweek.com/stories/2008-02-06/wolff-olins-intuitive-brandingbusinessweek-business-news-stock-market-andfinancial-advice [5 July 2013]

[12] CHIAPPINI, C. CIOFFI, A. *Identità cinetiche*. In *Progetto Grafico*, n. 9, December 2006.

[13] ANCESCHI, G. *Monogrammi e figure*. Firenze: Casa Usher, 1981.

[14] www.boldstockholm.se/case/swedish-history-museum/

[15] CIUCCARELLI, P. La marca come sistema complesso e le ragioni del metaprogetto. In Sistema Design Italia Magazine, n. 5, 2007.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Arab-Norman influence in the architecture of Campania in the 11th and 12th centuries

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Abstract
In general, the theme of the architectural relationships between the two coasts of the Mediterranean has received little attention from historians. The research on the Arab-Norman tradition concerning the historical and architectural heritage in Campania between the 11th and 12th centuries tends to analyse monuments with common architectural and stylistic features. By using a suitable typological analysis of the decorative elements, the research aims to identify the artistic models between Campania and the Islamic Mediterranean. The identification of a common thread that binds the transformation of the diverse types of construction has defined, on this topic, a global overview of the state of the studies on the architecture in Campania, with the specific purpose of identifying the cultural elements of continuity and innovation.

Keywords: *tarsia*, interlaced arches, Norman architecture, Islamic architecture, Campania.

The decision to perform a detailed analysis of the Arab-Norman presence in Campania and its relationship to Islamic architecture came about from research performed by previous academics. In fact, there is a historiographic thread that started at the beginning of the 19th century that identified aghlabide art in Ifriqiya and Fatimid before and after ziride. That Islamic culture is still clearly visible in the architecture and decorative aspects of religious and cultural monuments in Southern Italy today[1]. Moreover, recently, important strides have been made to bring to light, through appropriate scientific analysis and exploration *in situ*, the remains of the rich monumental heritage left as a legacy by the Arab civilization in Campania[2].
In this study, which deals in particular with the origins of the Islamic influence in the architecture of Campania in the 11th and 12th centuries, there are many historical elements that the Arab, Berber and Andalusian populations across the Mediterranean have spread, thus giving life to an artistic syncretism of great beauty.
From the 7th century, a new Middle Ages developed along the coast of Italy. It was a Middle Ages that was culturally different from the western Christian and Byzantine one that, thanks to Rome and Greece, had imposed itself throughout the Mediterranean basin and the eastern reaches of the known world. Southern Italy, with its undefended coastline, was a place in which new peoples migrated. Unmistakable architectural traces of these migrations can be found in Sicily, Sardinia, Abruzzo, Southern Lazio, Campania, Puglia, Basilicata and Calabria. The merging and clashing of these diverse cultures generated integration as well as repulsion. Nonetheless, all over the territory, the fragments of this cultural reciprocity are to be found and it is only recently that they have been given due value. Therefore, in many parts of Southern Italy there exists a sentiment for a distant past that has never gone away. It can be seen in the alleyways of the feverish neighbourhoods in some cities, in the frenzy of the street markets, the colours, the faces, in the lexicon and, above all, in the artistic

and architectural knowledge of Medieval monuments found in southern Italy. Of the many points of contact still visible today, this research concentrates on the cultural material of the architecture - perhaps as it brings out the accents of North Africa and Andalusia - which are the objectives of this work.
Furthermore, this argument was considered relevant in that it characterises the similarities and dependencies, and the ties and inflections that sparked these two worlds, even if our knowledge of Arab monuments - those that still have to be compared with their counterparts in Campania - is not yet sufficiently informed. For this reason, this research assumes even greater importance as it sheds light on an evocative and fascinating period in the Medieval architecture of the Mediterranean in the 11th and 12th centuries.
The numerous monuments from the Norman period still present in Campania evoke a sober understanding of space expressed in the stereotomy of the decorative external hanging walls, occasionally interspersed with inlays of tuff and volcanic stone, according to diverse planes. The ornamental motifs, of Islamic origin, are characterised by a series of arches in doubled and tripled recesses, inlaid in decorative shapes and strings woven with two-toned blocks. These architectural styles attest to the skilled artistic craftsmanship espoused, in particular, by the craftsmen of the city of Salerno and the Amalfi Coast – a politically powerful and rich territory for trade that frequently took place throughout the Mediterranean. Numerous remains of *tarsia* have been found in this territory, a technique much in use in the Arab world, though it has not been found elsewhere in Italy. In Salerno, for example, some of the best known examples have been found. These include: the fragment preserved in the Nona chapel of the Archbishop's residence; the rose window of the apse of the Church of San Felice in Felline; the large mullioned windows of the Pinto Palace and the arches of the portico that once enclosed the atrium of the Church of St. Benedict; the decorations of the only existing tower of Castel Terracena; the atrium of the eleventh century cathedral of Salerno and later on the hanging walls of the Pernigotti Palaces; and finally the Fruscione and Veniero Palaces in Sorrento and Villa Rufolo in Ravello (13th century).
Tarsia is a decorative technique that consists of cutting different materials of various colours. These coloured pieces are then cemented on the walls of a building with the purpose of creating a continuous pattern of pure and simple fantasy. The resulting effect is created, not by the changing surface of the wall, but through the contrasting chromatic divergence of the various stones. The stone pieces are worked, with the aid of wooden panels or tin drawn to scale, in a rectangular or curved design so as to replicate the motifs and decorative designs. The creative procedures of *tarsia* are different and oftentimes difficult, though offer numerous decorative possibilities. Generally, geometric *tarsia* are characterised by rectangular motifs with the compositions creating geometric effects in the shape of squares, diamonds, rhombuses, cubes, or checkerboards. Typically, the direction is in symmetrical agreement with the axis of the splice, made with little sand and almost entirely of lime in a bright white colouring, thus accentuating the desired decorative effect.
Tarsia was a technique much in vogue in antiquity and was well known as far as Greece where it was referred to as *plákosis* while in ancient Rome the term *incrustatione* was used – from which the Italian word “incrostazione” comes from. In the classical world, *tarsia* was utilized to decorate walls as well as pavements. Pliny the Elder proclaimed that the technique of encrustation was invented in Caria as the walls of the governor’s palace, the Mausoleum of Halicarnassus, were decorated in *proconnesium* marble[3]. The Romans used mainly marble from which the term *incrustatio* derived, being almost a synonym for the expression *incrustatio marmorea*[4]. This was greatly diffused in Roman architecture and was widely used in the decoration of many buildings in the Imperial period. The buildings in Pompeii would attest to this. The Pompeian examples are clearly attributable to the period before 79 AD, the year of the devastating eruption of Vesuvius. Other examples of architectural decorations done, using the encrustation technique, in antiquity can be found in Campania. For example, in Quarto Flegreo (NA), in the phlegrean fields, there is the ruin of a mausoleum from the second century A.D. were the technique was used on the outer facing wall[5]; at Santa Maria Capua Vetere (CE), in the north of Campania, stands another mausoleum that is considered to be the antique model of the bell tower in Amalfi[6].
According to Pliny the Elder, starting from the Julio-Claudian dynasty, another technique was developed: l’opus interrasile da interrado. This technique consisted of either making grooves and leaving the pattern or by cutting out the pattern so that the openings form the design and then filling these bottom plates with a warm mixture of marble dust, or thinner sheet of metal in a different material or by using a different quality of marble[7]. This particular ancient decorative technique was only used on walls given that for the floors the crustae (slices), inserted into the recesses and necessarily much thinner, were regarded as being prone to wear.
One of the most obvious differences between *tarsie* in the classical period and that of the medieval period consisted in the fact that it was used sparingly in the classical period. Conversely, in the medieval period it is possible to observe a veritable “cycle” of decorations. Another substantial difference consists in the choice of building in which the inlaid motifs are found in Pompeii; they are

not present on religious buildings. Meanwhile, in the medieval period, they are found mainly on bells and in churches. In some churches, the medieval *tarsia* is used in the centre of a ceramic bowl whose function was to "shine" when the sun shone, thus creating a pleasant chromatic effect. Such decorative details are still visible on the façade of the Veniero Palace in Sorrento (end of the 12th, beginning of the 13th century) – where the circular medallions are closed at the centre with tiled basins, commonly known as Hispanic-Arab, and are characterized by their particular bowled shape. Likewise, similar bowl shapes have been found in Villa Rufolo in Ravello[8].

There is much research related to the origins of the *tarsia* technique in the medieval period. Some academics think that it has Arabic origins and that it was brought from Sicily to Campania, or that it occurred simultaneously, while others state that the influences that underlie the origins of the use of *tarsia* are of the Campanian-Sicilian type[9].

The academic Luigi Kalby hypothesized, in his research, that the decorative motif of *tarsia* is of Arabic origin and that this design arrived in Campania from Sicily, particularly at the end of 12th century. He believes that Arab craftsmen were forced to abandon the island after the sudden and rapid collapse of the monarchy, which had been restored by the Normans[10].

We must note that, in Sicily, many Arab monuments were defunct of multicoloured *tarsia* and that the oldest *tarsia* present in Sicily are those found in the cathedral and cloisters of Monreale, where in 1176 the monastery, attached to the cathedral, became associated with Cava dei Tirreni and the sculptures of the famous cloister bells where master bell craftsmen worked[11]. In fact, King William sent a letter to the Abbot of Cava in 1176 mentioning the presence of 100 monks from Cava in Monreale.

Certainly, master Arab *tarsia* craftsmen existed in Sicily and skilled carvers are also mentioned as being amongst the Arabs deported to Lucera; though that is not to exclude that in Sicily the taste for such works is linked, indirectly, to Montecassino, which obviously had its inspiration from Salerno. Moreover, we know that in 1081 Duke Ruggero I, in the surroundings of Messina, allocated large sums of money in order to draw skilled bricklayers and craftsmen "*undecumque terrarum artificiosis caementariis conductis*" [12]. In Sicily, in addition to the known examples of the Cathedral of Cefalù and Monreale were *tarsia* walls are found, we are also able to cite the Church of St. Peter and Paul in Agrò, the Church of St. Mary in Mili San Pietro and the Church of St. Peter in Itàla (11th–12th centuries).

The importance of the city of Salerno, as the place in which *tarsia* gained particular importance, is documented by the fact that territory of Salerno has the major number of edifices decorated with this technique. In fact, the portico of the Cathedral of Salerno is one of the most notable examples[13]. The Cathedral of Salerno was made possible thanks to the will of Alfano, the great archbishop who ran the diocese of Salerno, at the time of the arrival of the triumphant Robert Guiscard in 1077. Alfano of Salerno was also profoundly linked to Abbot Desiderius of Montecassino[14]. The two clerics, despite the distance between their dioceses, continued to meet and, in particular, Alfano continued to be fascinated by the reconstruction that his friend undertook on the summit of Montecassino. Meanwhile, Desiderius, for his part, probably urged Alfano to undertake the same endeavor for his offices in Salerno. Therefore, Abbot Desiderius must have had a direct influence over the new cathedral which was built in the maritime city shortly afterwards; not only due to the influence that his action exerted on his friend the Archbishop, but also for the friendship that bound him with both Robert Guiscard, who's patrimony financed the new building, and his wife, Sikelgaita, who Desiderius happened to be related to.





Fig. 1: Pompeii, Reg. VIII, Ins.IV
Fig. 2: Pompeii, Reg. I, Ins. X





Fig. 3: Salerno, Cathedral of St. Matthew, Bell tower
Fig. 4: Salerno, Cloister at St. Matthew Cathedral, Detail of *tarsia*



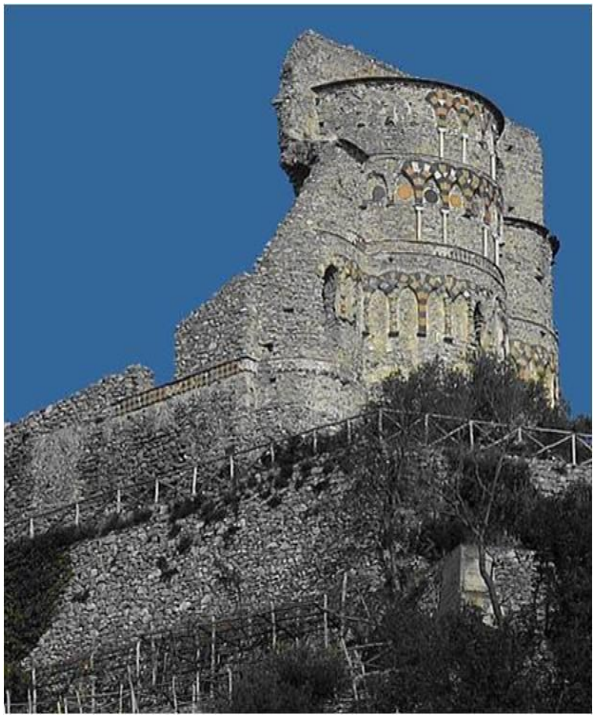


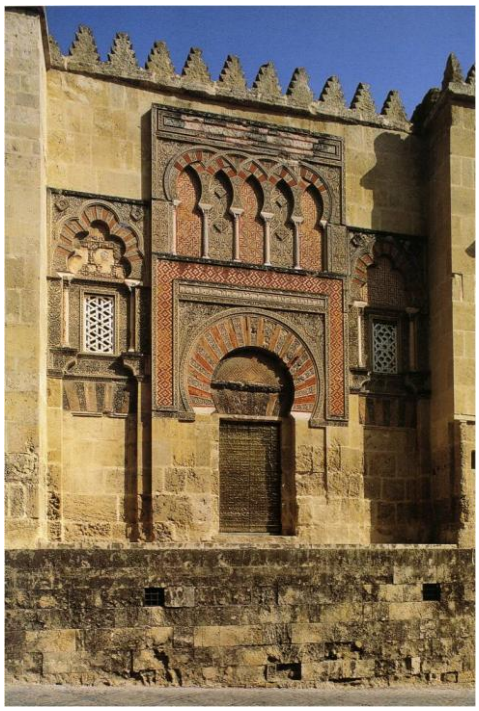
Fig. 5: Ravello, Villa Rufolo, Main gate tower, Underside of the dome
Fig. 6: Pontone of Scala, Church of St. Eustachio, Apse



Fig. 7: Ravello, Cathedral, Bell tower

Desiderius and Alfano were further linked by a predisposition and adherence to the ideals of an eclectic culture - universal, halfway between East and West - that was visualized through works of art, both architectural and figurative, and in terms of both antiquity and innovation[15].
Numerous artists from all over the Mediterranean participated in the reconstruction of the Abbey of Montecassino. Desiderius devoted himself to the reconstruction, restoration and embellishment of all of those buildings which were in particularly bad condition[16]. Specialized artisans came, more than likely, from Egypt. They also came from Byzantium, bringing all those technical secrets which recalled the Roman, Greek, Germanic and Arabic heritage, thus bringing the Cassino school of the 9th century to its splendor. This new cultural trend can be seen not only in painting and architecture but also mosaics, enamels and miniatures. Furthermore, the Arab and Byzantine artists who arrived in Montecassino found fertile terrain thanks to the splendid artistic season the abbey experienced in the 9th century. In particular, Abbot Gisulfo created an art form that was highly influenced by Roman antiquity. One must bear in mind that the monastic artists, who lived at the abbey at the time of Abbot Gisulfo, had the possibility to see, better than we can today, the remains of the Roman buildings in Cassino and of all the buildings in the vicinity of the abbey. Moreover, Desiderius had no reservations when it came to repairing the columns of the abbey by making purchases at a Roman antique shop.
The Cathedral of Salerno also plays an important role as it was responsible for influencing many of the Romanesque churches in the surrounding area. For example, the Cathedral of Ravello and Scala, the churches of St. Maria in Gradillo and St. Giovanni del Toro in Ravello, St. Eustachio in Pontone and The Annunciation in Scala, just to mention some of the notable examples whose walls were decorated using *tarsia*.
Only recently have academics agreed unanimously that in Campania, Romanesque builders were inspired by the decorative inlay systems of the Islamic world. Roberto Pane affirms that “it is conceivably possible to visualize a thirteenth-century Salerno; stunningly coloured by the East".
In the Arab-Islamic world such decorations were widely known in the Umayyad Caliphate and afterwards in Ayyubid architecture in Syria and Egypt. In the 8th and 9th centuries, with the arrival of the Umayyads in Iberia, the use of this technique, when applied to decorations with multicoloured segments, became prevalent. There are numerous examples of Arabic buildings, using *tarsia*, above all, in Andalucia: The Great Mosque of Cordoba (789-988). Only from the 10th and 11th centuries do we see North African monuments decorated with multicoloured segments or stone motifs in *tarsia*: the dome of the narthex gallery of the Al-Zaytuna mosque in Tunis (10th-11th centuries).
Furthermore interlaced arches, many of whom were also decorated with *tarsia* motifs, had a strong Arab influence. The idea of reinforcing the arch system through interweaving is most definitely of pre-Islamic origin, while in the West interwoven arches appear frequently in Roman mosaic designs. In Syria, they were already present in the early Christian period and were used to decorate facades, like on the lintel of the church of Behyo (6th century) such as the slab of stone of the church of Qasr al-Hayr al-Gharbi (728-29), where it is possible to see a multi-level architectural structure in which the ground floor consists of a small open archlet formed by intertwined arches.
The creation of the ornamented arches was realised by southern Italian craftsmen using stone material; dark slate; yellowish limestone; terracotta; travertine, sometimes perforated; bricks and, above all, grey and yellow tuff that allowed for various chromatic interplays[17]. The use of intertwined arches characterised many of the buildings during the Norman period. Such decorations, achieved using fascinating fantasy shapes and geometries, conferred a certain Orientale style on the walls. The decorative elements were usually inserted in the upper parts of the churchly buildings and in the apsides area; on the upper crowning of bells and, in general, on the external walls of noble buildings - articulated in complex and lively twists that would incorporate creative effects of light and shade.
The intertwined arches, even if used in the pre-Islamic period, can be placed in North Africa as belonging to the Fatimid culture. There is no doubt that there are many artistic links that have various origins, as decorated intertwined arches are present on many Romanesque monuments in Normandy, England and Norman Sicily; but also in Andalusia and in Islamic North Africa. And, in particular, in the Arab world, there is an accentuated regression of the functional form towards the supremacy of an ever more decorative one.
The flat treatment of the outer surface of the intertwined arches of the drum of the Salernitan bell tower recalls examples in the Algerian Islamic buildings, such as the palace of Ziride in Ashir; the minarets of the mosque of Sid Okba in Biskra (7th century); the mosque of Al Qal’a of Beni Hammad (11th century); the mosque of El-Mechouar in Tlemcen, built at the beginning of the 13th century in the Hammadite and Almohad style; and the Moroccan buildings, such as the Kutubiyya Mosque (1160-1195) and the *Qubba* al Barudiyin (12th century) in Marrakesh. The use of intertwined arches is quite diffuse, above all, in Andalusia, where it is still present in the mosque of Bab al-Mardum in Toledo (999-1000), The Aljafería Palace in Zaragoza (1049) and finally, the Giralda in Seville (1184-1198).
The intertwined arches of the transept and apse of the Cathedral of Cefalù (1145), most clearly Islamic, are the first examples built in Sicily – following those of the bell tower of Salerno (1140), by only a few years. The intertwined arches, with chromatic valences, of the churches of Monreale in

Sicily, St. Eustachio in Pontone of Scala and the Cathedral of Casertavecchia in Campania are all very similar.
It is possible to state that the Campanian models draw their inspiration from Umayyad Spain, this may be postulated from the Andalusian origin of the motifs, intertwined arches and the use of multicoloured *tarsia* - almost certainly reaching Campania through the role played by the city of Amalfi in the Mediterranean. It is no coincidence that the Arab traveller Ibn Hawqal (972) considered Amalfi as being more important than Napoli: its boats were the fastest in the Mediterranean and its territory the most fertile - enjoying the best conditions and being characterised by its richness and opulence[18].
To summarize, we can state that the routes that intertwined arches and *tarsia* took to penetrate the architecture of Southern Italy were numerous and varied. Primarily, they highlighted the differences that distinguished Arab architecture, with its Sicilian and Andalusian elements, assigning only to the later the artistic components that legitimise the Arabic morphological origin of many architectural elements. Conversely, as for the intertwined arches, they had a simultaneous emergence, at the expense of any temporal clue in Southern Italy, similarly to what happened in England, with the presence of the Normans.



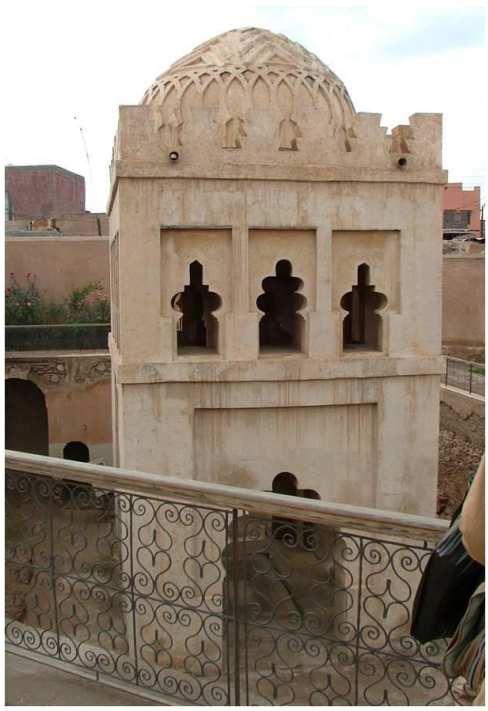


Fig. 8: Cordoba, Gate tower at Great Mosque
Fig. 9: Moroccan, Marrakesh, *Qubba* al-Barudiyin, Ablution Room





Fig. 10: Tunis, Great Mosque of Al-Zaytuna, Dome of the narthex gallery
Fig. 11: Tunis, Great Mosque of Al-Zaytuna, Underside of the dome of the narthex gallery





Fig. 12: Moroccan, Marrakesh, Kutubiyya Mosque, Minaret
Fig. 13: Algeria, Constantine, Historical center



Fig. 14: Casertavecchia, Cathedral, Lantern tower

Bibliographical References

[1] BERTAUX, Émile. *L'art dans l'Italie méridionale*. Paris : A. Fontemoing, 1904, p. 616-628; TOESCA Pietro. *Storia dell'arte italiana: Il Medioevo*. Torino: UTET, 1927, p. 595-596, 614-616; PANE, Roberto. *Intarsi murali romanici a Salerno*. In *Bollettino di Storia dell'Arte*, 1952, p. 39-40.
[2] KALBI, G. Luigi. *Tarsie ed archi intrecciati nel Romanico Meridionale*, Salerno: Ed. Testaferrata, 1971; FONTANA, Maria Vittoria. *L'influsso dell'arte islamica in Italia*, in CURATOLA, Giovanni. *Eredità dell'Islam, arte islamica in Italia*, Catalogo della mostra, Venezia, Palazzo ducale 30 ottobre 1993-30 aprile 1994, Milano: Silvana Editoriale, 1993, p. 457-476; CILARDO, Agostino. (a cura di) *Presenza*

araba e islamica in Campania, Atti del convegno Napoli-Caserta, 22-25 novembre 1989, Napoli: Istituto Universitario Orientale, 1992; GABRIELI, Francesco. SCERRATO, Umberto. *Gli Arabi in Italia. Cultura, contratti e tradizioni*. Milano: Vanni Scheiwiller, 1993.
[3] PLINIO IL VECCHIO. *Naturalis Historia*. XXXVI 47.
[4] BECATTI, Giovanni. *Incrostazione*. In *Enciclopedia dell'Arte Antica*. Roma : Ist. della Enciclopedia Italiana, VII, 1961, p. 144-151.
[5] Unfortunately, the monument is now in very poor condition: DE FRANCISCIS, Alfonso. PANE, Roberto. *Mausolei romani in Campania*, Napoli: Edizioni Scientifiche Italiane, 1957, p. 74.
[6] SERAFINI, Alberto. *Torri campanarie di Roma e del Lazio nel Medioevo*. Roma: Società di Storia Patria, 1927, p. 33-34.
[7] PLINIO IL VECCHIO. *Naturalis*…, cit., XXXV 2.
[8] PANE, Roberto. *Sorrento e la Costa*. Napoli: Edizioni Scientifiche Italiane, 1955, p. 106-108; PEDUTO, Paulo. *Bacini, tarsie e spolia nelle costruzioni in Italia meridionale al tempo degli ultimi Longobardi e dei Normanni*. In *Apollo*, n° 21, 2005, p. 99-114.
[9] On the origins of the *tarsia* technique in Campania: GAMBARDELLA, Alfonso. *Le tarsie murarie in epoca federiciana*, in FONSECA, Cosimo Damiano. *Cultura artistica, città e architettura nell'età federiciana*. Atti del Convegno di studi, Reggia di Caserta-Cappella Palatina 30 novembre-1 dicembre 1995. Roma: De Luca, 2000, p. 47-62.
[10] KALBY, G. Luigi. *Le decorazioni parietali nell'architettura della Campania Romanica*. In *La Chiesa di Amalfi nel medioevo*. Atti del convegno internazionale di studi per il millenario dell'archidiocesi di Amalfi (Amalfi-Scala-Minori, 4-6 dic. 1987). Amalfi: Centro di cultura e storia amalfitana, 1996, p. 301-312.
[11] BOTTARI, Stefano. *I rapporti tra l'architettura siciliana e quella campana nel Medioevo*. In *Palladio*, n° 5, 1955, p. 7-28; CIOTTA, Gianluigi. La cultura architettonica normanna in Sicilia, Messina: Società Storia Patria Messina, 1992, p. 135-189.
[12] GOFFREDO MALATERRA. *De rebus gestis Rogerii Calabriae et Siciliae Comitis et Roberti Guiscardi Ducis fratris eius*, Bologna: Pontieri E., RR.II.SS., n. s. V 1, 1928, Libro III, Cap. 32.
[13] BRACA, Antonio. *Il duomo di Salerno: architettura e culture artistiche del Medioevo e dell'Età moderna*. Salerno: Laveglia Editore, 2003.
[14] D'ONOFRIO, Mario. *La basilica di Desiderio a Montecassino e la Cattedrale di Alfano a Salerno: nuovi spunti di riflessione*. In AVAGLIANO, Faustino. *Montecassino. Scritti di archeologia ed arte*, Montecassino: Pubblicazioni Cassinesi, 1997, p. 231-246; ROSI, Giorgio. *L'atrio della cattedrale di Salerno*. In *Bollettino d'Arte*, n° 33, 1948, p. 225-238; PACE, Valentino. *Campania XI secolo. Tradizione ed innovazioni in una terra normanna*. In *Romanico padano, Romanico europeo.* Convegno Internazionale di Studi (Modena-Parma, 1977). Parma: Università degli studi di Parma, 1982, p. 226-256; GANDOLFO, Francesco. *La cattedra "gregoriana" di Salerno*. In *Bollettino Storico di Salerno e Principato Citra*, n° 2, 1984, p. 5-62.
[15] SPECIALE, Lucinia. *Montecassino e la riforma gregoriana*. Roma: Viella, 1991.
[16] CARBONARA, Giovanni. *Iussu Desiderii, Montecassino e l'architettura campano abruzzese nell'undicesimo secolo*, Saggi di storia dell'architettura, 2, Roma: Università degli studi, Istituto di fondamenti dell'architettura, 1979.
[17] Grey tuff like yellow tuff, due to their volcanic origin; belong to the category of pyroclastic rocks which is found in Salerno. Grey tuff has a volcanic origin and is found in the northern part of the plains of Campania and in the Agro-nocerino-sarnese while yellow tuff came from the volcanic eruptions of the Flegrea area*:* PENTA, Francesco. *I materiali da costruzione dell'Italia meridionale*. Napoli: Fondazione Politecnica del Mezzogiorno, 1935, p. 181-183.
[18] IBN HAWQAL, *La configuration de la Terre* (*Kitab Sūrat al-Ard*), trad. J.H. Kramers, G. Wiet, vol. I, Paris: Maisonneuve & Larose, 2001, p. 197.

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Art and nature in a lost garden: the Park of the Caracciolo Prices in Avellino

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Abstract
In the years between the 16th and 17th centuries, Prince Camillo Caracciolo, through a series of purchases of private lands, significantly expanded the already extended landholdings of his family in the area adjacent to the castle of Avellino. Right in this extensive green area developed in large part on the slope of a hill emblematically called Belvedere, the aforementioned Prince made a magnificent and grandiose useful Park for hunting and leisure.
The different heights determined the division of the Park into two distinct parts; the bottom one, closest to the castle, was embellished with a decorative wise use of water. In addition to some fishponds, an artificial lake and artistic fountains, stood out, above all, a very special element: a cave housing a nymphaeum decorated with stuccoes, sponges and sculptures. Several sources describe this garden as a marvel known throughout the kingdom both for its refinement and for its botanical variety and there are numerous testimonies of famous visitors who stayed in town just to see in person the much-vaunted and today disappeared Princes Caracciolo's Park.

Keywords: Italian Renaissance garden; water artifices; nymphaeum; Giovanni Antonio Nigrone.

1.
For almost all of the 14th century the county of Avellino was governed by a very particular figure who, together with the Caracciolo princes some time later, would prove to be fundamental for the history of this city: the Countess Maria de Cardona.
Descendant of a noble family of Catalan origins, the Countess de Cardona was prematurely orphaned of both parents, thereby becoming, in 1513, at the tender age of 4, heiress of the marquisate of Padula and of the county of Avellino. Her lineage allowed her to be raised in the best aristocratic Neapolitan milieu of that era, and this contributed in making of her a perfect Renaissance noblewoman. Inclined to sophistication, and a lover of culture and the Arts, once she entered into full possession of her fief, she became friends with the most illustrious personalities of the Reign. These scholarly friendships gave life to vivacious meetings of intellectuals in the Countess's Avellino residence, the old Norman castle, which the Countess de Cardona had restored to Noble Palace after two tragic events; the plundering of the city by Alfonso of Aragon in 1440, and the terrible earthquake of 1446, had substantially destroyed it. The indispensable renovations were particularly aimed at the creation of a sumptious new noble floor with rooms that would guarantee a befitting reception not only to it's owners, but also to it's numerous guests. A turning point for the modernization of the Avellino dwelling was then offered by her second marriage, propitiated by Charles V in 1539, with Francesco d'Este. The union with the young member of one of the most illustrious families of Italy, in fact, certainly had to make the Countess of Cardona consider it appropriate to adapt her palace as much as possible to the rank of the Este court. This assumption applies in particular to the work carried out in the years after the wedding if you consider that immediately after the wedding, which took place in 1539 by proxy but officiated in fact only the following year in Naples, the Countess de Cardona had the opportunity of visiting the famous Duchy of Ferrara and of appreciating the luxury and the

architectural refinement personally. His military career led Francesco to be away from Maria and his Avellino fief very often, and, when particular contingencies in the struggle between France and Spain forced him to side with the French (1555-1557), there was also in fact a definitive separation from his Spanish wife. With no heirs, the countess continued to brilliantly administer the county alone, an activity which at the time was rarely entrusted to a woman alone. In 1561 a new violent earthquake devastated the city and her palace, but this time the countess was not able to see the completion of the reconstruction. Maria de Cardona in fact passed away in 1563 and after her demise the estate passed to the *Demanio Regio*. Precisely an estimate of the Royal Chamber referred to the income of the county in 1566, making it clear that the Countess's Palace, despite the damage suffered as a result of the earthquake and the partial neglect of the last few years, looked rather dilapidated but a good part of it was still habitable [13]. The same document, listing each baronial income, speaks of 50 ducats obtained from *the castle garden*. The data in itself is not very enlightening as to the nature of this entry, it is, though, very useful in ascertaining that already at the time of the Countess de Cardona there was a garden with the building, and allows us to legitimately assume that the green area may have been a sort of anticipation of what would have later become the vast and magnificent Park created a few years later by the future rulers of Avellino, the Caracciolo family.

In 1581, in fact, after about eighteen years of royal exploitation, the fief was finally bought by Marino Caracciolo I, first prince of Avellino - the city was elevated to the status of principality in 1589 - Marino marked the beginning of the very long dominion over the fief of the noble Neapolitan Caracciolo family that would last continuously for nearly two and a half centuries. The new dynasty, definitely destined to leave its mark on the fate of the city, from the beginning aligned itself with the process of renewal already begun by the enlightened Countess de Cardona, hugely amplifying the project by far. The first real initiator of this renaissance was the second prince of Avellino, Camillo, who succeeded his father in 1591. Marino's firstborn, also heir to the huge economic wealth of the family, was both a man of arms and a man of culture, and to heroic military exploits - in Piedmont, France, and Germany, but especially in Flanders - he associated interest in the arts and literature. He did his utmost in many works of urban improvement of his fiefdom, such as the significant redevelopment of the ecclesiastical architectural heritage of the city, and expanded its boundaries through the acquisition of new properties. One of Caracciolo's great merits was to understand the administration of estates through a more modern business perspective. In Avellino, thanks also to the clever exploitation of the many albeit small watercourses on the territory of the city, a productive milling activity flourished and the old wool processing activity was intensified with the construction of new factories. As for the castle, the substantial changes gave back a building that had lost much of its appearance of fortified architecture, gaining instead the features of an elegant, stately palace with a rich system of stables and other outbuildings dedicated to horse breeding. In fact, the equestrian activities, aimed both at war and hunting, were enjoyed by Camillo so much, that for this very reason, he decided to equip his Avellino residence also with an adequate space for the exercise of hunt. To do this, the prince arranged to expand, through divestitures and new acquisitions of adjacent land, the feudal hunting reserve of which the castle had been able to avail itself of since the medieval period. It was the north area of the castle which from the valley of the Rio Cupo - the river which encircled the ancient Norman fortress to the north and the east - stretched uphill along the ridge of a green and panoramic hill emblematically called Belvedere. Camillo greatly expanded the boundaries bringing them up to the limits of the existing Picarelli and Pianodardine hamlets, areas respectively distant about three miles north and four miles northeast from the castle. This sumptuous Park was characterized in its lower section, that is in the area that is closest to the castle, by a section that is more decorated, and therefore rightly defined as a garden. It is very likely that the eastern part of this section included that unspecified green area which has been mentioned previously, attributing it to the period of the Countess de Cardona, and identified in the document of 1566 as *the castle garden*. The game reserve and the garden were therefore two different entities but closely connected and together they formed a single magnificent park. A description of the city of Avellino dating back to 1629 offers an interesting testimony of both structures [2]. The precious passage only briefly indicates the type of game in this park, while giving a more comprehensive picture of the elegant garden. In fact, it is clear that, thanks to a ramified system of water pipes, the system could rely on a substantial amount of water, and this factor was expertly used for decorative purposes.

A considerable contribution on the implementation of some of these decorations in the Camillo Caracciolo Park was undoubtedly made by Giovanni Antonio Nigrone, known *fontanaro* and water engineer of the time. Florentine, but with probable Saracen origins, Nigrone was, in his field, a real celebrity. Active, among other places, in Rome, Florence, Matera, Sermoneta and Viterbo, he worked with special continuity and fortune in the Kingdom of Naples, where, between 1603 and 1604, he appears to have been the creator of at least three of the six fountains built along the road which from Naples led to the fifteenth century Villa of Poggioreale in the attempt, commonly attributed to the then viceroy Count of Benavente, to transform that part of the city into a public promenade [17]. Nigrone himself provides us with a more comprehensive review of his works, with the implementation, between

the end of the16th and the beginning of the 17th centuries, of a manuscript containing detailed descriptions of several hydraulic mechanisms, fountains, water games and rich scenographic apparatuses which he devised. Among the many documented works, the author lists some that, without a shadow of doubt, confirm his great professional competence; these are works created in some of the most important gardens of the time, such as Villa Medici in Rome, Pratolino near Florence and Villa d'Este in Tivoli. This necessary clarification explains the importance of the figure of Nigrone in the context of landscape gardening and renders his presence in Avellino very significant in the early years of the seventeenth century: a presence that has been ascertained precisely from the aforementioned Florentine artist's treatise. Among the 313 drawings present in the 531 pages of the manuscript divided into two volumes, in fact, there are two watercolor plates depicting a fountain with artistic hydraulic automatisms that a handwritten annotation states had been created specifically for Prince Camillo's garden. Nigrone gave full proof of his abilities with a very structured work, by staging an artificial representation of the Avellino landscape which proved to be characterized by abundant waterways and in which the city's main architectural emergences, idealized, stood out. The park itself was symbolically depicted in the foreground through the reproduction of a classic decorative fountain surrounded by a few trees proposed with geometrically shaped tops. The entire system was driven by well-hidden hydraulic mechanisms that allowed the movement of certain elements of the picturesque scenery like the blades of the windmills or the small terracotta figures engaged in many different activities that populated the faux landscape. The two drawings mentioned and the brief description with which the author himself described them, are today the only evidence left of the fountain [1].

Despite the paucity of further information about this work of art, such as its precise location in the garden, there is no doubt that the rich decorative apparatus with which the Park was equipped, did not take long to increase his reputation among his contemporaries. So it was that, from the beginning of the seventeenth century, many visitors, more or less famous, vied to admire it. The testimonials of these visits which have reached the present day are the only tool available to attempt a more detailed reconstruction of the Park. Particularly with regard to the botanical aspect, one of the most interesting is the one proposed by Gian Vincenzo Imperiale, Genoese nobleman and man of letters who, between May of 1632 and the same month of the following year, crossed the whole of Italy to fetch possession of his fief in Sant'Angelo dei Lombardi. In the detailed guide of his long journey, Gian Vincenzo Imperiale also describes his fleeting visit to the Park on the day of Wednesday, March 30th, 1663, providing new insights and some confirmation [9]. Firstly, it certifies the great notoriety of the Park in those years, which, however, he judges to be deserved. He then implicitly clarifies the particular use which the owners made of it. In fact, with all evidence, the Caracciolo's intended this property of theirs as an elegant portion of constructed landscape, in which nature and art vied with each other in order to offer the most wonderful of shows, and they generously shared that beauty with all those who manifested the desire to do so. These noble intentions were indeed fully declared by the epigraph that stood out on the great gateway to the Park *To appease Mars with the delights of Peace, and to carry forward Peace in the midst of the games of Mars, Camillo Caracciolo, prince of Avellino, delight of Mars and defense of Peace, prepared, in this most splendid theater in the garden, for himself and his own, for the citizens and for the foreigners, in order to delight, the competitions of nature and art* [2]. Once again, Gian Vincenzo Imperiale helps to better understand how and which different botanical types were arranged inside the garden, of which the morphology of the system is specified - organized on different levels - the immediate proximity to the residence and, above all, the unfortunate exposure to the weather. Precisely in this latter feature, normally extremely detrimental to a green architecture, Gian Vincenzo Imperiale was surprised to detect the paradoxical strength of the Park. The forced use of plants, more commonly known for their strength than for their pleasant appearance, for decorative purposes, determines for the narrator the great originality of this garden, constituting proof of how it, in spite of everything, and indeed perhaps even more evidently, proves a masterly example of the art of the gardens of the time. Even though these plants were in fact a little too ungenerously denigrated even by the author himself - that which is called *fetid boxwood* for example, even though it really does have unpleasant smelling inflorescences, is actually an evergreen shrub greatly appreciated since ancient times for the its excellent cutting resistance which makes it very suitable for topiary artistic pruning - Gian Vincenzo Imperiale himself extolled the skillful arrangement in the garden that gave rise to valuable intersections of paths marked by live borders, to shady pergolas covered with green, artistic plant espaliers. The reason why only Flemish tulips, daffodils, peonies and anemones found space in the garden flowerbeds is easily explained by the time that Prince Camillo spent in Flanders.

If the latter may in fact certainly be referred to as the main ideator of the creation of the Park, the overt ability of the various members of the Caracciolo family to ensure the continuity of their dynasty is to be considered, and is also reflected in the management and care of their beautiful garden. The third prince of Avellino in particular, Marino II, son of Camillo and his immediate successor (1617), distinguished himself as a passionate promoter of culture and of the arts, and therefore, in perfect harmony with his father's work, continued the enhancement and beautification of the Park. In this

respect, it is essential to stress here that the travel records of Gian Vincenzo Imperiale widely discussed above, which go back to 1633 and are therefore three years after the death of Marino II, while also referring irremediably to the original work of Camillo, are mostly based on the state of the sites found after the government of the third prince of Avellino. The same is true with regard to the brief mention of the Park proposed by the Avellinese historian Scipione Bona Bella in 1656 but with referral to 1632. The episode is the visit to the court of the Caracciolo family by he who is referred to as the *King of Ethiopia, welcomed into the city with all honours, he was amazed by the Park and called it a delightful garden [...] of every delight in nature, wonderfully filled with art* [3;6]. Subsequent authors have identified the person in question as Zaga Christos, not agreeing, however, on exactly who he was, if the rightful heir to the throne of Abyssinia or a clever imposter [13;31].
Even more certainly, the state of the Park in December 1630, proved to be the result of the management of Marino II, when the Spanish Infanta, Maria Anna of Habsburg, was a guest of the Caracciolos for a few days, at the time travelling to Vienna where she was to marry the future emperor Ferdinand III. Marino II had died only the previous month, leaving his wife Francesca d'Avalos a widow and about to give birth to his only son. Pietro Veronesi, trusted secretary of the newly deceased prince and evidently still in service at his palace, in a detailed account of the episode, as well as confirming the decorative richness of the Park and emphasising the perfect function of the hunting lodge, denounced the presence in the garden of a further delectable distraction: a fishpond where to catch the trout that populated it [31]. Although the Infanta of Spain could not effectively fully enjoy the leisure activities offered by the Park due to bad weather, the wonderful welcome she received convinced her to offer herself as exceptional godmother to Marino's unborn successor. This happened punctually, by proxy, in January of the following year. In fact, during her stay in Avellino, the future fourth prince Francesco Marino I not being yet born, his uncle Marzio Caracciolo, brother of Marino II, and later archbishop of Taranto, who went by the name of Tommaso, did the honours, and acted as an attentive guardian throughout his nephew's childhood. The management of the fief of Avellino was thus firmly in the hands of Tommaso until 1646 and, curiously, the moment in which the young Francesco Marino took over the government more fully, coincided with one of the darkest periods in the city, which also irreparably marked the fate of the Park. At the end of 1647, the violent antispanish riots that had erupted in Naples a few months earlier, also extended to the province, and the city of Avellino was the object of looting and devastation that obviously did not spare the palace of the Caracciolos and its extensive garden. The damage to both structures was enormous, and even when things calmed down, and the Caracciolo's re-took possession of it, in 1648, they were never as they had been in the past. The castle was gradually abandoned, firstly in favour of the renovated ducal palace that the family owned in Atripalda, and then of a brand new structure built not far from the old medieval castle. As a result of the princes' increasingly frequent stays in other locations, the Park itself ended up losing the appearance of an important element of representation, and its lands began to be exploited instead as mere sources of income. In effect, a good deal of its vast surface was from the beginning intended for productive purposes, and it is known that inside there were areas for various structures, equipped for various activities such as beekeeping or grape pressing. After the progressive transfer of the court, however, this kind of activity definitely took over and radically transformed the past appearance of place of delight and elegant hunting lodge of the Park. Of course the ancient glories could not be so quickly forgotten, and during the second half of the seventeenth century to the early eighteenth century, there was no lack of evidence that they continued to celebrate the glorious past. This is the case of Abbot Michele Giustiniani who, in 1656, remembers the Prince's garden as one of the most delightful in the Kingdom [4], of a tax document kept in the State Archives of Naples which in 1676 still speaks of the Park as of a garden enriched with ornamental espaliers, and with cypresses, laurel, myrtle and boxwood in it [31], but especially in the case of the description offered by Giovan Battista Pacichelli in 1703 [5]. Probably mostly referred to, nostalgically, to the ancient splendor of the Park, the passage in question offers new insights regarding the analysis of its structure. The part already called *garden* by other authors, to differentiate it from the area used as a hunting reserve, is here further divided into a smaller area, referred to as the flower garden, and a larger one, characterized by the well-known water games, by paths, by the fishpond but also by a small artificial lake and by an unspecified number of statues. If of the small lake, there are no further significant references elsewhere, in the middle of the 1600s Bella Bona might have indicated the source of the statues. In his *Raguagli*, later taken over almost literally by others, the author, narrating the ancient Roman Abellinum which stood near Atripalda, whilst browsing the archaeological remains which could still be seen at the time, writes about the amphitheater: *From the Amphitheatre [...] in our, and in past times, many marbles have been gouged out, and beautiful statues, some of which have been transported to the small garden of our Lord Prince* [3;6].
However, despite these belated celebrations, during the eighteenth century, the Park became progressively more and more degrading and reduced in extension by the continued sales of its land to private persons. As mentioned, what determined such a state of decline was primarily the definitive transfer of the Caracciolo family to their new palace. This building, which today is the seat of the

Provincial Administration in Piazza della Libertà, was built in the early 1700s in what was then the extensive *Largo* in the western part of the city and that in those years, thanks to its orientation towards Naples, began to become the new administrative center of Avellino. The remains of the now abandoned castle were used for its construction, and its features as the family's representation palace are well testified by Carlo di Borbone's visit to Avellino in 1735. A report published in 1742 recounts the episode in which the king, welcomed into the city with the highest honours on January 4, was hosted in the Caracciolo's new palace, which was appropriately adorned for the occasion. In particular, a hall was prepared to look like a *faux ornamental garden*, which the Spanish king proved to appreciate, calling it *muy lindo*. Shortly after, the guests went into *the real great garden of the palace, (which had been prepared in advance by the Prince, master of the handsome, richly executed study, in order to provide an abundance of every kind of animals and beasts, and birds) in which His Majesty amused himself with great pleasure, hunting throughout the remainder of the day* [7].

It appears evident that the magnificent Park built by Camillus, though probably not surpassed in beauty, in fact, had been replaced at least in all its main functions. It is no wonder, therefore, that in 1779 the vast majority of its surface area had been converted to farmland by the new owners and the only remaining part of the old structure still owned by the Caracciolos resulted, according to what we learn from a document preserved in the Notarial Archives of Naples, a very small area near the castle ruins, where there had already been for a few years, a building used as an inn. After only a few years even that last strip of land was sold, and what was left of the Park started to slowly disappear. Already in 1810 the traces of the glorious plant were only vaguely readable: *even today you can still see a place called the Park, which was used for hunting, another area called the wall, where a rivulet formed a lake, and other vestiges of gardens, and hydraulic couplings that demonstrate its ancient magnificence* [24].

The history of Caracciolo Park would seem, therefore, to end this way, and in fact until a few years ago nothing of the old structure appeared to have survived, the only proof of its presence being entrusted only to the name that identifies the inhabited area which subsequently arose in the same area, the Park District in fact. Surprisingly, however, during some restoration work of the eighteenth-century Casino del Principe that became necessary after the 1980 earthquake, and which ended only in 2008, some underground rooms have come to light, undoubtedly attributable to the ancient garden. The so-called Casino del Principe, owned by the city since 1987, is a building constructed on an existing architecture around 1760 by Antonia Maria Carafa, wife of the seventh prince of Avellino, Marino Francesco Caracciolo. The princess wanted the Casino to make it into a hotel and, as such, the structure can be traced back to the inn which has already been mentioned above, and which stood in the last small area of the Park still belonging to the Caracciolo's before its total alienation from the family property. In the year in which the inn entered into business (1763), the Princes had in fact already begun the gradual sale of land in the Park, now marked by farms, and the construction of a room equipped to accommodate the many travellers, turned out to be a smart solution to reap additional profits from the residual properties of the time. In this sense, however, the hunting lodge lent itself particularly well to the purpose because its location, just a few meters east of the castle and along the busy Strada Regia di Porta Puglia (now Via Umberto I), ensured an intense daily flow of potential customers. Leaving aside the classic eighteenth-century structure of the edifice constructed by Carafa, the most important interest here concerns the aforementioned pre-existence on which it was built and from which the recently discovered underground rooms decorated with nymphs, constitute clear remains which have unexpectedly survived. Unfortunately, with respect to the old building, it was not possible to derive any useful information, neither from the restoration at the end of the last century, nor from any other relevant documentation. Even today, therefore, it is not quite clear what the original conformation of this architecture was, the period of its creation or the purpose for which it was conceived. In the absence of certain evidence, in fact, a univocal understanding about its precise temporal positioning wasn't found, and the doubt remains about whether its implementation can be traced back to the Countess de Cardona or the Princes Camillo and Marino II. On the other hand, full agreement seems to register about the suggestion that that structure constituted a pertinance of the large garden now disappeared, so much so, that it is commonly identified as the place where the gateway to the Park, accompanied by a previously mentioned epigraph, was to have been built. To further accord this already condivisible thesis, the analysis of the two splendid, recently rediscovered underground rooms that are actually proposed, to say the least, unequivocally as classical decorative structures of the late Renaissance, concurs fully, in line with the dictates of sixteenth and seventeenth century garden art. Both rooms present themselves today with the walkway flooded by about a foot of water, the level of which, in order to prevent it from rising excessively during periods of rain, is kept under constant control and if necessary, is suitably drained. The first, a barrel vault, is the most spacious but has no decoration. Far more interesting is the second room whose vault is centrally enriched with stucco decorations, which, although missing in many parts, maintain a reasonable state of preservation. The design, composed of these white stucco decorations, is that of a central ellipse mounted by several orders of rectangular frames variously

made up of floral patterns or laborious embroideries. In the short side, which looks towards the back of the room, a large white shell and a large frowning mask, stand out among the frames. This second element is colored red, and is depicted while irreverently showing a long white tongue which, bifurcating, acquires a further decorative value. The aforementioned mask thus appears to dominate from the ceiling, the main element of this environment, which is represented by an artistic wall fountain located on the apsidal bottom of the room. Here the various friezes appear significantly worse preserved, and the idea of what the decorative apparatus should have been in its entirety, is mostly offered by the remains of two statues, depicting a male figure and a female figure, respectively located to the right and left of the central compartment from which presumably water was supposed to gush. Both the anthropomorphic figures are flanked by the remains of two tuff stone columns with Ionic capital, ideal pediment supports which probably surmounted the fountain, while other more damaged parts of the latter still allow only a glimpse of a few hints of the typical sponge and shell decorations which enriched the drawing. Ultimately, the structure here described, is fully in the category of caves and nymphs, typical of 16th century Italian gardens, widely replicated even in the following century. Distinctive elements of these imagined and natural-looking specific spaces, in order to offer a refreshing and delicious break in the Renaissance garden, are mainly rock gardens, corals, marbles, sponges, shells and more generally all those decorative elements that recall the suggestions of the myth of the cave in which the presence of water is clearly guaranteed in the form of the various effects and games. The most famous gardens of the time did not fail to enrich their plants with similar architectural events, and the cave fashion was affirmed to such an extent as to be often integrated in the compositions of prior periods also. Emblematic in this regard is the case of the fifteenth-century Villa Medici at Careggi in which only in the second decade of the seventeenth century, that which was originally a cellar, hosting casks and flasks of wine for the famous Florentine family, was transformed into a beautiful underground cave - from the conformation, however, very similar to that found in the Casino del Principe - with a barrel vault decorated with frescoes and a wall fountain embellished with sponges placed centrally at the back of the room [20].

Based on these considerations, the reasons which have led to imagine the subterranean structures of Avellino traceable to the time of de Cardona or the Caracciolos, seem both equally condivisible.

The first hypothesis could be fully justified by the experienced influence which the knowledge of the Este court exercised on the Countess. In fact, apart from the beauty of the gardens probably directly admired in Ferrara, of course you cannot ignore the fact here that the brother of Francesco d'Este, and therefore the brother-in-law of de Cardona, was the famous Cardinal Ippolito, or rather, one of the largest Renaissance buyers of magnificent garden plants, the best known of which is probably that of Tivoli; indisputably one of the most significant models of all the literature on the art of gardens, exactly for all that which concerns water games, and all that which acts as its accompaniment. It is also known that Francesco d'Este himself was not at all insensitive to the garden fashion. When, in the second half of the 14th century, he went away from de Cardona for reasons already mentioned, returning to Ferrara, he built that which today is known as Palazzina Marfisa, from the name of one of the two daughters he had had, out of wedlock. Here, in fact, he created a garden, now lost, which was exalted by scholars who tried to ideally reconstruct the structure as a typical example of an Italian garden. Within this green space, even though clear evidence of those elements related to the tradition of grottos and nymphs, has not surfaced, it should be emphasized that various rooms of the building feature ceilings decorated with grotesques, that is, those particular pictorial subjects very popular in the sixteenth century, generally depicting naturalistic backgrounds, which were often associated with more traditional decorations in different materials, precisely in the faux caves recreated within a garden. On the basis of these considerations, therefore, it would at least seem possible that among the works of adaptation of the ancient castle from fortress to noble palace, undertaken during the Countess de Cardona's period of government, the creation of these underground rooms with nymphs could have been started.

On the other hand, the theory that takes their creation back to the Caracciolo's is not less plausible, when you consider the constant references to the various fountains or to the many water artifices never minutely described but regularly and systematically mentioned by numerous eyewitnesses, who were guests at the Park during the seventeenth century. Finally, the ascertained involvement in the creation of Camillo's garden, of a master *fontanaro* such as Nigrone, trained at the most famous courts of the period, and connoisseur of Renaissance gardens, certainly does not help to shed light on the possible paternity of the recent findings.

What is certainly clear, is that the underground nymphaeum found in the Casino del Principe, seems to be the last precious testimony still existing today, in that articulated garden complex, and those green spaces, which constituted the historic Caracciolo Park in Avellino, and which, because of its intrinsic historical and artistic importance represents a heritage that undoubtedly deserves to be concerned by a far more prudent work of conservation and enhancement.



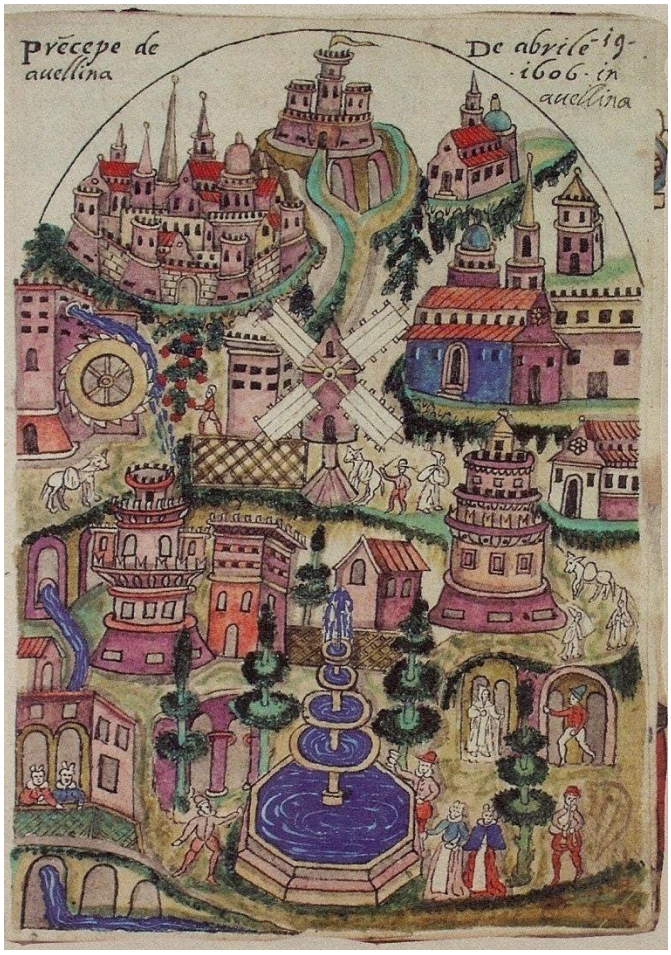

Fig. 1-2: Fountain designs created by Giovanni Antonio Nigrone.



Fig. 3: Underground room with decorations and fountain.

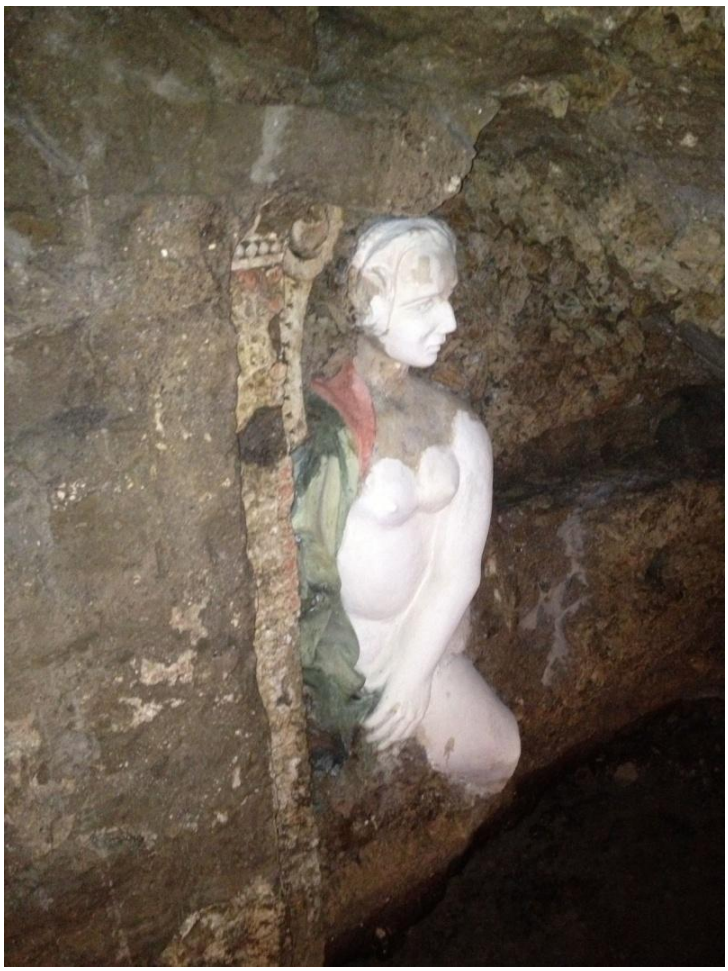

Fig. 4: Male figure of wall fountain, detail.



Fig. 5: Large frowning mask on the vault of the underground room.

Bibliographical References

[1] NIGRONE, Giovanni Antonio. *Scritti e disegni*. B.N.N., Sezione Manoscritti e Rari. Ms. XII. G. 59. (1585-1609).

[2] BACCO, Enrico; D'ENGENIO, Cesare. *Nuova, e Perfettissima Descrittione del Regno di Napoli, diviso in dodici provincie.* Napoli: Lazaro Scoriggio, 1629.

[3] BELLA BONA, Scipione. *Raguagli della città di Avellino*. Trani: per Lorenzo Valerij, 1656.

[4] GIUSTINIANI, Michele. *Sonetti di Monsignore Bartolomeo Giustiniani, Patritio Genovese, de' signori di Scio, Vescovo d'Avellino e di Frigento, con la di lui vita, scritta dall'abbate Michele Giustiniani, suo cugino*, Avellino: Lodovico Cavallo, 1656.

[5] PACICHELLI, Giovan Battista. *Il Regno di Napoli in prospettiva diviso in dodeci provincie*. Napoli: Stamperia di Michele Luigi Mutio, 1703.

[6] DE FRANCHI, Francesco. *Avellino illustrato da' Santi e da' Santuarj*. Napoli: Stamperia di Giacomo Raillard, 1709.

[7] SENATORE, Giuseppe. *Giornale storico di quanto avvenne ne' due reami di Napoli, e di Sicilia*. Napoli: Stamperia Blasiana, 1742.

[8] ZIGARELLI, Giuseppe. *Storia civile della città di Avellino*. Napoli: Stabilimento tipografico dei fratelli Tornese, 1889.

[9] BARRILLI, Anton Giulio. *Viaggi di Gian Vincenzo Imperiale con prefazione e note di Anton Giulio Barrilli*, in Atti della Società Ligure di Storia Patria, vol. XXIX, fasc. 1, Genova: Tipografia R. Istituto Sordo-Muti, 1898.

[10] BORZELLI, Angelo. *Giovanni Antonio Nigrone Fontanaro e Ingegnero de Acqua*. 1ª ed. Napoli: Riccardo Marghieri, 1902.

[11] CROCE, Benedetto. *Uomini e cose della vecchia Italia*. 1ª ed. Bari: Gius. Laterza e figli, 1927.

[12] ROTONDI, Giovanni. *Il castello di Avellino. Origini, eventi, conformazione, fine*. 1ª ed. Avellino: Tipografia Pergola, 1937.

[13] SCANDONE, Francesco. *Avellino moderna.*1ª ed. Avellino: Tipografia Pergola, 1950.

[14] MORMONE, Raffaele. Disegni per fontane di G. Antonio Nigrone. In *Il Fluidoro. Cronache napoletane*. Napoli: Stabilimento Tipografico Gennaro D'Agostino, n. 3, 1956, p. 109-116.

[15] DE CUNZO, Mario; DE MARTINI, Vega. *Avellino*. 1ª ed. Bari: Editori Laterza, 1985.

[16] GIANNETTI, Anna. Gli "istrumenti" idraulici di Giovanni Antonio Nigrone tra meccanica e mito virgiliano. In *Bollettino associazione per l'archeologia industriale*. Napoli: Stabilimento Tipolitografico Carte Valori, n. 23-24-25, 1989, p. 1-5.

[17] GIANNETTI, Anna. *Il giardino napoletano dal Quattrocento al Settecento*. 1ª ed. Napoli: Electa, 1994.

[18] DI NUNNO, Antonio; BORRIELLO, Orlando. *Avellino: immagini per una storia*. 1ª ed. Pratola Serra (AV): Sellino & Barra Editori, 1996.

[19] CATALDI, Maria Grazia; MASSARO, Andrea. *Avellino. Profilo di una città*. 1ª ed. Avellino: Edizioni del Comune di Avellino, 1999.

[20] MIGNANI, Daniela. I giardini della villa medicea di Careggi. In ACIDINI LUCHINAT, Cristina. *Giardini medicei*. 1ª ed. Milano: Federico Motta Editore, 2000, p. 157-172.

[21] BARATTA, Massimo; MUGIONE, Vincenzo. Il Casino di caccia del principe di Avellino. In *L'Irpinia Illustrata*. Cava de' Tirreni (SA): TOP PRINT Arti grafiche, n. 1, 2001, p. 50-57.

[22] GROSSO, Angelo. Giovanni Antonio Nigrone "ingegnero de acqua". In *L'Irpinia Illustrata*. Cava de' Tirreni (SA): TOP PRINT Arti grafiche, n. 1, 2004, p. 91-94.

[23] MASSARO, Andrea. *Locande, taverne, trattorie, osterie, bettole e cantine di Avellino*. 1ª ed. Atripalda: Walter Pellecchia Editore, 2006.

[24] SISTO, Michele. Uomini e paesaggi di Principato Ultra. Marciano di Leo e la redazione della statistica murattiana. 1ª ed. Avellino: Edizioni del Centro Dorso, 2008.

[25] BARRA, Francesco. Famiglia Caracciolo d'Avellino. In *Dizionario biografico degli irpini*. 1ª ed. Avellino: Elio Sellino Editore, 2009, vol. 3, p. 11-31.

[26] BARRA, Francesco. Francesco Marino I Caracciolo d'Avellino. In *Dizionario biografico degli irpini*. 1ª ed. Avellino: Elio Sellino Editore, 2009, vol. 3, p. 35-48.

[27] BARRA, Francesco. Marino II Caracciolo d'Avellino. In *Dizionario biografico degli irpini*. 1ª ed. Avellino: Elio Sellino Editore, 2009, vol. 3, p. 53-64.

[28] CATALDI, Maria Grazia. Maria de Cardona. In *Dizionario biografico degli irpini*. 1ª ed. Avellino: Elio Sellino Editore, 2009, vol. 3, p. 186-197.

[29] MONTEFUSCO, Armando. Avellino. Immagini per una ipotesi di storia urbana. 1ª ed. Avellino: Elio Sellino Editore, 2009.

[30] MONTEFUSCO, Armando. *Monografie per la storia di Avellino*. 1ª ed. Avellino: Biblioteca del Corriere, 2011.

[31] BARRA, Francesco. *Dal castello al palazzo. Il castello di Avellino*. 1ª ed. Fisciano (SA): Il Terebinto Edizioni, 2013.

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History and topicality of the historic earthquake-resistant timber frames: the Ischia's examples*

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Abstract
The so-called "baraccata house" – the first theorised building answer to earthquake-resistant behaviour improvement of the traditional masonry fabrics, as well as the first organic practical outfit of a legal post-seismic reconstruction standards (1784) – is attracting the increasing interest of a wide turnout of experts and scholars, because of its good performances in this field, as observed in well-conserved historic so-made examples and, more lately, in the laboratory-testing on proper specimens too (CNR-IVALSA). Focusing on the Ischia's historic tuff-masonry heritage, built in association with timber or metal frames after the massive 1883 earthquake, this paper examines islander last existing episodes, having fortunately survived replacements with reinforced concrete elements spreading during the 20th century. Thus, their constitutions, assets and arrangements have been surveyed and assessed at the light of on-site stratigraphic and "as-found" state of condition analyses of current fabrics, also helped by relating to the proper original unreleased philological *corpus*. Therefore, so-made dwellings and architectures detailed account has been obtained, relevant to designing compatible building conservation treatments, as well as up-dating the specific frame solutions.

Keywords: partition timber-framed wall; tuff-masonry walls; restoration; "as-found" survey; trusses.

* M. Bicco drew up Section 2. All photos are by M. D'Aprile.

1. The Ischia's "baraccata house" building system

On July 28th 1883 a strong earthquake had stricken the Ischia's island - a well-known, thermal holiday resort, particularly loved abroad - damaging and crushing most historic masonry heritage. Being in compliance with the Borbone's code of 1784, which had disposed the timber frames adoption, the so-called "baraccata house", for re-building the Calabrian and Sicilian cities and villages heavily beaten for the 1783's seismic events, the late XIX's reconstruction management of Ischia's dwellings widely used the cited frameworks, too. Missing an effective understanding of the traditional local-tuff masonry structures performance, seismic behaviour-related, because of their so-many falls and decays the technicians all had been called for the reconstruction planning, preferred a whole renewal of the isle building heritage, trough introducing timber or, in case of bigger sizes, iron frameworks in association with local tuff and pumice walls. Therefore, the initial huts design – later transformed into durable lodgings ("improved huts") – as well as the refurbishment intervention works and the public edifices renewals all were carried out on the basis of a short variety of typological solutions, using masonry-timber frameworks, since the first emergency program (1883). Though the late XIX's Ischia urban re-construction policy and strategy together with its technical solutions were already studied on a historical point of view [1], what actually was built in that occasion as well as its past and current effective building transformations have never been directly surveyed, unless paying attention to the relevant constructive aspects. With the aim of understanding and assessing features and frameworks



Figg. 1-2: Mileto (VV), the ex-Episcopal Palace. Re-built after the 1783's Calabrian earthquake the fabric adopted a chestnut timber framework with inner coating of rendered "wattle and daub" technique.

of this urban re-building program, so to valuating its compliance with the proper code and safety grading, few Ischia's buildings have been surveyed, also relating to unpublished archival documents. The chosen samples of course are those fortunately survived the late XX's reinforced-concrete wide dissemination. Thus, while so many studies begin valuate the interesting earthquake-resistant performing of the historic timber frames in the Mediterranean area, this paper puts light on the Ischia's post-seismic re-building program. It was the newly-born Royal Italian Government first text bench for forming and applying a common seismic-resistant building best-practice, though with relevant contradictions and operational limits. More lately, some laboratory tests and procedures have been carried out on similar artefacts. Among these, it's important pointing out the laboratory tests on the scale specimen of the former Episcopal Palace of Mileto (VV), re-built after the 1783's Calabrian earthquake (Figg. 1-2). Conducted by CNR-Ivalsa in S. Michele all'Adige with the partnership of the Department of Earth Science of the University of Calabria, the alternated increasing motions cycles highlighted the timber framework good performance, even after the masonry damage with material expulsions.

2. Origin and developing of the "baraccata house" building typology

Timber frames, even often in association with other constructive systems, used as earthquake-resistant structures date back to the Babylonian time. Being formerly made up of basic woven reeds matting and brick masonry (Aqar Quf's ziggurat), with the Romans this building solution evolved into the *opus craticium*. As Vitruvius documented and the ancient Pompei and Ercolano's remains still spotlight, this structure entailed timber trellis walled up with rubbles (*opus incertum*). This was the so-called "baraccata house" ancestor [2]. Other relevant authorities are the so-known tabernacles, made up of boards and used as emergency shelters after seismic events since the fourteenth century in Rieti [3], and the late XVII's dwellings reconstructed in Sicily using Calabrian woods after the famous Noto's earthquake [4]. Furthermore, it seems that this kind of structure were also used after the 1703's earthquake in L'Aquila [5], as well as in the urban reconstruction of the Calabrian and Sicilian historic centers damaged by the 1783's seism, for which, as it's known, the relevant Royal Instructions (1784) disposed the "baraccato" building system adoption, combining timber frames and masonry walls. Even though Giovanni Vivenzio was the first scholar to have underlined the "baraccata house" anti-seismic behaviour, certainly influenced by what had been planned and built in Lisbon after the famous quake



Fig. 3: Ischia, a gentry residential “baraccato” system solution with timber frames and tuff masonry walls.

Fig. 4: Ischia, Casamicciola, a “baraccata house” of “four compartments” building standard.



of 1755, it is particularly the late eighteenth century Calabrian and Sicilian reconstruction program the widespread of this building system is traditionally linked to. The cited code ordered two-storey regular sets made up of three different bodies, whose the central one larger, with no projections, high no more than 7.80 m, or 10.40 m because of a loft addition, but only where the fabrics were on the main streets. Moreover, improved timber joints were disposed as well, especially by using metal laces [6] while, as even Vivenzio suggested, the wall plugs were to be built with ashlars masonry or in *opus incertum*, made up of hard-stone rubbles.
It was possibly for the Royal Engineer F. La Vega, the technical committee director wanted by Borbone for studying the terrific 1783's seismic event damages, that the "baraccato" building system was chosen for the cited reconstruction planning. He had supervised the long-lasting excavation campaigns of the ancient Ercolano, Pompei and Stabia's ruins since 1780, indeed. Regardless of the codes, the Calabrian urban reconstruction practically went along with wide margins of autonomy for technicians and constructors, being only ordered the adoption of masonry structures reinforced with inner timber frames in chestnut or oak [7]. Still notwithstanding that regulation, i.e. in Reggio Calabria, the use of such timber structures was considerably reduced, often to a unique storey or even deleted [8]. Also the "baraccato" building system foundations presented different solutions; the most were continuous masonry walls or wooden pilings. The latter, particularly, were recommended by Vivenzio for using about 3.00 m tall timber posts, while for the continuous ones he advised to resort to stone beds, so did A. Gallo [9]. Moreover, this prescription was disposed for the same region after another big earthquake too, earlier in the 20th century, when Baratta suggested a reduced version of the "baraccato" building system, called "reduced", placing the timber frames on the second storey only [10]. As being codified by the Naples' Kingdom engineers after the cited 1783's earthquake, in the same regions the "baraccata house" building typology was newly adopted for urban reconstruction planning also in other occasions, as after the 1905 and 1908's seismic events [11], just due to its earthquake-resistant performance. Those shakes had only damaged the masonry portions [12].

3. Huts and "improved huts": the Ischia's "baraccato" building system

At night on the 28th of July a terrific earthquake, the most intense since 1228, heavily damaged Ischia with over 2300 victims. Most damages were on the northern side, especially at East [13]. Casamicciola, then the most populated island municipality with about 4300 inhabitants, got almost half of the total victims and most buildings destroyed or seriously ruined. There was the 1883's epicentre and the Ischia's economic development engine too, because of the thermal activities, since the 17th among the main reasons that had made up Ischia a famous holiday resort internationally known, above all in the nineteenth century. Hence, Casamicciola was firstly and more subjected to the urban renewal as well, testing solutions and procedures later adopted with minimal changes for the reconstruction planning of the other island districts. Even if referring to the cited bibliographical references for understanding the relevant historical context of these paper, some notes are however necessary to better picture the building solution features.
Since the first aids the reconstruction leading and management were assigned to the central administration, that took however advantage of the various stakeholders, as the Naples' Civil Corp technicians and the local professionals, with the decisive contribution of the Board of Architects and Engineers, as well as the building enterprises, that presented so many technical solutions and patents. But the Neapolitan Civil Corp engineers were the urban renewal planning actual supervisors, also for what concerned building aspects. Making blank slate of the local building tradition, basically upsetting the historic settlements of several mid and small villages scattered all over the island, the plan placed the new districts in the seismic safer zones – i.e. most along the shoreline – fixing up gentry lodgings and shack areas just where the first emergency huts had been settled up. Though it was the first time the seismic micro-zoning got in the codes, so revealing a decisive innovation, accordingly to the post-seismic urban renewal planning criteria just seen in Calabria and Sicily in the late 18th century, Casamicciola's and the other districts reconstruction corresponded to a fully desk-design, totally unrelated to the landscape and environmental relevant qualities, determining a draughtboard settlements link joined with the new coastal street, the core-element of the whole urban renewal. On a building point of view, all the intervention works must adopted the "baraccata house" system, preferably combining timber and masonry, leaving the usage with iron frames only for the biggest extent and public structures. Hence, the so-called "Calabrian system", as disposed by the cited Royal Instructions of 1784, was chosen as the building paradigm, only varying some features to allow the use of local resorts of best quality. For instance, for making up the stone-bed foundations were suggested the Arso's trachyte – a very lightweight and resistant lava – and for mortars the Perrone's and Casa Lauro's pozzolana, while to reducing the load-bearing timber frames costs the chestnut and fir were preferred to oak.
The "baraccata house" system was not through-and-through out of the Ischia's context, indeed. After another rather destructive earthquake on March 1881, some so-designed timber huts were raised as



Fig. 3: Ischia. This residential typology initially reserved to four families, though diversely modified, later was reduced to two.

Fig. 4: Ischia. The typical building solution known as “baraccato system” for huts. At the bottom a geo-radar prospections equipment used for timber frames surveying.



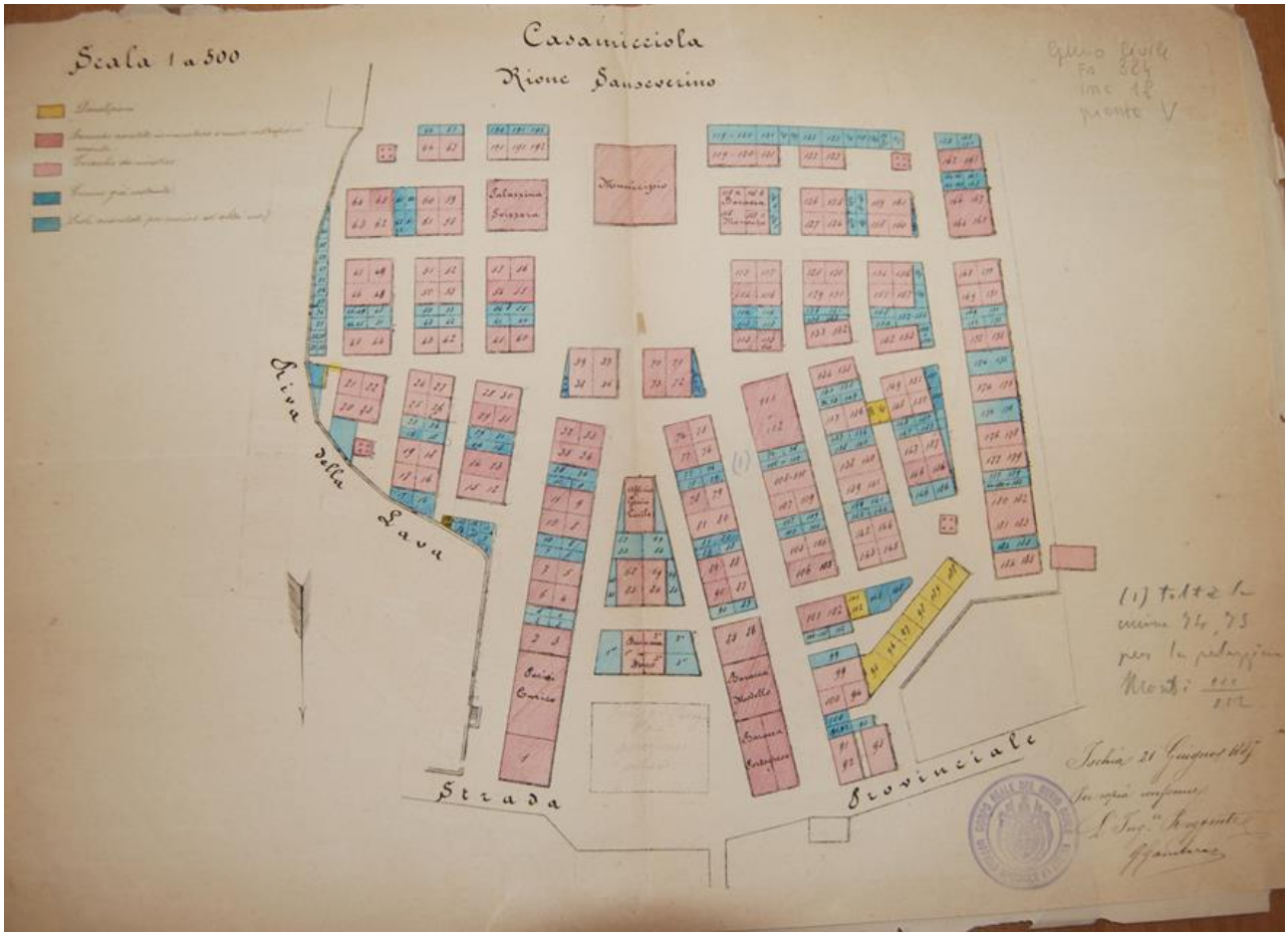


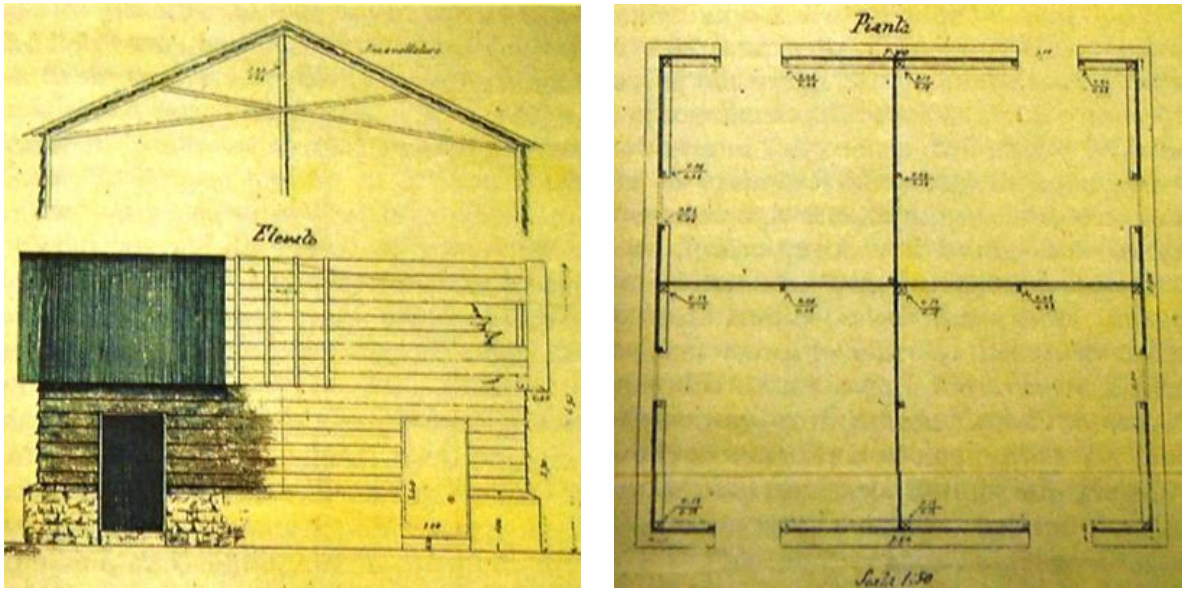
Fig. 5: Ischia, Casamicciola, Sanseverino's urban reconstruction plan, cadastral map, 1887. Naples' State Historic Archive (NaSHA). The "improved huts" with the tuff-masonry sidewalls are in pink.

first-aid shelters. Still inhabited two years later, these fabrics stood up very well under the shakes, so that this constructive procedure was almost automatically considered the best solution, although not cheap. Thus, in order to saving even more, it failed to comply with that building tradition had ordered brick side-walls, to preferring the local tuff-stone, provided that it were reduced in ashlars and set up in regular pattern, with good quality lime-mortars. Although various and repeated dissents regarded the cited frameworks above all for costs, many speculative shares connoted the nineteenth century Ischia's enterprise, also impeding, for instance, the adoption of large common dormitory timber rooms instead of the less reasonable solution of single timber fabrics for two or four families each.

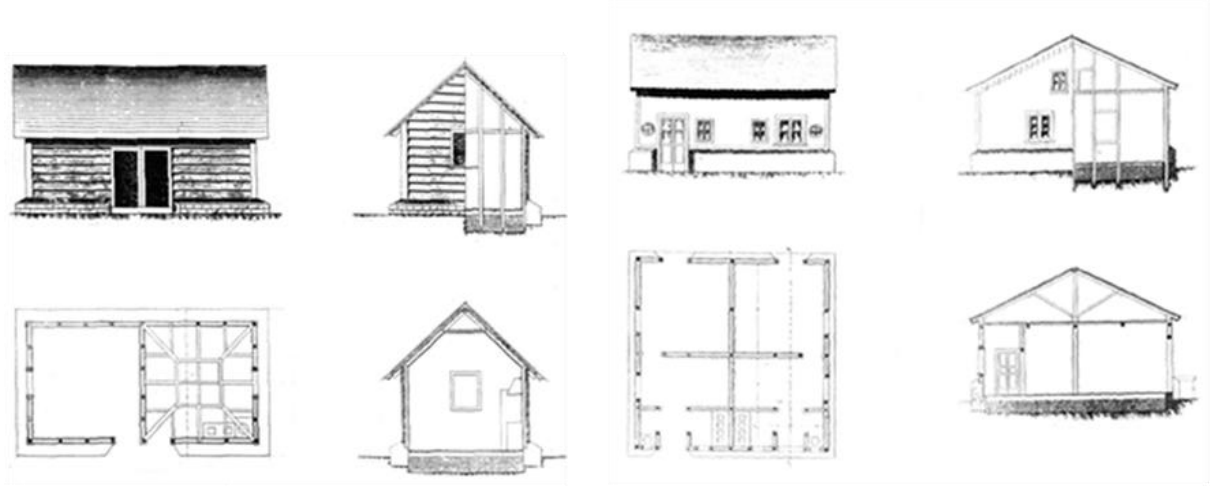
4. Earthquake-resistant historic building best practice: patterns and procedures

The Casamicciola's building code (1884) fixed the "baraccata house" constructive system adoption for both new production and refurbishment, on the basis of a limited variety of typological and morphological solutions. No attention was reserved to the heritage, going on with its demolitions even more than ten years later the seismic event. Hence, whether intervention works must were carried out to areas included in the master city plan or out of there, the timber-framed building technology with external tuff-masonry walls constituted the reconstruction program core-factor, almost automatically applied, and invariably unrelated to the environment and landscape features and to the relevant building damages, as well.

The basis module was a square room of 3.80-3.90 m in side – the so-called "compartment", module itself of the timber framework [14]. Thus, the urban parcel pattern could comprehend a couple or, better, a single residential unit on each short side. Always in accordance with the Naples' Civil Corp of Engineers, the main building typologies consisted in the following three standards: " the ordinary type of four compartments", or "of four" and of two of them (Figg. 6-9). Once accomplished the emergency stage, a lot of "four compartments standard" frabics were transformed into durable dwellings, by bundling adjacent units enlarged through the privatization of the next street portions and also improved with new small rooms for kitchen and utilities. A new storey and lofts often were added to these so-called "improved huts", while tuff-masonry sidewalls were raised up for insulating them. Only by the mid-twentieth century balconies and wider openings were settled on, too (Figg. 3-4).



Figg. 6-7: Naples' Civil Corp of Engineers, the Ischia's four compartments ordinary building standard (1883). (Casamicciola Municipality Historical Archive – CMHA)



Figg. 8-9: Naples' Civil Corp of Engineers, Ischia's timber-framed building standards (1883) on two (left) and four compartments (right). (CMHA).

Between 1884 and about 1888 the plenty of these building licenses for improving huts into durable lodgings is documented in the Naples' Civil Corp cadastral maps of the new urban sections [15] (Fig. 5). The relevant archival documentation, most unpublished, also consists of many building permission requests, from which taking effective constructive requirements and operational methods [16]. The instructions invariably indicated almost square layouts of 7.90 x 7.50-7.90 m built up with timber frames of fir, formed by vertical and horizontal members (12x12 cm) with cross-inclined posts (trestles) in the voids. Inner siding, rendered nailed boards and tuff-masonry side-walls, plastered as well, completed this structure. Also partitioning were timber-framed, coating by a mortar layer of 10 cm and then rendered too. Instead of the common timber trussis, the smaller roofs could also presented "post and beam" frameworks, covered by boards and corrugated iron, nailed to fir joists ("longherini"). Moreover, all the boards were overlapping each other for at least 3 cm.

Chestnut seemed to have been preferred for existing masonry structure refurbishments and for improving the new post-seismic dwellings with storyes and enlargements. Basing on size, these skeletons were composed by main and secondary piers (respectively, 12x12 and 15x12 cm) with cross-beams (18x15 cm) and 45° cross-inclined posts (10x10 cm). Generally, the "tenon and mortice" joints and the lap links of timbers, as well as the half-lap connections of the roof rafters were reinforced with nails and even iron squares. The tuff-masonry walls were plastered on both side. Roof frameworks didn't provide for any effective differences with the cited ones, being also still in fir. Oral statements of some of the older local building contractors talked about plastered jute tissue inner coating, nailed to timber-frames, rarely substituted by the "wattle and daub" workmanship.

Also the restoration and refurbishment intervention works were leaded by these building criteria. Where the masonry box could be survived, vaults, except the ground ones, raised storeys and thrusting elements were demolished, for erecting timber frames and floors, finished with plastered

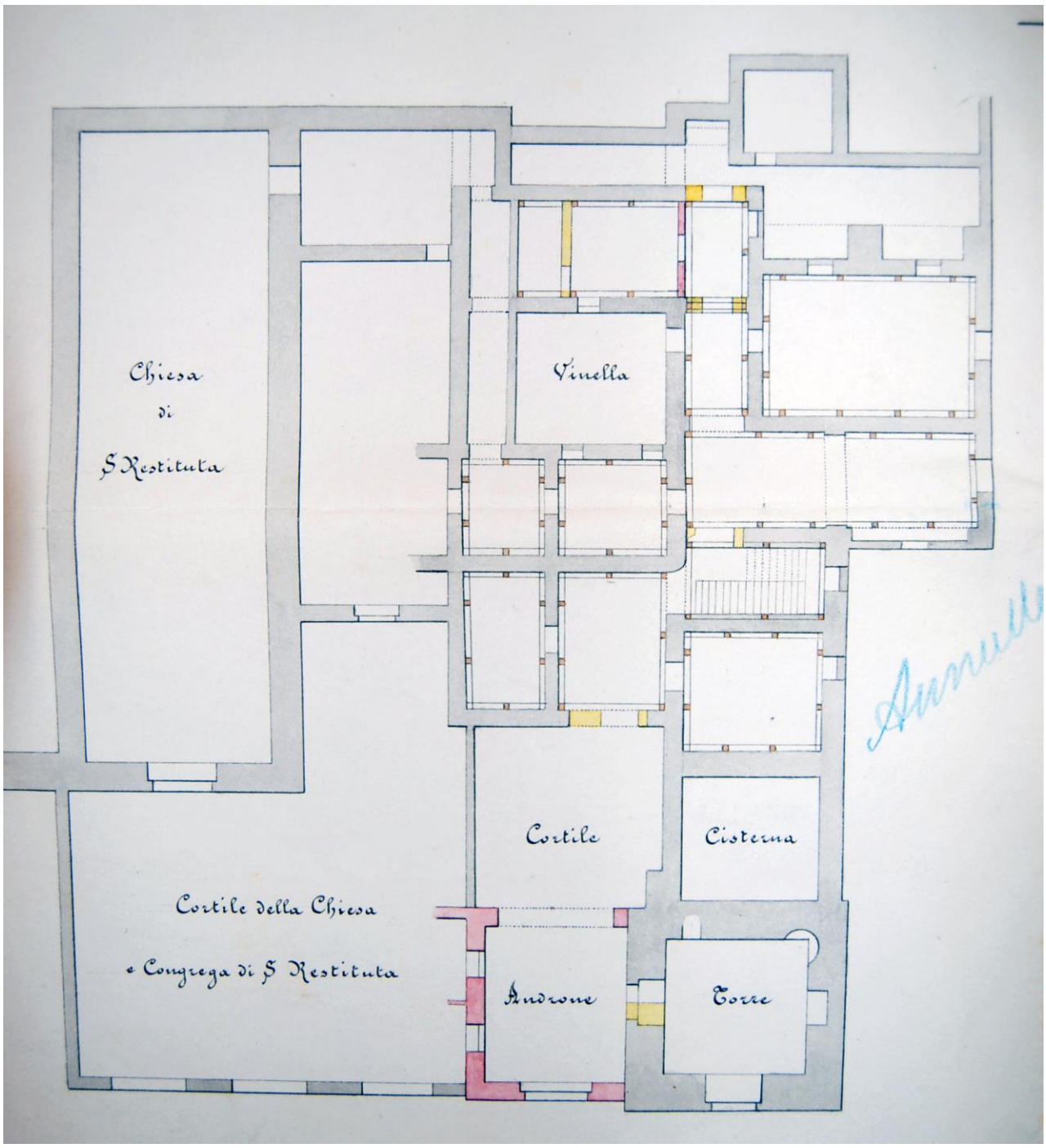


Fig. 10: Ischia, Lacco Ameno, the new town hall design in the former St. Restituta's monastery (1885), ground floor (NaSA).

boards. In Lacco Ameno the reconstruction plan of the St. Restituta church (1885), by the Naples' Civil Corp engineer F. Botta, and the so-called "restoration" program, a refurbishment one indeed, of the city hall in the adjacent former monastery (1888-90) well outlined the cited operational procedures, unconditionally using timber-framed solutions (Figg. 10-11). Since the bigger extent of the church they also laid on iron pointed oak piles, deeply driven into the ground [17].

5. Conclusions

By visual and measured surveying the building, material and measurement features of the Ischia's "baraccato" frameworks still in force, for some samples even observed with the geo-radar prospections, the relevant archival data have been compared and contrasted, highlighting interesting clarifications of the initial operational methods, as well as further fabric modifications undergone [18]. As it can be observed in other historic post-seismic re-built contexts using the timber-framed system – the Calabrian and Sicilian ones of the late 18th century, for istance – some working qualities of the



Fig. 11: Ischia, Lacco Ameno, St. Restituta Church's refurbishment design (1885). The new front.

timber-framed structures are out of line with the pertinent building code, revealing decisive approximations in joints and fixings workmanship, above all [19]. These artefacts earthquake-resistant performance strictly depends on their junctures holding, of course. Thus, inadequate timber joints forcedly entails house-builders and contractors improper acknowledgement of the "baraccato" framework requirements of an effective anti-seismic behaviour. In Casamicciola, Lacco Ameno as well as the other Ischia's districts, even most battered by the 1883's event, the "baraccato" timber frames often display similar improper workmanships of wooden members and joints alike. Posts, cross-beams and 45° inclined cross-bracing of the timber-framed tuff-wall dwellings have been only drawn from chestnut debarked logs indeed, rather than sawn in accordance with the relevant rules. Their size cross-section vary basing on dwelling extent, of course. Some of these timber elements, now taken apart, can be directly survey today, constantly revealing 12 cm in diameter and about 2.30 m in length. As referred above, generally the timber joints are of the "tenon and mortice" kind, also nailed and stiffen with iron squares.

Another common vulnerability of these timber-frameworks concerns their inadequate proofing. At that time for timber-insulating the traditional building culture entailed two or three pitch coats, not easily verifiable in the current fabrics as well as in the archival data [20]. Also about the local tuff-walling some notes must be underlined, due to its improper cross-wise concatenation. As well, the side-walls often lack the ashlars, rather substituted with rough-hewn stones of the local varieties of pumice and tuff - the Ischia's green one. At the end, some archival data also show the timber-framed masonry side-walls could also be fortified by applying on iron cross-beams, fastened with clamps to the timber skeleton. No samples of these, indeed, have been founded by now.

Bibliographical References

[1] DELIZIA, I. La ricostruzione. In, AA.VV., *Il terremoto del 28 luglio 1883 a Casamicciola nell'isola d'Ischia*, Roma, 1998, pp. 191-265 and *Il terremoto di Casamicciola del 1883: una ricostruzione mancata*, Napoli, 2006..

[2] RUGGIERI, N. La casa antisismica. In AA.VV. *Conservation of Historic wooden structures*, Proceedings of the International Conference. Florence, vol. I, 2006. SURNAME(S), Name. *Book title.* (Translated by SURNAME(S), Name*). 3ª ed. City: Publisher, 2010. 300 p.* Collection*. Translation of original book title*. ISBN 0000.*

[3] MAGNATI, V*. Notizie istoriche de terremoti successi ne secoli trascorsi e nel presente indirizzati alla serenissima maestà di Carlo II dall'abbate D. Vincenzo Magnati*. Napoli, 1688. SURNAME(S), Name. Chapter title. In SURNAME(S), Name. *Book title.* 3ª ed. City: Publisher, 2010, vol. 1, p. 200-250.

[4] TOBRINER, S. *The genesis of Noto. An Eighteen century Sicilian city*. Berkeley: University of California, 1982.

[5] MASCIARI GENOESE, M. *Trattato di costruzioni antisismiche*. Milano, 1915.

[6] GRIMALDI, A. *La Cassa Sacra ovvero la soppressione delle mani morte in Calabria nel secolo XVIII*. Napoli, 1863.

[7] MAURI-MORI, G. *Riedificazione di Reggio Calabria*. Roma, 1909.

[8] RUGGIERI, N. Il sistema antisismico borbonico in muratura con intelaiatura lignea: genesi e sviluppo in Calabria alla fine del '700. In *Bollettino ingegnieri*, n. 10, 2013.

[9] GALLO, A. *Relazione data all'Illustrissimo Senato di questa città da Andrea Gallo Pubblico Professore di Filosofia e Matematica in questo Real Collegio Carolino*. Reggio Calabria, 1784.

[10] BARATTA, M. *La catastrofe sismica calabro messinese del 28 dicembre 1908.* Roma, 1910.

[11] The Royal Laws n. 511/1906 and n. 193/1909.

[12] RUGGERI, N., TAMPONE, G., ZINNO, R. Typical failures, seismic behaviour and safety of the "Bourbon system" with timber framing. In *Advanced Materials Research*. vol. 778, Switzerland, 2013.

[13] DELIZIA, I., 1998, pp. 192-211.

[14] Casamicciola, Municipality. Historic centre recovery master-plan, General report. Ischia, 2008-14.

[15] Naples' State Historic Archival (NaSHA), Naples' Civil Corp Office, V. 324, f. 18.

[16] NaSHA, Naples' Civil Corp Office, V. 324.

[17] NaSHA, Naples' Civil Corp Office, V. 329, fs. 18, 19.

[18] D'APRILE, M. FERRI, L. BICCO, M. Traditional timber-framed masonry dwellings and huts in Casamicciola. In *Historic Earthquake-Resistant Timber Frames in the Mediterranean Region*. *H.ea.R.T. 2013*, Proceedings of the 1st International Symposium, November 4-5, 2013, Rende: University of Calabria, in print.

[19] TOBRINER, S. La casa baraccata: earthquake-resistant construction in 18th-century Calabria. In *Journal of the Society of Architectural Historians*, 1983, p. 56.

[20] Headword *Pitch* in RAGUCCI, L. Principi di architettura civile…. Napoli, 1859, II ed., pp. 220-221.

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The ideological approach to the study of Italian rural architecture in first half of XX century

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Abstract
In Italy between 19th and 20th centuries, the gradual shift from traditional to industrialized agriculture has led to a progressive detachment from secular forms of rural architecture.
Thus a critical study of these architectures started in order to understand the defects and to propose interventions of functional improvement or hygienic renewal; however, the growing interest for this type of architecture meant that researchers began to better understand and appreciate them.
The paper proposes a historical analysis of the phases of initial detachment and of subsequent critical re-evaluation, stressing that they have been deeply influenced by the ideological factors that characterized the 19th and 20th century both at the socio-political and at the architectural levels.
The rural rationalization typical of 19th century positivism was followed at the end of the century by a negative judgment related to the emergence of industry. In the fascist era a first critical re-evaluation was connected to the exaltation of rural life promoted to counteract urbanization and was characterized by the appreciation of essential volumes seen as forerunners of modern architecture. In the postwar, the whole of the anti-fascist parties praised the social values of rural life by promoting architectural neo-realism.

Keywords: Rural buildings, Vernacular architecture, XX century, Italy, ideological approach.

1. Preface
Although starting from the ideal purpose of the representation of an existing reality, any act of study starts from the reality itself to generate a critical discourse that – if properly read – is able to provide a large amount of information about the author of the study, as well as on its object [1].
In architecture, even the simple research based on an indiscriminate and uncritical accumulation of documents related to existing buildings (e.g. by surveying and describing a series of buildings considered as examples independent from each other) tells much of the method and operational tools of its author, through the ways of collecting data. A fortiori a historical research that has as its purpose the search for a system of relationships between these "documents" and between them and their context (geographical, historical, economic, social, ...) is based on the concepts of causality and correlation. Thus it requires the use of the tools of selection and interpretation, both of which involve subjectivity, that is dependence on the personality and intentions of the researcher [2].
The article aims to explain how, in Italy, the ideological currents that developed between the second half of the nineteenth and first of the twentieth centuries have significantly affected the study of rural buildings.

2. "Spontaneous" and "codified" rural architecture
Before getting to the heart of the discourse, it is important to define of the study the object at least in a synthetic manner. Rural architecture is in fact made up of a vast built heritage which includes buildings with different origins and characteristics; the term "rural architecture" is therefore not sufficient to

uniquely identify a homogeneous series of building objects and therefore requires further specifications [3].
The prerequisite to be able to classify a building artefact within the category of rural architecture is that its origin is closely linked to agricultural production or primary processing of agricultural products: thus without doubt the buildings intended for housing farm implements, but also mills, dairy farms, and buildings for providing housing of farm workers and livestock belong to rural architecture. Often, however, in the same building complex or in the same building there are both spaces for agriculture, livestock and housing. Within this class of buildings, a first distinction can be drawn between the rural buildings scattered over the territory and made up of isolated buildings and the one agglomerated in more or less small urban centres [3].
Regarding the ways of the original realization, we instead distinguish between two possible origins, often intertwined and not clearly, nor easily distinguishable, to which the two types of architecture correspond: “spontaneous” architecture and “codified” architecture.
“Spontaneous” architecture arises from the initiative of people in response to their own housing or productive needs; this architecture is built, therefore, by unskilled workers, that are often the same end-user [4]. As a result, the employed construction techniques are linked to a local technological tradition that has developed slowly over centuries, closely related to the nature of the place (material resources, morphological and hydro-geological characteristic, climate) and transmitted from father to son from generation to generation [5]. Through a process of abstraction – due to the simplicity and schematic nature of their shapes – these buildings represented the archetypal idea of home consolidated through the centuries in the common imagination of local people [6] and they have established a solid foundation of empirical knowledge spontaneously revived in new buildings making only minor modifications from time to time [7]. Technologies and building types were born and evolved in adherence to the nature of the place, acquiring a strong local nature; for its strong connection with territory, social structure and local culture, spontaneous buildings are therefore also called "vernacular" [5] and assimilated to dialects [8].
Instead "codified" architecture originates from the ideational action of a specialized individual (master builder, architect, engineer, ...) which conceives the work and other specialized individuals who realize it (craftsmen). "Codified" rural architecture is typical of a proto-capitalist or capitalist economic organization of agriculture, in which the buildings were commissioned by the landowner (e.g. a noble or a religious organization) that granted them in use to those who ran the farm land [4]. Since they do not coincide with the end user, these specialists were not necessarily linked to the place of execution, and could more easily move from one place to another or come into contact with other cultures and architectural techniques, giving life to a more rapid evolution of architectural traditions through learning and interaction, factors that led over time to a higher degree of experimentation. In this category of rural architecture are also some examples of "major" architecture (e.g. Venetian villas designed by Palladio).

3. Ideological approach to rural architecture

3.1 Interest in rural architecture in the second half of 19th century

In Italy, the gradual emergence of capitalistic agriculture has fostered over time many investments for the rationalization of the use of built spaces according to the new techniques of cultivation and for the gradual introduction of improvements in the standards of accommodation for men and livestock.
This rationalization process became more pronounced since the end of the 18th century, when the spread of the spirit of the Enlightenment led to the re-evaluation of technical/practical knowledge applied to productive activities and there was an increase in attention to the topic of rural constructions by skilled technicians.
During this period, the development of hydraulic and the growth of capital investment promoted the reclamation of wetlands and the improvement of irrigation of drylands in order to bring water where the needs of (agricultural, but also manufacturing) production were greater; moreover the growth of mechanical engineering favoured the increase of the efficiency of milling plants.
After the mid nineteenth century, the gradual spread of the positivist spirit and the emergence of hygienist theories [9] led people to take a negative critical attitude towards rural architecture seen as backward and hygienically inadequate [10]; new types of model agricultural complexes were also designed and tested according to the most modern standards of hygiene and technology.
At the same time, the national unification (1861) gave rise to a different cultural debate focused on the formal aspects of architecture rather than on the technical and typological ones.
In the Middle Ages – from the common Roman root from the persistence of pre-Roman roots – under different socio-economic and cultural impulses many local architectural traditions developed; Renaissance led to the gradual recovery of classical architecture and the gradual emergence of an architectural culture that – even in the various local variations – had a common national character.

Through successive stages of diffusion, the classical language – considered an example of order and rationality –finally consolidated in the neoclassical style that reached international diffusion.
Democratic ideals that were born in the cultural context of late 18th century and gradually spread throughout Europe, gave rise to the modern idea of nation and to the principle of self-determination of peoples. This phenomenon was – along with many other cultural factors – the basis for the revival of interest in medieval architecture in its multiple local and national manifestations and for the birth of neo-Romanesque and neo-Gothic revival. In particular, in Italy neo-medieval revival retrieved the different local architectural variety, both in monumental and in popular and vernacular elements.
When the formation of the unified state gave rise to the debate on the national architectural style, the upholders of neo-medieval architecture – among which is essential to remember Camillo Boito [11] – proposed a style that could promote national identity through its local diversities, however, the cultural neo-classical and neo-renaissance trend gradually prevailed and – in accordance with national centralist policies – it tended to cancel local differences in favour of a common and homogeneous identity [12].
In the last decades of the century, large numbers of people moved away from countryside to urban centres of many regions (in which the first big industrial companies were growing) and to foreign countries (mainly North and South America, but also France and Germany), with a significant increase of emigration (about 300˙000 people/year in the last years of the century and a total of over 5˙000˙000 people between 1876 and 1900) [13, 14]. This phenomenon was partly caused by population growth and partly by a crisis of Italian agriculture due to the spread of certain pests of cultivated plants (e.g. grape downy mildew and phylloxera) or of silkworms (pébrine), and to the lowering of prices of agricultural products due to the growth of imports from the new continent [15].
The stagnation of agricultural economy increased the feeling of eternal immobility of large areas of the countryside, this was associated to the corresponding progressive growth of major cities according to modern town planning criteria (e.g. need for railway routes, location of industrial settlements, hygienic and sanitary criteria, real estate speculation). In this context, the gap perceived between the two worlds grew enormously, resulting in a progressive cessation of architects' interest in the vitality of vernacular buildings, now deemed incapable of providing useful lessons to modern architecture.
The indifference of architects began gradually to be joined by a new kind of interest in the exotic and picturesque character of rural life and – consequently – of rural architecture.
Since the mid 19th century, explorations had arisen knowledge interest of the "primitive" cultures of Asia and Africa, giving birth to ethnology, a new science whose birth is «linked to the formation of colonial empires, with the interests of joint control of peoples subjugated by the colonizing nations» [16]. In Italy – more than in other European countries – the large cultural gap between urban and rural society of some part of the country favoured the application of ethnographic studies to the local reality. Ethnographic studies pointed their own attention mainly on folkloristic and cultural aspects of agricultural life and only by reflex of architecture, giving rise to a systematic collection of data and materials which were gathered in museum collections and temporary exhibitions.
These studies took shape in isolated attempts of reconstructing vernacular buildings or urban environments, however, limited to demonstrative contexts and almost never applied to contexts of contemporary life. For example, the castle and the village of Valentino in Turin (1882-1884) [17], the Neo-Gothic village of Grazzano Visconti (begun in 1906) [18], and examples of vernacular buildings from each Italian region constructed for Exhibition of Italian ethnography (realized in 1911 for the 50th anniversary Italian national unification) [12] belong to this category of interventions.

3.2 The ruralist policy of the fascist period and the rediscovery of vernacular

The First World War was, in some ways, a turning point with regard to the attention given to rural culture and architecture: the enormous social and economic damage caused by the war put a strain to the values of the *Belle époque* and undermined the foundations of the positivistic trust in progress and modern technique [19]. Therefore, a revival of interest in vernacular culture and art took place.
In architecture, this resurgence of interest is demonstrated by La Garbatella and Aniene districts in Rome, designed under the direction of Gustavo Giovannoni and whose urban organization was inspired by the English garden cities; in these districts buildings are characterized by forms and decorative details taken from rustic architecture. Marcello Piacentini himself (who in the 1930s would become the standard-bearer of monumentalism architecture) between the late 1910s and early 1920s designed several residential buildings inspired by the shapes and materials of architecture minor [12].
The main contribution of this renewed interest, however, is due to the first systematic applications of geographical research to the study of rural architecture. Unlike the aforementioned ethnological inquiries, geographical studies on rural house tended to further integrate the analysis of formal and cultural factors with economic factors related to agricultural production and with environmental conditions and topographical context, extending, finally, also to the study of historical evolution [20]. These geographical studies – for several decades already active in many central and northern Europe

countries – were promoted in Italy by Renato Biasutti starting from 1924, before the affirmation of the «mythical ruralism which affected the nation» since the late years of the decade [21].
Another key aspect of this period was the rise of the Fascist regime, into whose origins some of the reasons for the Italian agricultural policy between the two world wars can be traced. The years following the First World War were characterized by a deep economic and social crisis – linked to the depletion of war orders, to the unavailability of raw materials, and to the outstanding public debt – which caused the failure of many minor industries [22].
This moment of crisis gave start to union protests both in industrial cities and in rural areas of northern Italy, characterized by capitalistic farms. These protests aroused among industrialists and landowners the fear of a communist revolution. To this period of social instability – which was named red biennium – the petty and middle bourgeoisie reacted by supporting the fascist squads that helped put an end to union demands with violence [19, 23].
The credit acquired by the fascist movement in this situation favoured its rise to power in 1922 following the March on Rome. The slogans promoted by the regime in this period were marked by a spirit of renewal and modernity; between 1922 and 1925, fascist policies were aimed at promoting economic recovery through the reduction of taxes on industries and higher social classes and at the moderation of wages, in order to reduce production costs and promote export at the expense of domestic working classes well-being [22].
Following this phase of economic recovery, the Fascist regime began to promote agriculture and to strongly foster the social class of landowners, who was among the supporters of its rise to power. In 1925 Mussolini gave start to the so-called "battle of the grain" – a plan to increase the production of wheat and «to liberate Italian people from the bondage of stranger bread Italian» [24] – and to plans for reclamation of swampy areas of the national territory [23] in order to gain new lands for agriculture and to prevent malaria [25].
In the following years a anti-urban and ruralist campaign was also promoted: its motivations were manifold and manifold its relapses. In addition to the aforementioned independence from food imports (considered to be essential in time of war), another openly declared reason was demographic: in fact, it was believed that the urban population had lower fertility rates than rural one. Therefore, the reduction of migration from countryside to cities would have to ensure the stability of demographic growth and allow for a population growth; the aim was to make national inhabitants approach or exceed in number the population of other large European countries [26]. In the ideas of the regime the containment of migration towards cities would have allowed also to reduce the need for investments in the construction sector [27] therefore they could be concentrated in agricultural and industrial production – vital to the war effort – encouraging productivity improvements [28].
However another motivation – never explicitly mentioned in official speeches – was the need to reduce the risks associated with the presence of large amounts of unemployed in the cities, which could have encouraged strikes and uprisings, and instead of keeping the population in rural areas where it was most easy to regiment it in the ranks of the regime through the corporatist unionism [19].



Fig. 1: From left to right: poster of the "Battle for Grain" (1925), cover of an issue of the journal *La conquista della terra* (The conquest of land), showing Mussolini in the act of harvesting wheat (Duilio Cambellotti,1938) and poster of the land improvement of Pontine Marshes (Duilio Cambellotti, 1936).



Fig. 2: Farm “Bainsizza” in the municipality of Latina (formerly Littoria), founded in 1932 in Pontine Marches.

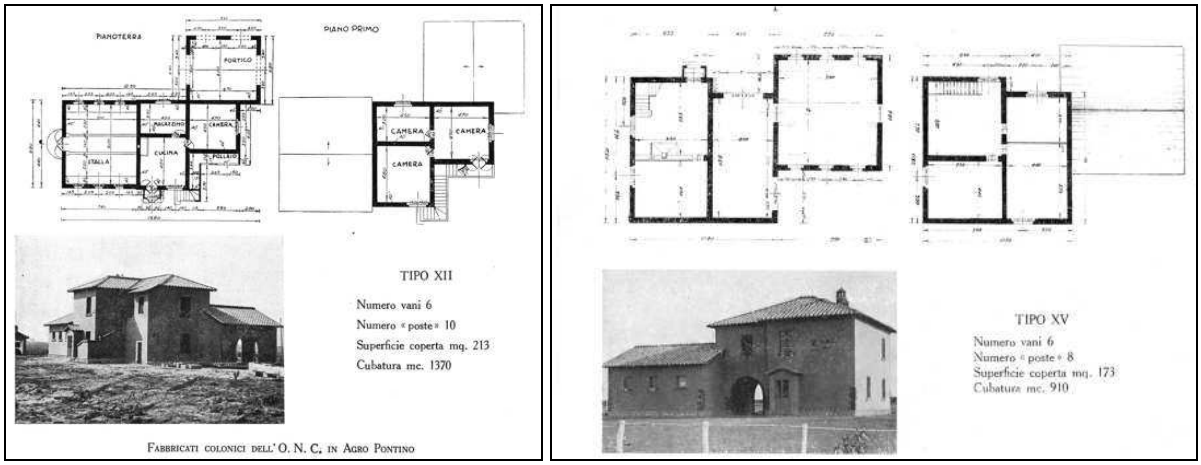

Fig. 3: Standard plan for small farmhouses in the municipality of Latina (formerly Littoria), in Pontine Marches.

In this context begins - and continues until the beginning of World War II - the policy of colonization of reclaimed campaigns and of establishment of new settlements in the service of agricultural production. The main example of this policy is the reclamation of the Pontine marshes: at the end of the first district land reclamation, officials of the National Opera Fighters (body responsible for the reclamation) had to face the problem of the organization of the agricultural system; they opted for the fragmentation of the territory in small size farms entrusting the management to sharecroppers, each of which corresponded to a farmhouse [29]. The choice of small family-run units was also aimed at maintaining the social unit formed by the patriarchal family, which – with its system of rules and discipline – was a greater guarantee of social stability compared to larger farms, in which many farm labourers were present and therefore a greater number of family units not related by blood had to cohabit [23].
The promoters of the reclamation believed that colonization would have failed without the reference of urban entities therefore, the territorial system of Pontine reclamation areas was organized on various hierarchical levels: the scattered settlements – constituting the basic unit of the system – were hierarchically subject to the villages, which they referred from the administrative point of view and for key services and these, in turn, were subjected to a city [29].
The materials used in the construction of farm houses and rural buildings were the traditional ones (local stone, brick, wood, plastered mats of reeds, etc.) and the buildings were constructed following some models developed depending on the location and size of the household. With a historicist approach, the architecture of these houses resumed, by stylizing and trivializing them, many morphological elements considered archetypal (arc, external staircase, chimney) [30] in order to elicit a traditional image of simplicity and modesty and to encourage immediate recognition by the settlers [29]. Even in the development of the newly founded cities, formal references were almost always rural, thanks to the use of «a traditional rural village image» [31].
At the same time, since the first post-war period abroad a new architectural trend was establishing itself. Its demands were summarized in five points by Le Corbusier (pilotis, roof garden, free design of ground plan, free design of façade, horizontal window) [32]. Proponents of modern architecture refused the reference to history as a tool for the project, but at the same time many of them drew from

the history of architecture essential cues for their architectural poetics; in fact, many architects were inspired by Mediterranean vernacular architecture, but they operated in an ahistorical way, i.e. taking their references as formal models that could be decontextualized and exported to any place and, therefore, used without a connection neither with local characters, nor with climate, nor with building traditions.
In Italy, the link with history was more alive and declared in all the architectural trends. The unequivocal historicism of the monumentalist and ruralist architects is accompanied by the explicit Mediterraneanism of many rationalist architects (e.g. Adalberto Libera, BBPR, Figini and Pollini) [12]. Since the mid-1920s, these architects emphasized the Mediterranean origin of many of the formal components of modern architecture (flat roof, volumetric simplicity, white surfaces, absence of ornamentation) for the purpose of exalting the Italian character of their own architecture, which the promoters of an enduring classicism charged with xenophilia [33], however they confirmed the substance of the unhistorical and decontextualizing design method of modern international architecture.
However, in the 1930s a new approach to the study of vernacular architecture started as a reference for modern architectural design. The leader of this new approach was Giuseppe Pagano, an active member of the fascist party – but later a socialist partisan during the Second World War – and the director of Casabella magazine (1933-43). From the pages of the magazine he edited, Pagano strongly opposed to the rhetoric monumentalist drift of the "official" architecture of the fascist regime, but also to the personal formal studies of most of the other modern architects, considered as a form of mannerist drift from rationalism [34].
A key moment in Pagano's research was the exhibition *Architettura rurale italiana* – staged together with Werner Daniel in the *Triennale di Milano* in 1936 – in which they exposed photos of many rural buildings from all over Italy, divided by region and by functional and constructive type, but without reference to the construction dates.
Pagano saw vernacular architecture as the emblem of essentiality and rational design; the absence of reference to the historicity of the proposed buildings was suitable for enhancing their nature of examples of «collective and anonymous» [35] design synthesis between context, form and function and to shield them from the stylistic and historicist approach to architecture.
In addition, the study of vernacular architecture in its many local expressions became for Pagano the research for «a more concrete and less abstract national style» (far both from the monumentality and from the picturesque) [12], but also for the principles of «respect of money, abolition of superfluous, morality» summarized in the concept of "modesty" [36].
However, as a whole the period of the fascist regime showed a strong discrepancy between the rhetoric ruralist proclamations and the reality of a progressive and constant urban growth [37].
Between the end of the 1920s and 1930s, the effects of fluctuating domestic economic conditions and of the great international crisis of 1929 caused the fall in the prices of agricultural products [22], resulting in underemployment and in a decline in domestic consumption. This aspect and the awareness that the development of a modern industrial sector was essential to implement the projects of imperial expansion, urged the regime to invest in industrial development plans [23].
Although the manufacturing sector with the highest number of employees continued to be agriculture, on average, in the 1930s the living conditions of rural population worsened and the phenomena of depopulation of countryside and industrial urbanization (i.e. those that the ruralist policy was intended to counteract) were strengthened. The size of the cities grew significantly, but the lack of funding (focused on agriculture and on war related industry) to public housing determined a severe lodging shortage and therefore precarious housing conditions.
In addition, as a result of the progressive rise of colonial policy and after the founding of the empire (1936), over the years also the architectural image of the regime show a gradual marginalization of modernist and ruralist trends and linked itself to the monumentalist architecture with classical inspiration [36].

3.3 The critical recovery of rural architecture in the postwar

At the end of the Second World War, Italy was still an essentially agricultural country with a low level of industrialization, aggravated by war damages [38]. The high rate of unemployment among veterans drove the new republican state to entrust the task of absorb unskilled labour to building, thus discouraging the technological progress of the construction industry and encouraging immigration from rural areas [39].
Building activity in this period involved primarily the major urban centres, both in order to remedy the damage of the war, and due to the critical condition – that we have already described – in which social housing was because of the policies of the previous two decades [40].
However, interventions on historic centres were not limited only to areas damaged by bombardments, but they were extended to many neighbourhoods that were considered hygienically unhealthy, with the declared purposes of building renewal and the latent goal of property speculation. This situation led to

the gentrification of the redeveloped areas with the systematic expulsion of humbler social classes towards newly built suburban neighbourhoods [41], generating a devastating impact on the social fabric of the historic city.
In the general climate of the building and moral reconstruction of the country the cultural current of neo-realism developed. It was characterized by «a sort of celebration of the dignity of deprivation» [31] and it involved various forms of artistic production, including architecture. The recourse to neo-realism was a polemic act against the arrogance of fascist rhetorical excesses [36] and was promoted by both of the major political and cultural currents emerged victorious from the Civil War: the Christian Democratic and the Communist.
In architecture, neo-realism was certainly the outcome of the rejection of the monumentalist rhetoric dominant in architecture during the fascist regime, but it was also reconnected to the movement for organic architecture, sponsored by Bruno Zevi in the years after World War II in the wake of the North American and Scandinavian experiences [39].
Many suburbs – built to accommodate the displaced from the historic centres bombed or "redeveloped" as well as the first groups of immigrants from the countryside – were designed by resorting to the realization of low rise building volumes, organized according to organic and informal planimetric schemes in an attempt to recreate housing and environmental conditions similar to those of traditional rural villages [39]. The morphological and stylistic reference to rural architecture was not a simple formal research, but it was connected to a re-evaluation of psychological and social aspects of the population, in order to protect individuals from the alienation that would have resulted from the total distortion of their ways of living, in the conviction of the close connection between the physical environment and the human environment [42].
Therefore the formal and morphological research that starts from the study of rural architecture is aimed at bringing attention to the individuals, no longer seen as impersonal components of a mass regimented in totalitarian assemblies, but as vital reality studied in its socio-cultural aspects.
One of the key moments in the birth of architectural neo-realism and in the new attitude towards rural architecture was the study of the architectural and social reality of the Sassi of Matera. This complex of cave dwellings of great historical interest – declared UNESCO World Heritage Site in 1993 – became a symbol of urban decay in southern Italy after some research brought to light the poor hygienic and housing conditions due to the lack of modern sanitation, to overcrowding and to cohabitation between humans and animals [43].
The research undertaken had led to the understanding of the social structure of the population of the Sassi, that was discovered to be strictly related with the morphology of the settlement. Characteristic element of this reality was the "neighbourhood unit", that is the social relationship between the group of families whose homes faced the same public space, in which a large part of their social life took place. [8]
The knowledge of the social reality became a design tool when the rehabilitation requirements led to the need for evacuation of the inhabitants and for their transfer in newly founded neighbourhoods and villages built closer to the land cultivated by the population: in the construction of the *La Martella* village between 1951 and '54, the designers (Ludovico Quaroni, Federico Gorio, Michele Valori, Piero Maria Lugli, and Luigi Agati) organized the buildings according to the contour lines of the land as to enter in an organic relation with it and attempted to produce an architectural environment capable of perpetuating the system of social relations that characterized the life in the Sassi [44, 45].
In the second half of the 1950s the so-called "economic miracle" took place: a radical process of economic, social and housing transformation. This phenomenon was combined with a rapid development of the industrial sector favoured by the influx of cheap manpower in urban areas as a result of decline in employment in agriculture. The economic miracle caused and at the same time was powered by a mass migration from the countryside to cities and from the poorest South, to the more industrialized North, which resulted in a construction boom that doubled the urban fabric of the major cities during only twenty-five years (1946-1971) [46].
Large transfers from one region to another, the extension of compulsory schooling to eight years, the spread of television have contributed to a sharp decline of traditional culture, which had markedly different character from region to region and from place to place, and which was directly handed down from generation to generation. These phenomena have produced a progressive cultural homogenization that has configured as a real anthropological break [5].
In this context, there has been a profound change in housing needs and, consequently, in building standards, which, combined with the desire to move away from a past of poverty seen as something to be ashamed of, led to a rejection of the vernacular building and in particular of the rural ones [5].
In the following years this refusal meant that the studies on rural architecture, returned to being relegated to historical-geographical research, moving them away from the relationship – that had developed over the previous decades – with modern architectural design.



Fig. 4: View of popular housing INA-Casa *Tiburtino* in Rome (project coordinators: Ludovico Quaroni and Mario Ridofi, 1949-1954), published in the journal *Casabella-Continuità* n.215, 1957

4. Conclusions

The article pointed out that the evolution of the ways of approaching the study of rural architecture has always been closely linked to the cultural and political ideologies that have occurred over time.
Indeed during the analysed period, the focus on rural architecture has changed repeatedly over time involving different researchers (engineers, ethnologists, geographers, architects, ...) and passing from an initial negative opinion and desire to reform, to a superficial interest for its folkloristic and picturesque character, to achieve progressively a wider interest for fundamental aspects of its nature (essentiality and functional rationality, relationship with the environment and correspondence between built environment and social forms) in order to revive them in the design of contemporary architecture.
Today, heritage rural architectural has undergone a process of decay and de-contextualization as a result of the extinction of the traditional agricultural world. The one who had to begin the study of these architectures would be in need of basing a significant part of his knowledge on secondary sources created in the period analyzed in the paper; the research summarized in the paper can then help them gain a critical look at these sources openly denouncing their historicity, that is the connection with ideologies and research methods of the different periods.

Bibliographical References

[1] TORSELLO, B. Paolo. *Figure di pietra. L'architettura e il restauro*. Venezia: Marsilio, 2006.

[2] ZAMPERINI, Emanuele. *Evoluzione tecnologica e tipologica delle coperture lignee in Italia nel periodo 1800-1950*. Tesi di dottorato in Ingegneria Civile ed Edile/Architettura, Università degli Studi di Pavia, ciclo XXVI, tutor: prof. M. Morandotti, 2013.

[3] LA REGINA, Francesco. *Architettura rurale. Problemi di storia e conservazione della civiltà edilizia contadina in Italia*. Bologna: Calderini, 1980.

[4] CINIERI, Valentina, ZAMPERINI, Emanuele. Le cascine: patrimonio di archeologia agricola della Val Padana. In BISCONTIN, Guido, DRIUSSI, Guido (eds) *Scienza e Beni Culturali*, n. XXIX, *Conservazione e valorizzazione dei siti archeologici. Approcci scientifici e problemi di metodo*. Venezia: Arcadia Ricerche, pp. 841-851.

[5] CINIERI, Valentina, ZAMPERINI, Emanuele. Arquitectura vernácula: memoria y protección. El caso italiano desde el abandono hasta el reconocimiento de un nuevo patrimonio. In VIEIRA DE ANDRADE Junior, Nivaldo, HUAPAYA ESPINOZA, José Carlos (eds) *Encontro Internacional*

Arquimemoria 4. Sobre Preservação do Patrimônio Edificado. A dimensão urbana do patrimônio, Salvador de Bahia, 14-17 May 2013. Salvador: Segoe UI.

[6] GRASSI, Liliana. *Storia e cultura dei monumenti*. Milano: Società Editrice Libraria, 1960.

[7] CANIGGIA, Gianfranco. *Strutture dello spazio antropico. Studi e note*. Firenze: Alinea, 1981.

[8] ZEVI, Bruno. Dialetti architettonici. In ID. *Storia e controstoria dell'architettura in Italia*. Roma: Newton & Compton, 1997, pp. 609-671.

[9] TURRI, Francesca, ZAMPERINI, Emanuele. The military engineers and hygiene in barracks in the second half of the 19th century. In CARVAIS, Robert, GUILLERME, André, NÈGRE, Valérie, SAKAROVITCH, Joël (eds) *Nuts and Bolts of Construction History. Culture, Technology and Society*, vol. III, Paris: A&J Picard, 2012, pp. 309-316.

[10] JACINI, Stefano Francesco. *La proprietà fondiaria e le popolazioni agricole in Lombardia*, Milano: Borroni e Scotti, 1854.

[11] BOITO, Camillo. L'architettura dell'Italia nuova. In ID. *Architettura del Medio Evo in Italia*. Milano: Hoepli, 1880, pp. V-XLVI.

[12] SABATINO, Michelangelo. *Orgoglio della modestia. Architettura moderna italiana e tradizione vernacolare*. Milano: Franco Angeli, 2013.

[13] TASSELLO, Graziano, FAVERO, Luigi. Cent'anni di emigrazione italiana. In ROSOLI, Gianfausto (ed) *Un secolo di emigrazione italiana: 1876-1976*, Roma: Centro studi sull'emigrazione, 1978, pp. 9-64.

[14] http://www.treccani.it/enciclopedia/emigrazione/

[15] SEGRE, Luciano, TORRI, Giulia. Viaggio storico nella forma e nella vita dei luoghi. In *Campagna e città. Dialogo fra due mondi in cerca di nuovi equilibri*, Milano: Touring Club Italiano, 2011, pp. 34-87.

[16] http://www.treccani.it/enciclopedia/etnologia/

[17] TORSELLO, Paolo. Quali fondamenti? In ID. *Restauro architettonico. Padri, teorie, immagini*, Milano: Franco Angeli, 1984, pp. 48-76.

[18] LA REGINA, Francesco. La progettazione della storia. In ID. *Come un ferro rovente. Cultura e prassi del restauro architettonico*, Napoli: CLEAN, 1992, pp. 91-119.

[19] BRESCHI, Danilo. Fascismo e antiurbanesimo. Prima fase: ideologia e legge (1926-1929). In *Storia e Futuro. Rivista di storia e storiografia*. N. 6, May 2005. Bologna: Dipartimento di Discipline Storiche di Bologna, 2002-…

[20] GAMBI, Lucio. Renato Biasutti e la ricerca sopra le dimore rurali in Italia. In BARBIERI, Giuseppe, GAMBI, Lucio (eds) *La casa rurale in Italia*. Firenze: Leo S. Olschki, 1970, pp. 3-14.

[21] GAMBI, Lucio. *Una geografia per la storia*. Torino: Einaudi, 1973.

[22] DE ROSA, Luigi. *La rivoluzione industriale in Italia*. Bari: Laterza, 1980.

[23] TOLAINI, Roberto. I contadini italiani e le loro famiglie negli anni trenta. Le ricerche dell'INEA di Arrigo Serpieri tra ruralismo e modernizzazione. In *Quaderni storici*. a. XLV, n. 2, August 2010. Bologna: il Mulino, 1966-…

[24] MUSSOLINI, Benito. Per la battaglia del grano. In ID. *Scritti e discorsi dal 1925 al 1926.* Milano: Hoepli, 1934, pp. 123-124.

[25] MUSSOLINI, Benito. La lotta contro la malaria. In ID. *Scritti e discorsi dal 1925 al 1926.* Milano: Hoepli, 1934, pp. 139-141.

[26] MUSSOLINI, Benito. Il discorso dell'Ascensione. In ID. *Scritti e discorsi dal 1927 al 1928.* Milano: Hoepli, 1934, pp. 37-77.

[27] MUSSOLINI, Benito. Ai vèliti del grano. In ID. *Scritti e discorsi dal 1927 al 1928.* Milano: Hoepli, 1934, pp. 257-263.

[28] DE FELICE, Renzo. *Mussolini il fascista. L'organizzazione dello Stato fascista 1925-1929*. Torino: Einaudi, 1968.

[29] NUTI, Lucia. *La città nuova nella cultura urbanistica e architettonica del fascismo*. In *Metodo*. N. 17, June 2001, year XIV. Gello (San Giuliano Terme): METODO Associazione Socioculturale, 1988-2008.

[30] DI LEMBO, Vittorio. *I poderi dell'Agro Pontino. Tipologia di casa rurale*, http://www.borghidilatina.it/main/i-poderi.htm

[31] CIUCCI, Giorgio, DAL CO, Francesco. La cultura architettonica in Italia. 1900-1990. In ID. (eds) *Architettura italiana del '900. Atlante*. Milano: Electa, 1990, pp. 8-75.

[32] LE CORBUSIER. *Vers une architecture*. Paris: Cres, 1923.

[33] DANESI, Silvia. Aporie dell'architettura italiana in periodo fascista – mediterraneità e purismo. In DANESI, Silvia, PATETTA, Luciano (eds) *Il Razionalismo e l'architettura in Italia durante il Fascismo*.. Milano: Electa, 1996, pp. 21-28.

[34] ZEVI, Bruno. La vicenda italiana. In ID. *Storia dell'architettura moderna. Volume 1.* Torino: Einaudi, 1996, pp.165-220.

[35] D'AMIA, Giovanna. Giuseppe Pagano e l'architettura rurale. In *Territorio*. N. 66, 2013. Milano: FrancoAngeli, 1996-…, pp. 109-120.

[36] CIUCCI, Giorgio. *Gli architetti e il fascismo*. Torino: Einaudi, 1989.

[37] ACCASTO, Giovanni. La bonifica pontina. In *ArchitetturaCittà. Rivista di architettura e cultura urbana*. n. 14, 2006. La Spezia: Agorà Edizioni, 2000-2006, pp. 7-11.

[38] CROCIONI, Giovanni. *Il rapporto città-campagna nel dopoguerra. Trasformazioni territoriali e ciclo economico fra il 1945 e il 1975*. Milano: Franco Angeli, 1978.

[39] DE FUSCO, Renato. *Storia dell'architettura contemporanea*. Bari: Laterza, 1997.

[40] GARDELLA, Ignazio. Necessità di una evoluzione della tecnica edilizia. In CIUCCI, Giorgio, DAL CO, Francesco (eds) *Architettura italiana del '900. Atlante*. Milano: Electa, 1990, p. 169.

[41] TURRI, Francesca. Gli abitanti del recupero edilizio. In *Il Nuovo Cantiere*, n. 9, 1984. Milano: ETAS Kompass, 1967-…

[42] VALERIANI, Enrico. *Stretti tra due millenni*. Roma: Gangemi, 2012.

[43] CERVELLATI, Pier Luigi. *L'arte di curare la città*. Bologna: il Mulino, 2000.

[44] TAFURI, Manfredo. Gli anni della ricostruzione. In ID. *Storia dell'architettura italiana. 1944-1985*. Torino: Einaudi, 1982.

[45] GORIO, Federico. Il villaggio La Martella. In CIUCCI, Giorgio, DAL CO, Francesco (eds) *Architettura italiana del '900. Atlante*. Milano: Electa, 1990, pp. 174-176.

[46] CROCIONI, Giovanni. *Il rapporto città-campagna nel dopoguerra. Trasformazioni territoriali e ciclo economico fra il 1945 e il 1975*. Milano: Franco Angelo, 1978.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Design Tools and methods for the enhancement of cultural itineraries and thematic cross-border pathways

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Abstract
The aim of this research project is to reinforce the shared identity of Northern Lombardy (Italy) and Southern Ticino (Switzerland) by preserving and enhancing the shared cultural heritage present in the historical network of footpaths that connect the regions concerned. By synergizing experts in cultural itineraries, municipalities, landscape designers, geomatics engineers, architects and designers, the project seeks to pursue this aim through the protection and enhancement of the local heritage of areas crossed by the paths, integrating promotional activities to raise awareness among the public and encouraging people to get to know and use the trails. This historical trail network, categorized according to the different functions of the anthropogenic structures (transit routes and population migration, devotional trails (art and faith), connections between villages in the valley and high altitude pastures, forestry and rural micro-economies (local food and wine production), is investigated participatively with extensive use of ICT and the computerized management of spatial and environmental information.

Keywords: Design, Heritage, Landscape, Routes, Tourism



Fig. 1: Panorama of Lake of Como, Balbianello peninsula and, in the background, Bellagio, seen from Via Regina road near Lenno - Ossuccio.

1. Background and overall scenario

This research is part of a wider cross-border program, the aim of which is to implement measures to protect, enhance and promote the landscape and the historical and cultural heritage of the area.

In addition to the Politecnico di Milano in the role of leader, the partners in the program are: the Fondazione Politecnico di Milano, Iubilantes Association, Mountain Community Lario Intelvese, University of Applied Sciences of Italian Switzerland, Office of Cultural Heritage of Cantone Ticino, Mountain Community Lake Como and Lugano valleys, Museum of Via Spluga, Town of Cernobbio, University of Pavia.

The "Via Regina Lariana", from Como to Sorico, is one of the oldest routes of historic and cultural exchange between Italy and Switzerland. The beautiful Swiss-Italian footpath along the Via Francisca and Via Spluga, with which it forms a continuum, is a fundamental "system" of transalpine soft mobility, the potential of which for European development has so far not been adequately grasped. It possesses all the characteristics required to be identified as part of a Major European Cultural Route [1]: a trail and a territory, therefore, to know and to protect, and to maintain intact for those who travel on foot.

The specific objective of this project, called "I CAMMINI DELLA REGINA", ID 33829732, Misura 3.1, P.O. Cooperazione Transfrontaliera – INTERREG IT-CH 2007-2013", born from the synergy between cultural experts, local museums, government departments, landscape designers, architects, designers and geomatics engineers, is to create an adequate tool for the full development of this important route and the surrounding area.

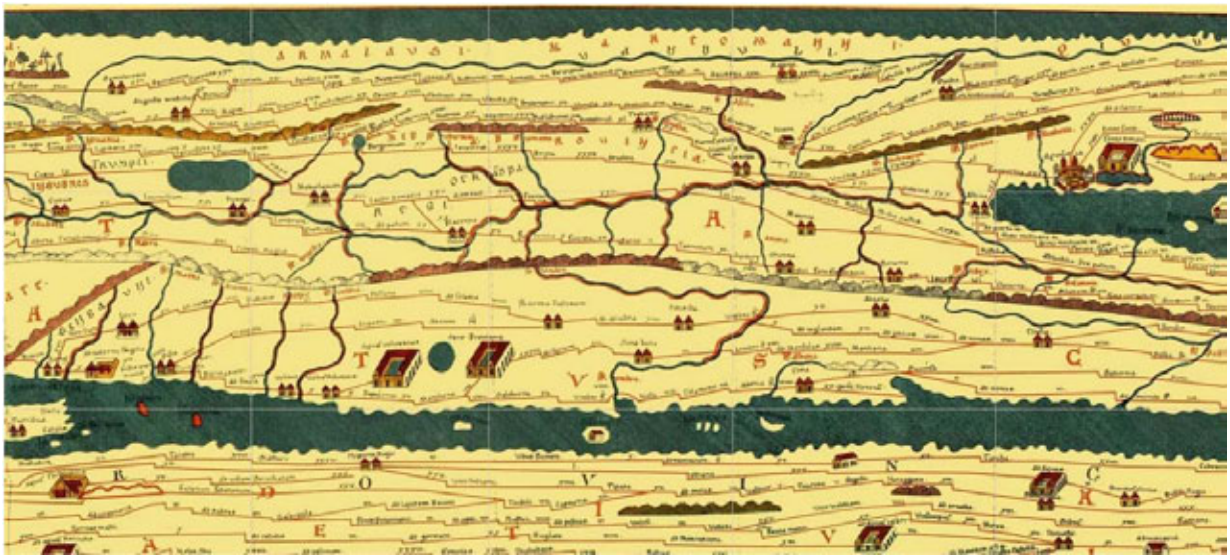

Fig. 2: From "Tabula Peutingeriana". The route from Bergomum to Comum.

2 . Historical Background

The name *Via Regina* is commonly used to refer to the road which starts at Como and keeping to the west of the city continues along the lakeside to the top of the lake itself, at the Ponte del Passo. Here begins the valley road, opened in 1837, to Chiavenna, which from here climbs the mountainous foothills up to the Spluga and beyond, to Chur. However, the road from Dongo on Lake Como that climbs up to the pass of San Jorio and continues through Switzerland to Bellinzona is also called Via Regina.

Known since the Middle Ages, the name of this road appears in documents in various forms: sometimes *Via Regia* (1256), at times *Strada Regina* or *Via Regale* (1352). Whatever form it takes, the name simply indicates that this is the main route, with minor ramifications. It is however understandable that the name Regina has often brought to mind Queen Theodolinda, to whom we owe the development of the region after the Lombard occupation, and who is credited with rebuilding many stretches of this road.

The road is also documented in the *tabulae geographicae*, Roman military maps that have come down to us under the name of "Tabula Peutingeriana". The Romans marched towards the Alps and their crossing points by this route, starting from *Novum Comum*, the new city built on the shores of the lake by Julius Caesar between the years 89 and 59 BC, inhabited by 5,000 settlers including 500 Greek nobles.

There is considerable documentation of inhabited places along the Via Regina in Roman times. This mainly consists of inscriptions, but there are also archaeological remains, including some fine mosaics and traces of fortifications erected during the decline of the Roman Empire, when the increasing pressure from barbarians called for greater defense of the territory. These findings are still visible in the area, or preserved at the Archaeological Civic Museum of Como. In the twelfth century Barbarossa marched both to and from Milan along the Via Regina.
Maintenance obligations for the road, and also the eastern shore of the lake and its hinterland in Ticino, were settled by the *Statuti Comensi* (1335), to which the various municipalities located along the Via Regina had to submit, testifying to the importance of the road for the entire region of Lake Como.
Paolo Giovio refers to the *Strada Regia* in his book *Larius*, written in 1537.

3 . Objectives of the project

The aim of this research project is to reinforce the shared identity of Northern Lombardy (Italy) and Southern Ticino (Switzerland) by preserving and enhancing the shared cultural heritage present in the historical network of footpaths that connect the regions concerned. By synergizing experts in cultural itineraries, municipalities, landscape designers, geomatics engineers, architects and designers, the project seeks to pursue this aim through the protection and enhancement of the local heritage of areas crossed by the paths, integrating promotional activities to raise awareness among the public and encouraging people to get to know and use the trails. This historical trail network, categorized according to the different functions of the anthropogenic structures (transit routes and population migration, devotional trails (art and faith), connections between villages in the valley and high altitude pastures, forestry and rural micro-economies (local food and wine production), is investigated participatively with extensive use of ICT and the computerized management of spatial and environmental information.
In this context, design plays a strategic role in guiding surveying activities and the recovery, protection, enhancement and reuse of the architectural heritage and landscape of cultural interest (buildings, arts, historical documents), with particular regard to the thematic itinerary of the "Via Regina", which runs from Como to the Splugen Pass, and therefore between Italy and Switzerland. This is a fundamental system of transalpine pathways characterized by slow mobility, of which the potential for European development has not yet been adequately grasped.

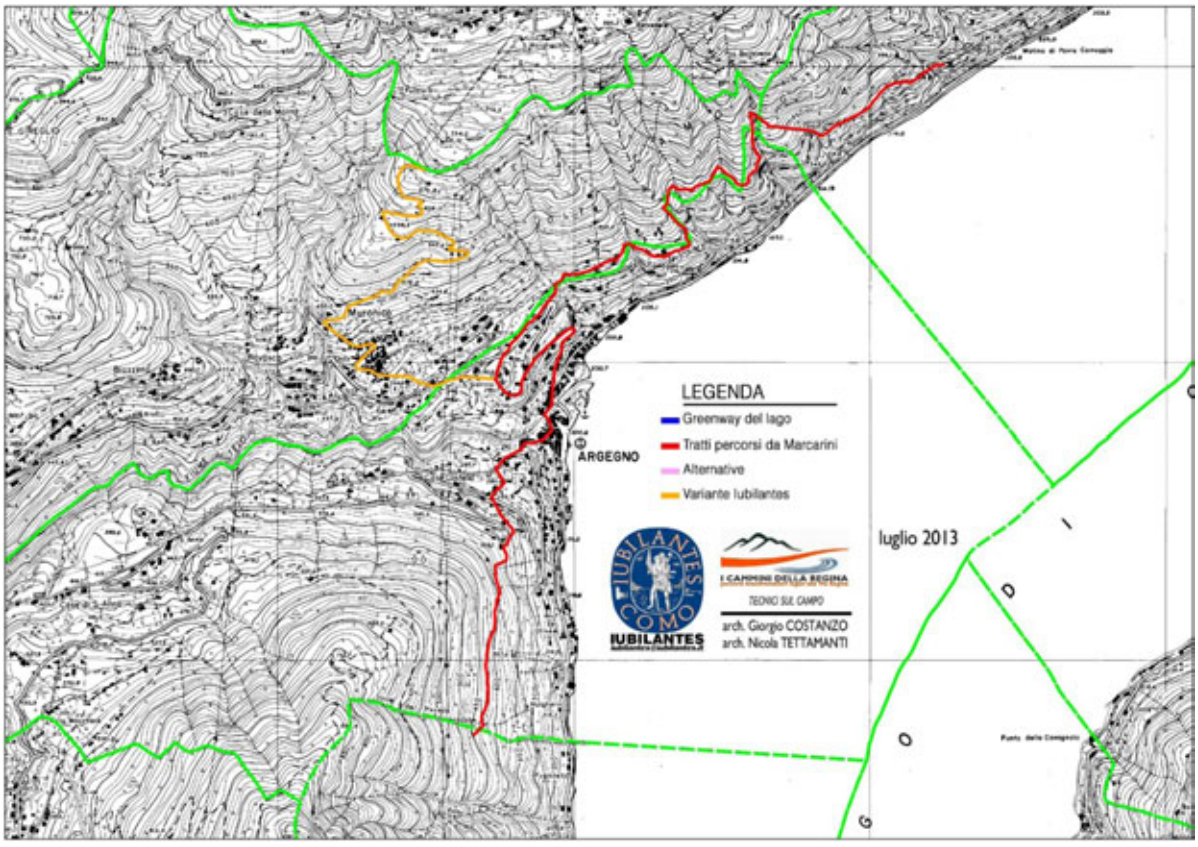

Fig. 3: Map of the area used to carry out survey operations, indicating the pathway (or its alternatives), which was. In particular, it highlights the stretch that runs through the town of Argegno.



Fig. 4: The board used to collect information in the survey divided into three categories: historical and cultural elements, morphological elements, tourism elements. Each category is split up into detailed sub-categories. All information has been transferred to digital data base. On the right are some pictures of the photographic survey of the Ossuccio area.

4 . Recipients and expected impact.

The main beneficiaries of the project are the local communities who are invited to rediscover and enhance the potential of their territories through integrated methods of acquiring new knowledge and experience. These combine historical traditions with the innovations and devices of information technology and communication, which enable collaborative participation.

A further aim of the project is to reconnect the system of footpaths with wider thoroughfares in the great tradition of European cultural routes (Via Francigena, etc.). This will benefit walkers, whether locals or visitors, who will be able to enjoy accessible, safe, scenic routes immersed in nature and spectacular landscape.

Re-opening these pathways will help local and cross-border communities rediscover past values and build new hopes for the future in the traditions and cultures that unite people who are today separated by a land border but are aware of belonging to a broader, shared heritage.

Tour operators will be able to use the new and more flexible tools for information and promotion provided by new technologies.

Young people will be attracted by the new technologies that provide them with more immediate sources of knowledge and access to new job opportunities.

The future establishment of information points along the route or the re-use of toll booths , stations , religious structures , customs facilities and farm buildings, as places of information and refreshment may also impact on the job sector, by training professional figures dedicated to the care and maintenance of paths, assistance to walkers / pilgrims; the management and organization of visits, accompanying guided tours, etc.

In short, the project has the following specific objectives:

- to compare methodologies and experiences of safeguarding assets, heritage and cultural landscape, particularly the axes of pedestrian border crossings, and artifacts found along these pathways;
- the physical regeneration, restoration and maintenance of sections of footpaths, bridleways, pavements and buildings present on the ancient roads (toll plazas, fountains, gravel stream beds, fords, old roadhouses, customs facilities, hospitality and reception sites in general) and religious buildings (churches, shrines, canonical pathways votive chapels) can be valued as such or reutilised as in the case of canonical functional structures, such as paths and / or reception facilities;
- to support collaboration, exchange and mobility between operators and between cultural institutions, strengthening links and exchange of experiences in research and the identification of best practices carried out by the various parties in the specific context ;

- to promote the recovery and enhancement of the peculiarities of local cultures and the use of innovative tools for communication and promotion of cultural heritage and historical memory of the border.

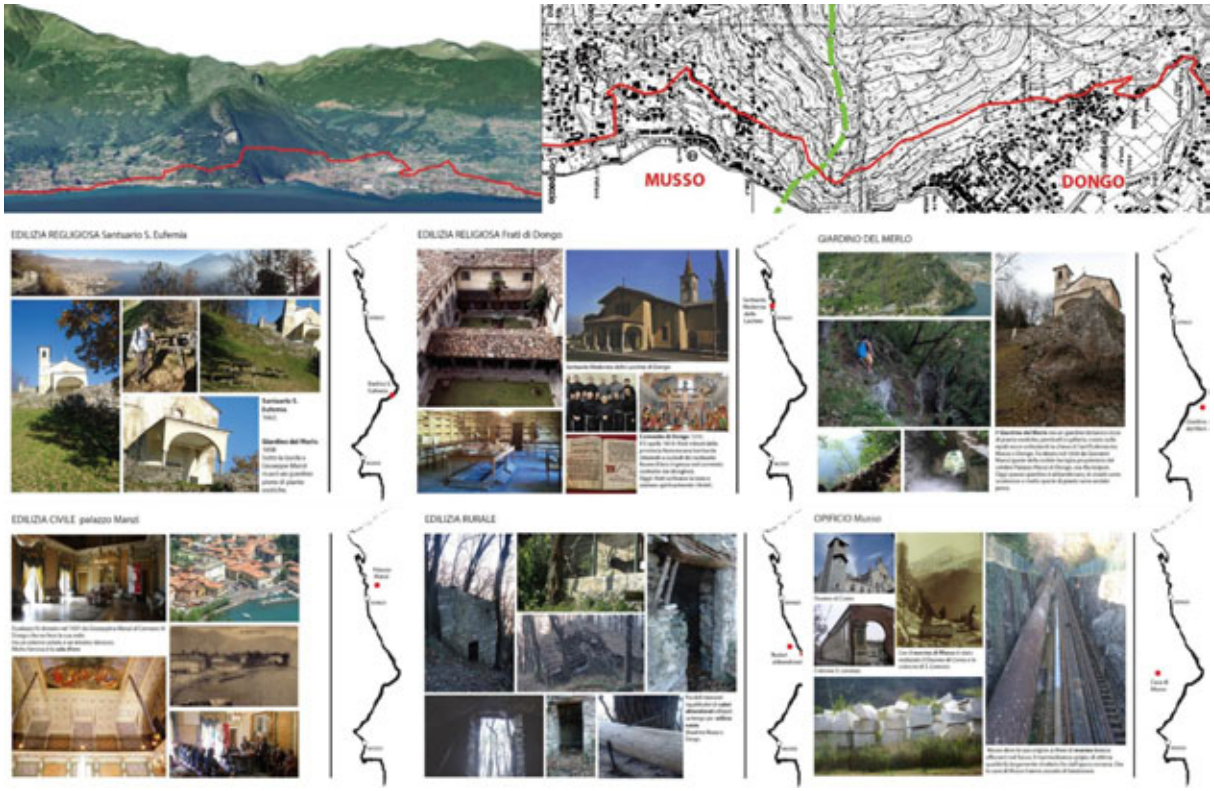

Fig. 5: Summary of significant survey operations between the towns of Dongo and Musso returned with summary tables showing the characteristic points and highlights of the area. These include pre-existing buildings and religious convents, and important material or work related findings (e.g. the marble quarries of Musso), and fine gardens which are characterized by a unique lake climate which fosters the growth of tropical plants. Analysis gathered by Fabio Ferrara, Luca Carbone, Diego D'Angelo.

5 . Description of the project: the contribution of design

This document describes the objectives, the methodology used and the first results obtained by the design research team at the Politecnico di Milano.

The research team, which operated in coordination and interaction with the other two units of the Politecnico di Milano, respectively devoted to geomatics and cultural heritage conservation, has offered a contribution on two different, interrelated levels.

In terms of analysis, a methodology for detecting and reading the connotative elements of the area was defined (divided into three categories: historical and cultural elements , morphological elements, tourist elements). A benchmarking exercise was carried out in relation to similar experiences in communication design, analyzing: best practices, target audiences, user samples, user needs and ease of access to the trails, and the detection of user needs by the system. All of this resulted in a meta-design and the definition of reference design scenarios .

In terms of the project, a first contribution was made in the strategic design of products and services in its widest commodity-related applications, which range from product to furnishings, temporary installations, visual communication and media, and in communicative artifact design, with particular reference to the role that design plays in appraising promoting and developing cultural and environmental heritage .

The research team dealt with issues relating to the reading of morphological elements that characterize the environment (materials, types of structure found in areas of human activity and along the pathways), identifying taxonomies and meta-planning scenarios for the concept designing process.

Mapping and spatial analysis of best practices was undertaken in relation to the network of historical "trails" "corridors" and eco museums, and their possible implications for the Italian and Swiss territory .

In addition, it was decided to collect and systemize initiatives already undertaken, or in progress, by different actors and institutions, including those in other INTERREG programs.
The research group has been involved in drafting the integrated visual communication (brand identity) that will identify the values expressed by evidence of visual and material culture in the area. They have designed products and services and communication artifacts (creating logos and trademarks, signage, information points, manuals, visual identity, objects, interfaces, and digital publishing products), taking into account the regulations on signs to slow traffic widespread in Switzerland.



Fig. 6: Designs by Alessandro Grasso, Dania Barbin, Sara Flamigni for the recovery of the pathways that from Cernobbio, climb Mount Bisbino reach Carate Urio. They are proposed enhancements for the Museum of World War I, the reuse of the stone quarries of Moltrasio and shelter for the famous "Bisbino horses' a breed that lives in absolute freedom.



Fig. 7: Between the towns of Ossuccio, Lenno and Mezzegra, where the particular climatic conditions have historically permitted a flourishing production of olive oil, Sara Gabbioni, Alice Conti, Sara Biasini, Chiara Berbenni devised a pathway equipped for folk events based on olive oil tasting and buying local products.

The phase currently being drafted includes, *inter alia* :

- definition of the territorial brand identity;
- identification of integrated tourist routes;
- creation of a network for the re-development of the former barracks of the Guardia di Finanza, located along the Swiss-Italian border, as "stations" in an ecomuseum (dedicated to travel related services and information, insights and 'portable' cultural museum experiences of local production and cultural excellence , mobility services and hospitality, local food and wine, etc.) and as a dining and reception area for visitors;
- graphic design of vertical and horizontal tourist signs and the media through which to apply them;
- creation of an informative totem / a first aid kit distributor;
- graphic design, promotional paper (brochure / guide, pocket maps, flyers, postcards) and digital (Apps depth on routes, dining areas, first aid);
- planning/teaching an International University project workshop (summer school) for the development of design scenarios for the dissemination of good practice , to be implemented in the context of academic degree courses and open to schools of architecture, design and landscape design. The theme of the workshop will be the development of a strategic plan for the enhancement of " cross-border trails " in view of Expo 2015.

6. Impact on university teaching: experimentation of educational models

The theme of the project was also proposed in the teaching program for undergraduate students at the Politecnico di Milano who were attending the Degree Program in Product Design, Furniture orientation, Como Campus [2]. On the basis of information generated in the initial phase of field research and analysis, together with autonomous research on the area carried out by students (using surveys, photographic documentation, interviews, literature research, dialogues with institutions, libraries, on-site visits, inspections, and user-safety tests on the route itself), groups of undergraduate students were assigned the development of design proposals along the entire route of the Via Regina, which runs from the town of Cernobbio to the town of Sorico.
10 areas have so far been studied, assigned to as many student groups. These are administrative areas in 24 municipalities, which are crossed by the Via Regina, between Cernobbio and Sorico (Ponte del Passo), at the end of Lake Como where the Valtellina (from the East) joins the Val Chiavenna (from the North) .



Fig. 8: He Yingying, Gao Jie, Chen Guangkai designed a number of service buildings for visitors, in front of the famous Comacina Island, such as a watch tower on the lake shore, toilets cabins with a sky view, and a pavilion on the banks of a stream, in order to hear the sound of the rushing water. All projects are designed to transfer a sense of calm and peace to the visitor.

Students have designed systems, services and products to enhance experience of the historical, environmental, scenic, geomorphologic and gastronomic qualities of each area, as well as the evidence of material culture and the memories of work and the local economy still alive there.
In this perspective, designing environments and local areas by redefining and reshaping the way the local area and landscape can be seen and enjoyed, by developing cultural walking trails in alternative to the routes commonly used by other forms of transport, has become a way of strengthening and enhancing awareness and diffusion of the culture rooted in places. Design tools and methods (tools of innovation for creating new scenarios to be perceived and enjoyed) were used to produce new visions of historical traditions and by inspiring people to outdoor action, to walking and hiking, foster local development.
Focusing on the needs expressed by walkers and trekkers (the typical user of historical trails) students were also asked to design a "traveler's kit": a set of items useful to the rambler along the Via Regina (walking from Spluga in Switzerland, or vice versa, walking from Como). These might be: a walking stick, route map, sketch book and water-colors, backpack, bandana, association membership card or badge and so on.

Bibliographical References

[1] The European Council has defined the political and cultural orientations for recognition as a "Cultural Route" or "Major Cultural Route" according to the pan-European dimension of the project.
The European Cultural Routes involving Italy are: Camino de Santiago de Compostela, the European M ozart Ways, Parks and Gardens, ViaFrancigena, Via Agostina, The Routes of the Olive
Tree, St. Martin of Tours, Casadean Sites, Routes of Jewish Heritage, the Cluniac Sites in Europe, Tra nsromanica, The Iron Road in Central Europe, The Phoenicians' Route, the Iter Vitis route.

[2] The course "Final Workshop" was held by Professors Roberto de Paolis (responsible), Maria Rita Ferrara, Nicola Crea, Gabriele Fumagalli, assisted by Giorgio Buratti, Luca Dellera, Emanuele Lupidi.

[3] FRIGERIO, G., LURASCHI, G., MARTELLO FRIGERIO, D. (edited by). *L' antica via Regina: tra gli itinerari stradali e le vie d'acqua del Comasco: raccolta di studi*, Como: Società archeologica comense, 1995.

[4] MARCARINI, A. *Il sentiero della regina. Dieci passeggiate da Como a Chiavenna*. Sondrio: Lyasis, 2005.

[5] BETTINI, V., MAROTTA, L., TOSI, S. (edited by). *La via Francigena in Italia. Alla ricerca del paesaggio*. Portogruaro: Ediciclo, 2011.

[6] DAVIS, P. *Ecomuseums: a sense of place*, Leicester: Leicester University Press, 1999.

[7] CASTELLI, A., VILLARI, B., VIGNATI, A. *ME.Design. Design strategies, tools and procedures aimed at increasing the value and promote the resources of the Mediterranean area between local and global. An italian example of action-research about design for locality*. In WERWIJNEN, J., KARKKU, H. *SPARK! Design and Locality*, Helsinki, Ilmari, 2004.

[8] SOLNIT, R. *Storia del camminare*, Milano: Bruno Mondadori, 2002.

[9] WALDHEIM, C., *The Landscape Urbanism reader*, New York; Princeton architectural press, 2006.

[10] APPLETON, J. *The experience of landscape,* John Wiley & Sons, London, 1975

[11] GIBSON, J.J. *The ecological approach to visual perception*, London: Erlbaum, 1986

[12] PRIORE, R. *No people, no landscape. La convenzione europea del paesaggio: luci e ombre nel processo di attuazione in Italia,* Milano: Franco Angeli, 2009.

[13] MAGGI, M., FALLETTI, V. *Ecomusei cosa sono e cosa possono diventare*, Torino: Allemandi 2001.

[14] BOLICI, R., POLTRONIERI, A., RIVA, R., *Paesaggio e sistemi ecomuseali*, Maggioli Editore, 2010

[15] BAGDADLI, S., *Le reti di musei. L'organizzazione a rete per i beni culturali in Italia e all'estero*, Milano: Egea, 2001

[16] LANZI, F., LANZI, G. *Il pellegrinaggio del Millennio, vie d'Europa e d'Italia per Roma: luoghi e simboli*, Milano: Jaca Book, 1999.

[17] STOPANI, R. *La via Francigena. Una strada europea nell'Italia del Medioevo,* Firenze: Le Lettere, 1988

[18] DÉCAMPS, H. *Au printemps des paysages,* Paris: Buchet-Chastel, 2004

[19] DONADIEU P., PERIGORD M. *Le paysage, entre nature et cultures*, Paris: Armand Colin, 2007

[20] McHARG I.L., *Design with nature*, New York: John Wiley & sons, 1992.

[21] BUREL F., BAUDRY J., *Ecologie du paysage. Concepts, méthodes et applications*, Paris: Édition Tec Doc, 1999.

[22] FARINA, A. *Principles and methods in Landscape ecology,* London: Chapman & Hall, 1998.

[23] FARINA, A. *Landscape ecology in action,* Dordrecht: Kluwer, 2000.

[24] FARINA, A. *Verso una scienza del paesaggio*, Bologna: Alberto Persida, 2004.

[25] FARINA, A. *Principles and methods in landscape ecology. Towards a science of Landscape,* New York: Springer-Verlag, 2006.

[26] BARILLÀ P., BLATTO M., *Geologia e forme del paesaggio per escursionisti*, Ed. L'escursionista, 2007

[27] FENOGLIO M., *Andar per luoghi. Natura e vicende del legame con i luoghi*, Ed. Ananke, 2007

[28] BRACCI G., *Il piacere di camminare. Riflessioni e consigli sul muoversi a bassa velocità*, Ed. Il Lupo, 2010

[29] BRIZZI E., FINI M., *I diari della via Francigena*, Ediciclo ed., Portogruaro, 2010

[30] DEMETRIO D., *Filosofia del camminare. Esercizi di meditazione mediterranea*, Milano: Raffaello Cortina Editore, 2005

[31] FABOS, J., AHEM J., *Greenways. The beginning of an international movement*, Amsterdam: Elsevier Press, 1995

[32] FARINA A., *Il paesaggio cognitivo. Una nuova entità ecologica,* Milano: Franco Angeli, 2006.

[33] INGEGNOLI V., Giglio E., *Ecologia del paesaggio, Manuale per conservare gestire e pianificare l'ambiente,* Sistemi editoriali, Napoli, 2005

[34] KURSTER H., *Uomo, mondo, rappresentazione. Piccola storia del paesaggio*, Donzelli editore, Roma, 2010

[35] LE BRETON, D. *Il mondo a piedi. Elogio della marcia*, Feltrinelli, Milano, 2000

[36] LEED, E. *La mente del viaggiatore. Dall'odissea al turismo globale*, Il Mulino, Bologna,1991

[37] PEZZANI C., GRILLO S, GRILLO E., *Sentieri nel Canton Ticino*, Guide Iter, 2011

[38] BETTINI, V., MAROTTA, L., TOSI, S.S. (a cura di). *La via Francigena in Italia. Alla ricerca del paesaggio,* Portogruaro: Ediciclo, 2011.

[39] GIANONI, P. *Può un itinerario culturale essere identificatore di un processo di riqualificazione del paesaggi?* in BETTINI, V., MAROTTA, L., TOSI, S.S. (a cura di). *La via Francigena in Italia. Alla ricerca del paesaggio,* Portogruaro; Ediciclo, 2011, pp. 159-166.

[40] DAVIS, P*. Ecomuseums: a sense of place*, Leicester University Press 1999.

[41] VIGNATI, A. *Ecomuseums in Lombardia: design the identity of the Lombardia Ecomuseum Network,* In: INTERNATIONAL CONFERENCE OF EDUCATION, RESEARCH AND INNOVATION. 16/11/2009-18/11/2009, Madrid (pp. 1- 6).

[42] VIGNATI, A., MANDARINI, M. *La Strada Verde. Ecomusei, cultura del progetto e sostenibilità verso Expo 2015*, Santarcangelo di Romagna: Maggioli, 2010.

[43] VIGNATI, A., MANDARINI, M. *La sostenibilità ambientale. Buone pratiche per lo sviluppo sostenibile nel territorio del forum di Agenda XXI Locale della Valle di Scalve e dell'Ecomuseo delle Orobie*, Santarcangelo di Romagna: Maggioli, 2010.

[44] VIGNATI, A., MANDARINI, M. *Ecomuseums and Design: Research Experiences and Training Workshops made by Ecomuseums Lombardy Network and Milan Polytechnic*, In: 3rd International conference on Education and New learning technologies 4th-6th July 2011 Barcelona (Spain).

[45] BRESSAN, M., BERNARDI, M. *Paesaggi della Transalpina. Itinerari tra storia, arte e natura*, Della laguna, 2006.

[46] POGLIAGHI, P. POGLIAGHI, L. *Montagne della Svizzera italiana. Escursioni, ferrate e vie normali nella Svizzera italiana,* Tamari Montagna, 1998.

[47] LORENZETTI, L., VALSANGIACOMO, N. (a cura di). *Lo spazio insubrico. Un'identità storica tra percorsi e realtà socio economiche*, 1500-1950, Lugano: Casagrande, 2005.

[48] MIGLIO, G.F., PINI, G. *Larius. La città e il lago di Como nelle descrizioni e nelle immagini dall'antichità classica all'età romantica,* Milano: Alfieri, 1959-1966.

[49] A. Balbiani, *Como, il suo lago, le sue valli e le sue ville descritte e illustrate*, Milano: Francesco Pagnoni ,1877.

[50] CARAMEL, L., PATETTA, L. *L'idea del lago. Un paesaggio ridefinito: 1861-1914*, Milano: Mazzotta, 1984: catalogo della mostra tenutasi a Como (Villa Olmo, maggio-giugno 1984)

[51] T. TARAMELLI, *I tre laghi*, Milano: Artaria, 1903.

[52] C. AMORETTI, *Viaggio da Milano ai tre Laghi*, *Maggiore, di Lugano e di Como e ne' monti che li circondano,* Milano: Giuseppe Galeazzi, 1794.

[53] I. CANTÙ, *Viaggio ai laghi Maggiore, di Lugano, di Como, al Varesotto, alla Brianza e luoghi circonvicini,* Milano: Vallardi, 1852.

[54] R. LODARI (edited by), *Il giardino e il lago. Specchi d'acqua fra illusione e realtà. Conoscenza e valorizzazione del paesaggio lacustre in Italia e in Europa*, Gangemi, Roma 2007.

[55] D. BERTOLOTTI, *Viaggio al Lago di Como. Si aggiunge: La Descrizione di una gita da Milano a Cassano lungo il naviglio, e da Cassano a Lecco lungo l'Adda non che Alcuni Cenni intorno Varese ed i suoi Dintorni*, Ostinelli, Como, 1821.

[56] A. LONGATTI, *Como e il Lario: un rapporto d'immagine*, in RUMI, G., VERCELLONI, V., COVA, A. (edited by), *Como e il suo territorio*, Milano: Cariplo, 1995, pp.259-303.

[57] F. LOSE E C. LOSE, *Viaggio pittorico ai tre laghi, Maggiore, di Lugano, e Como...*, Milano: Francesco Bernucca, 1818.

[58] M. KHAN-ROSSI, *Itinerari sublimi, viaggi d'artisti tra il 1750 e il 1850*, Milano: Skira Editore, 1999.

[59] C. MARGHERITIS, C. SINISTRI, G. INVERNIZZI, P. PEVERELLI, *Il lago di Como nelle antiche stampe: catalogo delle stampe dei paesi del lago fino alla fine del secolo XIX, Como:* Litotipografia Giuseppe Malinverno, 1978.

[60] A. BRILLI, *Su questo lago sublime, artisti e viaggiatori stranieri sulle rive lariane,* Milano: Federico Motta Editore, 2002.

[61] F. CANI, *Costruzione di un'immagine. Como e il Lario nelle raffigurazioni storiche dal medioevo al novecento,* Como: Nodolibri, 1993.

[62] AA.VV. *Le vie dei Càrden. Itinerari escursionistici tra Italia e Svizzera alla scoperta del patrimonio architettonico del Càrden in Valle Spluga, Valle Mesolcina e Val Bregaglia.* Campodolcino: Museo della Valle Spluga e della Valle San Giacomo, 2013.

[63] AA.VV. *Guida alla manutenzione e al recupero dell'architettura rurale intelvese,* Missaglia: Bellavite, 2013.

[64] VAN DE SFROOS, D. *Terra e acqua. Viaggio "dolce" alla scoperta del Lago di Como. Musica, poesia, tradizione, arte, storia e natura.* Merate: Dmedia Group, 2013.

XII International Forum Le Vie dei Mercanti
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OVERVIEW OF THE WATERFRONTS FEATURES: A PERCEPTUAL APPROACH

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Abstract
Up to last century, waterfronts were principally used for industrial and commercial purposes due to their strategic position. However, in recent decades these urban places have been undergoing renewal interventions aimed at valorizing their cultural and recreational potentialities for both tourists and citizens.
In fact, ever more architectural, urban and environmental studies are focusing on this issue with it representing one of the elements that contributes to improving the quality of life of the people experiencing the city.
The way in which people come into contact with the cities waterfronts is influenced by an ensemble of perceptual and environmental features that allows to identify the representative parts of the cities and their cultural and natural richness, in spite of their dynamic nature.
In current literature, there are not many studies on the way in which people perceive the waterfront environmental quality nor the influence of specific aspects, such as visual and auditory, on their overall perception.
This paper is aimed at carrying out an overview of these emblematic open spaces based on their restorative and recreational features. With the objective of assessing how the sonic environment can influence the perception of the overall environment, full spatial acoustical references are registered by means of in situ binaural and ambisonic recordings.

Keywords: Waterfront, sustainability, soundscape, perception

1. Introduction
The complex relationship between the urban renewals and hydrographical elements with their whimsical behavior has left traces that can be appreciated from the foundations up to the current configurations of our cities. River rises or floodings on the one hand, and the construction of commercial ports or river basins, on the other, are examples of transformations suffered by the frontier between the urban developments and the geomorphological configuration processes that have contributed to the current shape of waterfronts.
The renewals suffered in the coastal boundaries at the beginning of the last century led to radical changes at urban and social scales with the attraction of the population and commercial activities. The privileged condition of being nerve centers of trade between cities led not only to the construction of port structures with a large presence in the urban fabric but also to the parallel development of a culture of wellness and welfare. Along with the transformation linked to their inherent activities, interventions aimed at making the most of the cultural and historical values of the coastal boundaries were also added. In recent decades, the rapid development of the tourism sector has encouraged the transformation of the land uses and the leisure activities traditionally linked to the waterfronts. The need to show an image of an attractive multicultural destination focusses the attention of authorities

and stakeholders on these areas, that are intended to convert them through major interventions on the business cards of their cities.
The approach to the characterization of the waterfronts can be carried out from different points of view based, for example, on the kind of hydrographical element, the complexity of the topography or the extent of the human intervention in the coastline boundaries. On this occasion, we have preferred to focus on the complex relationship between the urban limits and the coastal line from the point of view of the needs of the residents and tourist.
The aim of this paper is to offer an overview of the waterfront features that contribute to enhancing the lively conditions of these areas and the wellness of their users, with the ultimate goal of improving the quality of life of the citizens. The waterfront of Naples has been chosen as a case study in order to undertake an approach to the complex process of how these places are perceived by their users. With the view of assessing the influence of the sonic environment on the perception of the overall environment, full spatial acoustical references are registered by means of in situ binaural and ambisonic recordings.

2. Sustainable developments of the waterfronts

Waterfronts play an important role in urban areas, being together with other open spaces as parks and squares enjoyment reference points in citizen's life. The need to obtain better environmental standards as well as the rapid development of the touristic sector in the last decades has prompted renewal projects to promote their leisure and recreational potentialities.
The coastal boundaries are an assembly of parts that needs a balanced coexistence and integration with the human intervention. Its inner reality is a result of the articulation of morphologic, cultural, historical, economic, politic, environmental and social issues that converge in a complex system in a state of unstable balance [1]. Nowadays the touristic sector as the driving force of the coastal cities' economy is the trigger for changes in social, urban, environmental and infrastructural planning and development. As a favorite tourist destination, especially in regions with warm weather, the environmental quality and amenity of these areas needs to be carefully managed.
The approach to the intervention projects on the waterfronts should be made from a perspective of sustainability and environmental respect, understanding sustainability as the difficult work to strike a balance between nature and individual interests [2]. It is very important to tackle the renewal project of urban spaces from a holistic approach, that includes multiple disciplines into the design process. [3]. Evaluating the environment together with people's behavior should be such an important stage of the project as the design itself.

3. Outline of the waterfront problems from the point of view of the perceptual characterization

As in the rest of the city, there is a large quantity of variables of different types and from diverse origins that can affect the complex process of the perception of the waterfronts. A positive or negative evaluation of one element may be decisive in the overall satisfaction of the quality of the area, so the attention and care of the details are essential in getting full enjoyment of the waterfront users. Purely functional aspects such as the accessibility or availability of areas for the rest, and issues beyond the urban design such as maintenance or cleanliness should be taken into account by the authorities in order to offer a quality product capable of attracting potential users as well as to compete with other tourist cities.
Road traffic constitutes one of the biggest and hardly solved environmental problems of developed cities. On waterfronts, the characteristic layout of a road beside the coastal line, constitutes in itself a not constructed barrier difficult to overcome between the natural and the anthropogenic environment at different levels: displacement, perceptual (visual-auditory-smells interaction), pollution. While vehicles passing are an obstacle to the flows of persons and also for the visual perception of the natural and built environment, traffic noise acts as an excellent masking of natural sounds like the one of the wind or the waves.
Urban waterfront soundscapes are not normally characterized by the predominance of natural sounds, but rather by a meshing of artificial and mechanicals ones, that contribute to the homogenization and loss of identity of the sonic environment. Though the soundscapes are dynamic entities, resulting as the evolution of the sound sources acting, it is important to rescue and valorise the natural elements that result favourable for the restorative and liveliness features of the urban spaces, to allow users a comfortable relation with the environment.

4. Overview of the urban waterfronts

As a result of different independent and disarticulated strategies of improvement, many of the urban waterfronts are characterized as being constituted by a cluster of residential, commercial and industrial areas somehow connected to the urban fabric. This and other problems of a diverse nature

(environmental, dismantling of port areas, deterioration and degradation of unused areas ...) are the origin of many interventions undertaken by the authorities, aimed at making the most of the underused waterfront.
Compared with other sort of interventions, the ones intended to promote the restorative properties of a waterfront do not constitute by themselves a high economical inversion and contribute to the improvement of the liveliness and quality of life of the citizens.
The pedestrianisation of a road that runs parallel to the coast line is an alternative adopted by some municipalities to tackle environmental problems. However, the border configuration of this roads and its role of traffic receiver and channelers makes it difficult to do without them.
A brief description, not exemplifying, of some European waterfronts with a promenade is reported below in order to explain different dispositions and solutions that are offered to the costal boundaries. To target the understanding of the wide variety of realities that can be found in the study of the waterfronts, we have elaborated a non-exhaustive classification based on the kind of environment and the proximity of a road. A first classification has been established into two main groups based to the level of human intervention: waterfront in natural areas and waterfront in urban areas. For both groups a second distinction has been made according to the existence of road traffic adjacent to the waterfront promenade: waterfronts with road traffic and waterfronts without road traffic. In turn, the waterfronts with road traffic have been classified in those with restricted road traffic or with non-limited road traffic.
Venice (natural lagoon-waterfront without perceived road traffic). This waterfront intervention in the area of Soto Pezzegalo Barena of the Venice Lagoon can be classified such as those that, with a subtle transformation of the environment enable walking on the path in a complete integration with the nature. This promenade away from the urban development is intended to allow eventually the visit to the fragile area that surrounds it subject to environmental regeneration [4].
Benidorm (Fig. 1) (urban seafront promenade with road traffic). Benidorm city bases its economy mainly on tourism and entertainment, and it is together with the islands, one of the favourite national and foreign tourist destinations in Spain. The project of the waterfront “Playa de Levante” in Benidorm, inaugurated in the year 2009, is already considered an emblematic example of intervention undertaken in the waterfronts. The design of the seaside promenade presents a layered topography that allows a transition adapted to the two levels of reality coexisting in the urban coastal boundaries. The higher level, with concrete and ceramic finish shows a sinuous topography and contains landscape gardens and areas for rest in contact with the road and the built strip area. The lower level instead is made with natural materials and proceeds along the retaining wall in direct contact with the sand [5]. These two levels enable the user two different ways of experiencing the waterfront, one linked to the constructed area, that allows also the contemplation of the sea from a privileged position, and another one linked to the natura that facilitates to walk all along the coastline. On the bottom level due the height difference, the harmful noise perception of traffic is reduced by the shielding effect of the retaining wall structure.


Fig. 1: Waterfront promenade of Benidorm. Ortophoto (Source: Bing maps.)

Oporto (Fig. 2) (urban seafront promenade with road traffic and urban park**).** The “Passeio Atlântico” is only a part of the ambitious set of interventions that have been carried out in the coastal boundaries located between Matosinhos and Oporto. The part of the promenade placed in Oporto, inaugurated in 2002, is constituted by two promenades, separated by a green area. The upper promenade runs parallel to the road, and serves as a link between two green areas of the city [6]. The lower promenade instead adapts this trace to the irregular topography placing itself only a few metres above the sea level[6], and acting like a transition element between the urban and the wildlife nature with secondary paths that leads directly to the shore. As in the example of Benidorm, the disposition of the bottom promenade reduces the negative effects of the traffic because of the difference of level. The green area contributes to improving the environmental quality and enables citizens to approach the experience of a natural place through an urban park.



Fig. 2: Waterfront promenade of Oporto. Ortophoto. (Source: Google maps.)

Pozzuoli (Fig. 3) **and Salerno** (urban seafront promenade with road traffic). The Lungomare Yalta of Pozzuoli runs parallel to Giacomo Mateotti street and it corresponds to a model of promenade at the same level as the road. It is provided by landscaped gardens arranged sinuously along its route to improve the environmental quality of the area. Within the same group, we can include the Lungomare Trieste of Salerno, which is composed of green stripes of vegetation organized between the two directions of the road and between the road and pedestrian promenade.



Fig. 3: Waterfront promenade of Pozzuoli. Ortophoto. (Source: Google maps.)

Ligurian coast (urban seafront promenade; the promenade lays on the trace of the former railway trucks, and it shows a great variety of solutions along its route: with and without road traffic and with-without landscape gardens). One of the most difficult problems that some Italian coastal areas face is the disposition of the railway line parallel to the shoreline. To the usual breakdown of the urban fabric assumed by the existence of the train tracks, the difficulties to interrelate the narrow strip that remains between the railway and the coastal line with the rest of the city must be added. The connections are usually inhospitable places located far away from each other, more intended to channel the flows of road traffic than the pedestrian ones, which do not favour the access and enjoyment of the citizens to the coastal areas. The solution of covering the railway or the removal of it leaves traces of the neglection, decay and abandonment that these areas have been suffering during decades. This situation which can only be resolved through an unitary intervention of improvement and integration of this forgotten areas with the rest of the city/ies. On the Ligurian coast, the railway line was moved inland, and 25km were transformed in a promenade designed for bicycle and pedestrian traffic [7]. Due to the long route of the promenade, the waterfront presents different solutions as a result of the articulation of the existing items before the translation of the tracks with new ones. The renewal works finished in 2007 have contributed to the improvement of the accessibility to the sea, with the promenade acting like a connector between the landscape gardens and the leisure areas. Though the footprint left by the railway line has only allowed the area to be an outline of what could have been, the intervention implies a huge improvement to the environmental quality of the waterfront, and puts the coastal strip to the service of citizens.

Malmö (Fig. 4) (urban seafront promenade without road traffic in a stretch of the route, and with restricted road traffic in another). The route located between Ribersborgstrand and Östra Varvsgatan is an example of urban seafront promenade integrated into the citizens' life. Its route runs in parallel to a restricted road traffic area, or alongside a large urban park, and is composed of a combination of sandy stretches and finished wood surfaces that ceate a perfect blend with the environment. In the area of the Sunspromenaden, wooden steps lead to concrete platform to have a closer relationship with the water surface [8]. The urban park is used by the citizens as a resting area in which to enjoy the positive effects of the contact with nature.

Genoa (urban seafront promenade without adjacent road traffic) The current waterfront Voltri of Genoa has been created to improve the image that the city offers to the sea. Running separately to the road, it is an intervention in which the promenade acts like a distribution element along which recreational and public services are arranged to improve the offer of leisure activities of the area.



Fig. 4: Waterfront promenade of Malmö. Ortophoto. (Source: Google maps.)

Lisbon (Fig. 5) (urban riverfront promenade without adjacent road traffic but nearby the bridge Vasco de Gama). This waterfront promenade has its route linked to an urban park designed for its integration in the social life of the city. The beautiful main promenade runs from the Passeio dos Heròis do Mar through the urban park and rises on the river bank allowing for a beautiful relationship with the shore [9]. Two perpendicular paths connect the road adjacent to the park with the main promenade and enter the river. Despite the strong negative influence on the overall environment of the road traffic noise coming from the bridge, the intervention gives a satisfactory improvement and recuperation of the area at the service of the citizens.



Fig. 5: Waterfront promenade of Lisbon. Ortophoto. (Source: Google maps.)

5. Case study: Waterfront of Naples

The waterfront of Naples is currently undergoing the implementation of pedestrian areas and road traffic restrictions in various locations, which makes it of particular interest to compare different environmental qualities perceived by users along its route.

5.1. Definition of the area of study

The study area includes the stretch of the waterfront promenade between the intersection of via Mergelina and via Francesco Caracciolo and the curve where Via Ammiraglio Ferdinando Acton and Via Francesco Caraciolo converge.

Ten zones have been established along the study area attending to the different visual, auditory and olfactory features that can affect the perception and characterization of the places (Fig. 6).



Fig. 6: Photos of the locations in which the measurements have been made. In order from left to right: intersection via Acton - via Nazario Sauro, intersection via Nazario Sauro - via Cuma, fontana dell'Immacolata, Castel dell'Ovo, via Partenope 1, via Partenope 2, via Caracciolo 1 (in front of Villa Comunale), via Caracciolo 2 (entrance to the sea), via Francesco Caracciolo 3 (in front of Ali Lauro), intersection of via Francesco Caracciolo – via Mergelina

5.2 Methodology

The approach to the citizens's perception of these urban spaces was carried out through a set of 128 surveys done on the waterfront promenade of Naples between January 15th and February 25th of 2014. The questionnaire was organized in three categories of questions: demographics questions, questions about global perception, and questions about a specific group of sense stimuli (visual, sound and smells) and the weather conditions. The survey included, inter alia, questions related to the environmental quality, and the subjective perception of the landscape, the soundscape and the smells of the area. The questionnaire is composed by single and multiple choice questions. The answer to the questions about assessment, were rated in a seven points Liker's scale from positive (1), to negative (7).

As a preliminary study, soundwalks and measurements in fixed positions were carried out along the waterfront promenade in the months of September and October of 2013. The interviews were conducted in the proximities of the points of study and combined with binaural registrations in order to correlate subjective and objective parameters. The binaural audio signals (16 bits/44.1 kHz) were recorded after or before the surveys with the use of a portable device "M-Audio Microtrack 24/96" and headphones "Sennheiser HDC 451". With view to further studies, several recordings were performed in different points along the seafront in Naples with the ambisonics technique. By means of this method, it is possible to register full spatial information of the sonic environment. With the adequate post-processing, acoustic immersion into the recorded soundfield becomes possible. The equipment utilized includes a Soundfield microphone SPS200, digital recorder Zoom H6, and wind shield Røde Blimp.

5.3 Analysis and results

The main characteristics of the sample of people interviewed are given in Table I. As expected, most of the visitors of the area are local people (77%) and the the rest of them are divided into tourists and inhabitants of a nearby city (23%).

	Provenance(%)	Gender		Age (%)						
		Male (%)	Female (%)	15-19	20-24	25-29	30-39	40-49	50-59	>=60
Tourist	12.50	4.69	7.81	0.00	1.56	2.34	4.69	1.56	1.56	0.78
Local	77.34	36.72	40.63	18.75	12.50	9.38	14.06	6.25	10.94	5.47
Inhabitants of a nerby city	10.16	6.25	3.91	3.13	2.34	0.78	1.56	0.00	1.56	0.78

Table 1 - Characteristics of the sample of people interviewed

The sound sources recognized during the preliminary works in the area are mainly the following ones: traffic – with engine (cars, motorbikes, trucks, buses, touristic trains, car toys), traffic - without engine (bicycles, skates, pedal cars, scooters), planes overflying, boats with and without engine, horns (from cruise ships, buses, cars, bicycles, and pedal cars) voices (children crying, children playing, people talking, persons shouting, laughs), steps, music, sounds from restaurant-food activities (movements of chairs and tables, cutlery and plates, movement of awnings, engines, fans, generator), baby carriages, wheelchair, wheel luggage, construction sounds (hammer hitting, noise of tools) . In figures 7 and 8

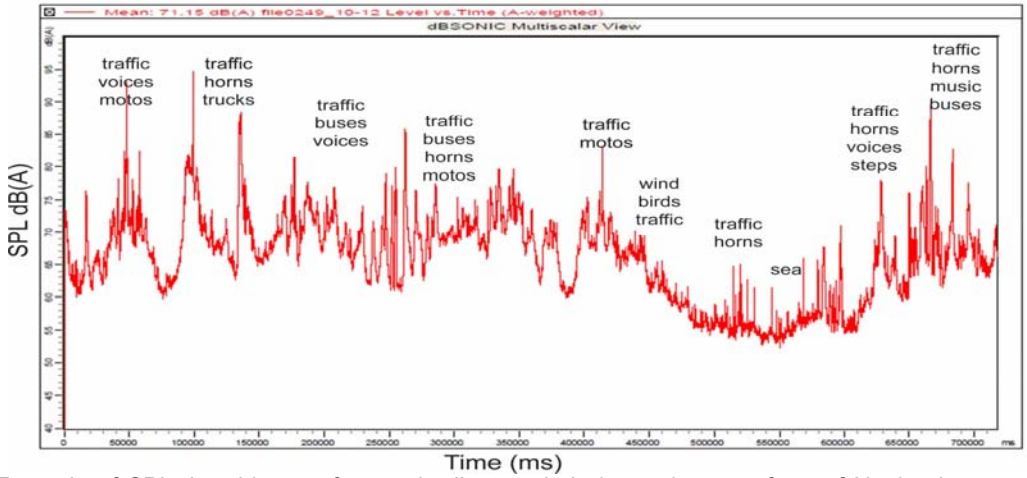

Fig. 7: Example of SPL time history of soundwalk recorded along the waterfront of Naples in a road without restrictions to the traffic circulation (13th October 2013 -17.30 till 17:43- Stretch of via Caracciolo between Ciro Mergelina and Ferdinando Galiani)

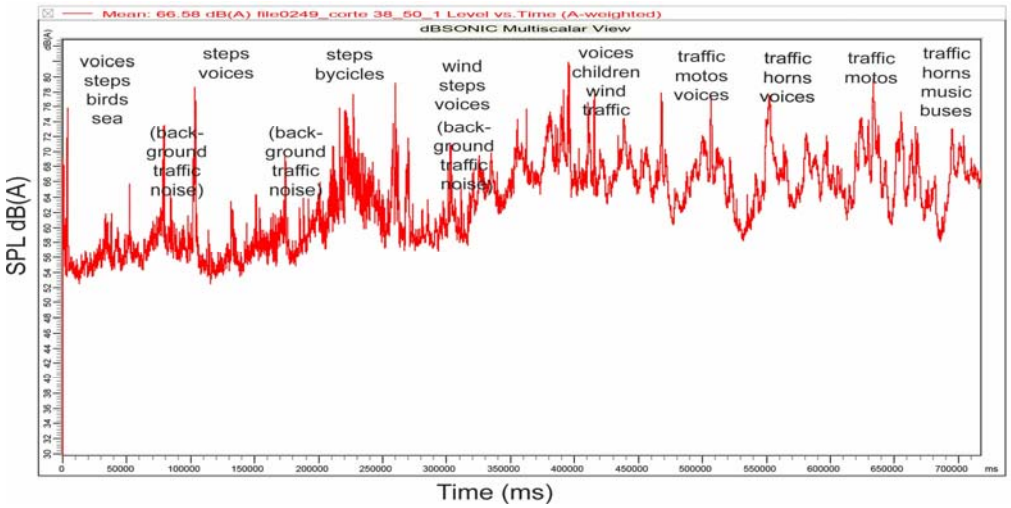

Fig. 8: Example of SPL time history of soundwalk recorded along the waterfront of Naples in a stretch with two main traffic conditions: a pedestrian area (till aprox. 400000ms) and an open to traffic area (from aprox 400000ms till the end of the registration). (13th October 2013 -18:08 till 17:20 - Stretch of via Caracciolo between the entrance to the sea and piazza Vittoria)

two representative time histories in which are written the predominant sound sources acting recognized by the operator are displayed.
The sound pressure levels along the waterfront promenade vary from 55.40 dBA in the zone 5 (pedestrian area) to 78.1 dBA in zone 9 (table 2). The partial results are that for similar sound pressure levels, some soundscapes are considered more pleasant than others according to the kind of sound sources acting.

Location		Kinds of traffic	Mean LAeq (dBA)	Max LAeq (dBA)	Min LAeq (dBA)
Via Acton - Via Nazario Sauro	1	WR	69,86	72,40	68,70
Via Nazario Sauro - Via Cuma	2	RT	67,14	73,70	64,80
Fontana dell'Immacolata	3	RT	59,80	61,90	58,40
Castel dell'Ovo	4	P	67,92	71,80	67,50
Via Partenope (near Antonio & Antonio)	5	P	60,74	68,90	54,90
Via Partenope (in front of Vainilla Caffé)	6	P	58,96	69,00	55,40
Via Francesco Caracciolo (in front of Villa Comunale)	7	WR	69,06	74,20	55,40
Via Francesco Caracciolo (entrance to the beach)	8	P	66,09	71,60	59,90
Via Francesco Caracciolo (in front of Ali Lauro)	9	WR	70,64	78,10	62,50
Via Francesco Caracciolo - Via Mergelina	10	WR	70,86	75,60	65,80

Table 2 – Mean, maximum and minimum LAeq of all the registrations made in each position. Kinds of traffic restrictions; WR = without restrictions to road vehicles circulation. RT = restricted to one sense of circulation. P=pedestrian area

The percentage of subjects that have evaluated positively (5, 6, or 7 points in a 7 points Likert's scale) the environmental quality and several sense stimuli (landscape, soundscape or smells) was obtained. For example, more than the fifty percent of the subjects interviewed have expressed a positive judgment of both the environmental quality and the landscape. Forty percent of the interviewees gave positive judgments to the environmental quality and the soundscape, and a slightly lower percentage of the subjects gave a positive judgment to the environmental quality and the smells. Obviously, the higher number of different sense stimuli considered, the less number of subjects that express a positive rating to all of them (Fig. 9). These outcomes indicate that the visual parameters have a significant influence on the overall assessment of the places confirming previous research results [10][11][12]. Slight differences have been found between the number of women and men that gave a positive judgment to the questions considered, especially to the last group of questions (environmental quality – landscape - soundscape - smells).

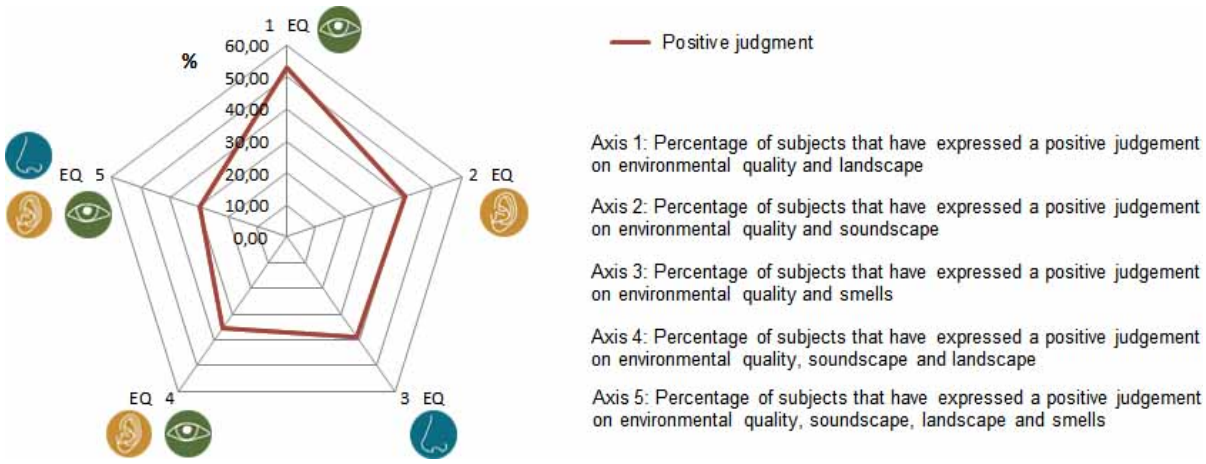

Fig. 9: Percentage of subjects that have given a positive judgment to several issues.

We have referred first to the percentage of subjects that have expressed positive judgments to the aspects previously cited (fig. 9). If the same evaluation is made with the negative ones (less than 4 points in a 7 points Likert's scale), the highest percentages correspond to the group of subjects that have judge negatively both the environmental quality and the soundscape (13%), and the environmental quality and the smells (11%). This seems to indicate that for positive judgments visual has an important role in the perception of the waterfront, but for the negative ones sounds and smells have a very remarkable influence. Significant differences have been found between the number of women and men that have given negative valuation in the different aspects assessed, except for the judgment of both the environmental quality and the landscape. In these cluster of questions, women have shown a trend to give stronger judgment than men. Further research is needed in order to compare these outcomes in other places with more generally accepted negative features.

6. Conclusions

The way in which people come into contact with the cities' waterfronts is influenced by an ensemble of perceptual and environmental features that allows to identify the representative parts of the cities and their cultural and natural richness, in spite of their dynamic nature.

The visual stimuli play an important role in the perception of the overall environment, but the influence of the other senses together with other psychological and physical parameters cannot be underestimated.

In current literature, there are not many studies on the way in which people perceive the waterfront environmental quality nor the influence of specific aspects, such as visual and auditory, on their overall perception. There is a need for more detailed research on the perception of the waterfronts in order to understand the multidimensional characteristics of people's environmental experience.

Acknowledgements

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Bibliographical References

[1] **Rumulo, M.** La cartografía per la planificazione delle coste del mediterraneo. *L'area costiera mediterranea. Intervento e conclusione del 1º Convegno Internazionale Sulle Coste del Mediterraneo.*Napoli. Giannini Editore.157-163, 2000.

[2] **Gifford, R.** Environmental psychology and sustainable development: Expansion, maturation, and challenges. *Journal os Social Issues.* Vol. 63, No. 1, 199-212, 2007.

[3] **Kopec, D.** *Environmental psychology for design.* 2nd Edition. Canada : Fairchild Books, a Division of Condé Nast Publications, 2012. ISBN 978-1-60901-141-3.

[4] **Rocco, R.** *Laguna di Venezia. Valorizzazione aree umide.* Architettura del paesaggio. 25, 98-101, 2012.

[5] (Not specified) *Promenade tra città e mare*. Il progetto del paesaggio contemporaneo. Paysage. 6, 54-57, 2010

[6] ***Hausbald, K****. Porto 2002: Promenades on the Douro.* Topos. 41, 39-45, 2002

[7] **Andreas, A.** *A railway park for the Ligurian Coast.* Topos. 53, 36-39, 2005

[8] **Person, A.** *Malmö moves closer to the sea.* Topos. 41, 26-33, 2002

[9] **Baroni, L.** *Waterfront fluviale. L'anima litoranea de Lisbona.* Architettura del paesaggio. 17, 46-51, 2007.
[10] **Brambilla , G., y Maffei, L.** Perspective of the soundscape approach as a tool for urban space design. *Noise Control Engineer Journal.*58 (5), 532-539, 2010.
[11] **Viollon, S., Lavandier , C. y Drake, C.** Influence of visual setting on sound ratings in an urban environment. *Appl. Acoust.* 63, 493–511, 2002
[12] **Liu, J., Kang, J., Luo , T., Behm, H.** Landscape effects on soundscape experience in city parks. *Science of the Total Environment.* 454–455, 474–481, 2013.

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The Acoustics of Underground Places in Campania

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Abstract
The interest for the acoustics of underground places is increasing in recent years. The charm of the place and properly equipped shows generate success and appreciation from the audience. In Campania there are several caverns used for shows. The caverns are: Pertosa and Castelcivita, in South of Salerno. The show in the cavern of Pertosa is the "Inferno di Dante" while the show in the cavern of Castelcivita is the "Myth of Orpheus and Eurydice". During the shows the tourists are accompanied along the path by an actor that explains the scene view in that place. The caverns are karst origin, and the touristic paths have length of 1.0 km inside the earth with stalactites and stalagmites.
This paper describes the characteristics karsts and acoustics of the places in which the shows are organized.

Keywords: Underground places, caverns, shows, acoustics

1. Introduction
The caves, with their wide halls, endless depths, stalactites and stalagmites that form natural surreal sculptures, suggest an unknown world where, according to fables and legends, fairies, witches, elves and goblins lived in. On the other hand, for the primitive man, that he lived them millions of years ago, they represented the entry of mysterious underground worlds.
Today some of these caves are used for public shows, in particular: since the second half of XVIII century in France, the royal Superintendent of province organized a party, with banquet, music and dance in the caves of Osselle (France) lighted with hundreds of torches; around the 1778 choral groups climbed close to the Peak Cavern (England) in order to offer their songs to famous and wealthy travelers. In 1822 the caves of Postojna in Slovenia were opened to the public for dancing parties with popular music. Later the idea of using caves for public shows, particularly in the summer season, it is consolidated in several parts of the world. In France, concerts of popular music and jazz take place in the Cave of Aven Armand, while in the large Cave of Lombrives there are many forms of entertainment and services for ceremonies. In the Caves of St. Michael, in Gibraltar, dating about 40,000 years ago, a large room of the cave is fitted out as an auditorium for prose, ballet and symphonic music, and it is open all the year.
In Italy, despite the presence of many karst caves, their use for public shows involving real aspects of representation is not widespread. In Campania, the Caves of the Angel in Pertosa and the Caves of Castelcivita, both in the province of Salerno, host for several years entertainments that owe their success to the particular acoustics and the mystery that they evoke.

2. The Caves of Angel

The Caves of Pertosa, called also “Caves of Angel”, are located in the heart of National Park of “Cilento e Vallo di Diano”. They date back to 35 millions of years ago and they are the only caves to be crossed by an underground river, the Tanagro, whose course was deviated at the beginning of ‘900, for the purpose of energetic uses [4]. In this way the entry of the caves is been flooded, so as to allow the access to the interior only by suggestive boats carefully led by expert guides who, standing on the bow of the raft, moved them with the help of their hands and an iron rope stretched horizontally on the middle of the water course. (Figure 1).

The cave of Pertosa looks like a large gallery, 15m wide and 20m high, which opens, at about 70 m above sea level, at the foot of the “Intagliata” Mountain. The enormous entry seems like a great mouth of the mountain, hidden among ferns, ivy and moss (Figure 2).

The geo-morphological characteristics of the Caves of Pertosa inspired, several years ago, a natural setting for shows. In this place were also made some scenes of the movie "The Phantom of the Opera" directed by Dario Argento. Now the performance of the show "Dante's Inferno" takes regularly place. On a route of about 1 km, viewers are accompanied by groups at several stations, each of which takes place in a topic related to a circle of Dante's Inferno. The show takes advantage of the natural scenario of the caves. People, divided into groups of 30 units, "live" the caves along a route suited to the spectacular needs, and, interacting with the actors, become themselves the characters of the opera of the poet. The entire show-route is made even more emotional by a suggestive artistic lighting, particular special effects and attractive tridimensional reconstructions. Led by Dante himself, people come into the tunnels of the mountain and, cave by cave, they meet Paolo and Francesca, Ulysses, Minos, Count Ugolino and many other characters of the first canticle of the Divine Comedy (Figure 3). The audience moves within the scene and meets the characters. There are not papier-mâché scenes and backdrops, but a prehistoric scenario with 35 million years.

Moreover, for fifteen years, a summer festival of ethnic music, the "Negro Festival", takes place in the music antrum, at the entry of the caves (Figure 4). The name comes out of the river that flows into the inside of the caves, by which it is possible to access in order to enjoy the charming view of stalactites and stalagmites. The Negro river offers an appropriate title for this festival, which has become an important and expected time of celebration and multiracial exchange. Created in 1996, it welcomes and accommodates about eight thousand people immersed for three days in the uncontaminated nature dominating the entire complex. The square and the area of the Caves of Pertosa are transformed into a citadel of music and culture, where concerts, exhibitions of photography and contemporary art, music workshops and ethnic dance stages are organized. The program offers many different activities, all in the name of the interaction between music, art, culture and nature.



Fig. 1: A view of the boarding platform

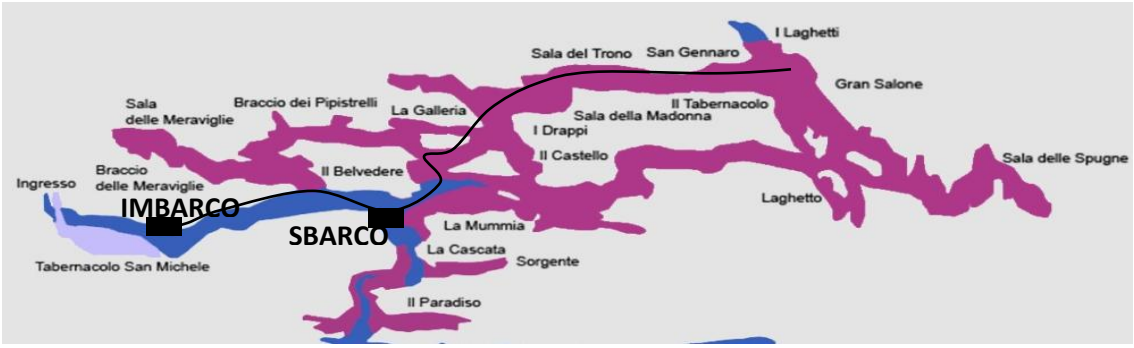

Fig. 2: Caves of Pertosa _ Planimetric portion with the route taken by the visitors (black line)

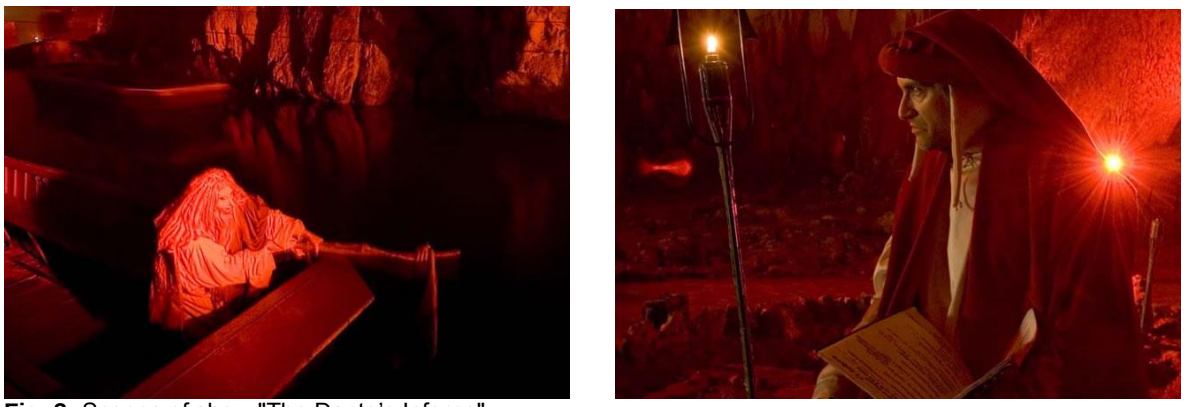

Fig. 3: Scenes of show "The Dante's Inferno"

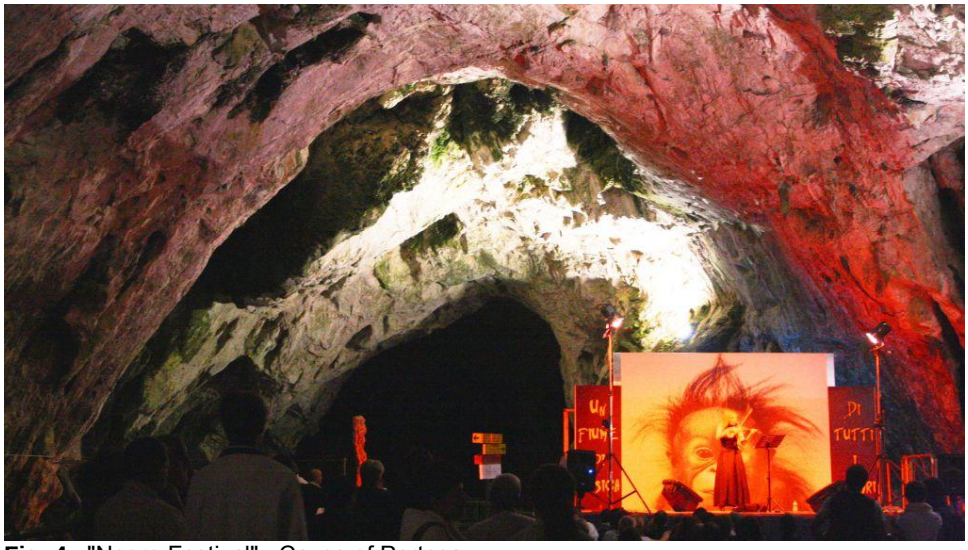

Fig. 4: "Negro Festival"_ Caves of Pertosa

3. The Caves of Castelcivita

Inhabited in prehistoric times and known since antiquity, the Caves of Castelcivita are one of the most important and extended underground karst complexes of Southern Apennines. Next to National Park of "Cilento e Vallo di Diano", at the foot of the mountains of Alburni, just elevated above the Calore river, these caves consist of 1700m of tourist routes, on a total of about 5000m. [5]

The underground was unknown until the end of the '800; in fact in the 1899 there was the first adventurous and tragic exploration of the caves by two brothers, Francesco and Giovanni Ferrara, who entered with the oil lamps in the early 300m of the cave and there they got lost in the tunnels and died. The entrance was different than what it is today, just more than a hole visible from the thick vegetation that covered it. The people believed that the entrance was the devil's mouth, from here the name "Devil's Cave", because often from the hole came out flows of fire and smoke due to the combustion of the gas contained inside.

The Caves of Castelcivita originated because of the erosive and corrosive action of the karst waters on the fractured cretaceous limestone mass and, from a morphological point of view, they consist of a main branch of large size, where are connected a series of secondary tunnels, in different ways and at different levels. The caves are a series of galleries, salons, narrows and wells, which chase each other, overlap, sink in leaps and abysses where the horrid and the fantastic alternate in a rainbow of colors. The entrance to the caves, at the foot of a limestone wall, opens up onto a large square, on the western slopes of the Alburni mountains, on the right side of the Calore River, about 94 m above sea level, and it is characterized by an opening, partially enlarged, enclosed by an iron gate, beyond which the ceiling rises up and a sense of dismay affects each one. Proceeding along a gentle slope for about 20 meters, there is the first cave, called "of Guano", 40 m long, 26 m wide and 12 m high, which until years 50-60' was the ideal retreat for bats. Just beyond there is the "Castle room", characterized by a group of stalagmites resembling an ancient medieval castle at the top of a hill. At the end of this tunnel, the route branches into two cavities, heading south there is the room known as the "Wells of Carbonic Acid", then sixty meters over that one called "Bertarelli Room", where the majesty of columns and stalagmites and the quantity of stalactites contribute to the creation of a wonderful



Fig. 5: Caves of Castelcivita _Planimetric portion with the route taken by the visitors (black line)

scenario. This room is more than 40 meters high and presents a moltitude of concretions. Here another branch rejoins the walkway 70 m ahead.

In the extraordinary, unique and hypnotic scenario of the Caves of Castelcivita takes place the emotional mythological fable "Orpheus and Euridice"; it comes out an exciting theatrical-literary adventure where, due to the magic background, a young Orpheus crosses the Hades searching his one and true love. At the entrance of the caves the audience was welcomed by the god Apollo, who offers to lead them in this journey. The people are divided in groups of about 40 units to start their journey into the realm of the afterlife. The public continues its journey until it meets Charon (Figure 6); then it comes to the dwelling of the famous “Erinnys” who try to block the road to travelers with a simoniacal dance, but also them, deeply moved, let them pass. Apollo leads the travelers along the route, leading them to the presence of Pluto and Proserpina, whom Orpheus (Figure 7) asks, with a poignant song, to let him carry away the loved Eurydice, and he gets it on the condition that he should never looking back until he reaches to sunlight. Orpheus accepts and, followed by Hermes, he moves towards the exit with his beloved. Then the audience come back on the footsteps of Orpheus, Eurydice and Hermes in order to come out from the realm of the dead to regain the life, but before they hear the harrowing lament of Orpheus’s head, detached from the neck by the Bacchae, wandering without rest, leaning on his lyre on the bed of the Ebro river.

This show is not simply a performance: in fact, it is a tool able to charm everyone, students, tourists and simple spectators through a well-established formula, which combines the mythological aspect of the story to the charm of the place, which wisely blends music and beautiful singing with a modern and understandable language, which joins special lighting effects with video and multimedia screenings, transferring unique and absolute emotions to the audience. Moreover, the show is sung, played, danced and mimed by the actors in a superlative way. The show is played along a route of approximately 1 km, characterized by the succession of large cavities adorned with huge stalactite-stalagmites groups and extraordinary morphologies of concretions that almost completely cover the ground.



Fig. 6: Charon the ferryman



Fig. 7: Orpheus and Euridice

4. The acoustics of the caves

The use of caves for public events has prompted acoustics experts to study these underground places, in order to discover the acoustic characteristics considering the parameters used for the characterization of auditoriums. Recently, in the caves, several surveys with modern instruments are been carried out [1] [2]. Indeed, to understand what are the properties of the sound field responsible for the sound perception in these environments, a model of analysis and description of the sound would required, but in literature there are not objective parameters for this type of situation because are replicated the acoustic descriptors born to define the behaviour of environments designed for musical performances. Therefore, to describe the acoustic behaviour of the two karst complexes studied, have been used precisely these parameters; in fact, the two caves of Pertosa and Castelcivita may be treated as large areas that, although not born to accommodate musical shows, must their notoriety, as well as the charm of the place, to the particular acoustics that can make these places fascinating and enveloping, but at the same time steeped of huge mystery.

5. Measurements methods

Because of the particularity of the places it was impossible to use the complete equipment, as recommended by ISO 3382 [3]; the responses to the explosion of balloons were recorded by means of an omni-directional microphone equipped with a preamplifier 01 dB PRE 12 H, connected to the interface of a sound analyzer, connected in turn to a portable notebook, all powered by a battery. Subsequent processing of the recorded impulses provided the acoustic parameters for the characterization of the environment. Because the audience, both during the show Dante's Inferno (Caves of Angel), and during the show Orpheus and Eurydice (Caves of Castelcivita) does not take up a fixed position to attend the performance, the relationship between stage and audience is different from that of a typical theater. For this it was necessary to place the source and the receiver randomly, but nevertheless at the height of the head of the viewers. In the study, only the places of greater size and permanence were monitored (Figure 7 and Figure 8).

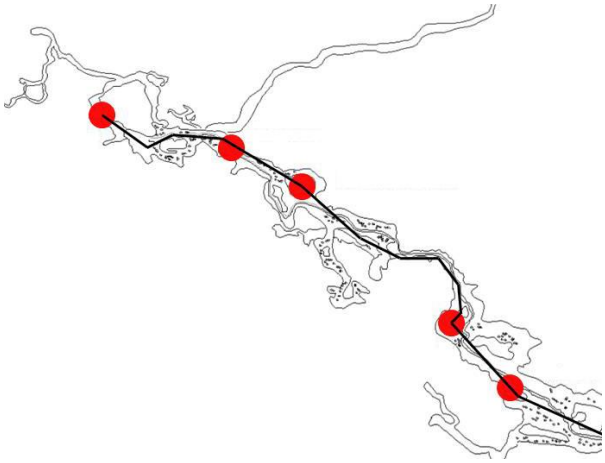

Fig. 8: Caves of Castelcivita _Planimetric portion with the localization of measurement points (red points) and the route taken by the visitors (black line)

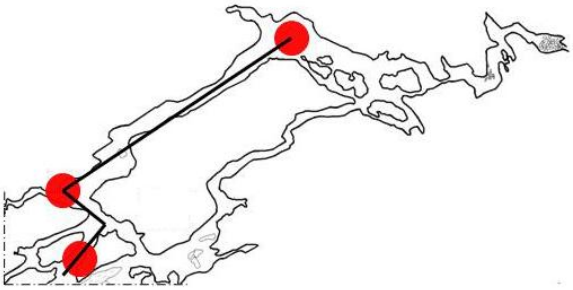

Fig. 9: Caves of Pertosa _Planimetric portion with the localization of measurement points (red points) and the route taken by the visitors (black line)

6. Conclusions

The measurement campaign has provided encouraging results in terms of descriptor indexes; almost all of the rooms showed, in fact, values in accordance with the optimal ones, except some of them where, although not reaching these good values, there is not however an excessive reverberation.
The caves are underground places, but they can be, likewise for theaters, auditoriums and concert halls, environments suitable for holding performances and shows; furthermore, compared to the latter, the underground places have the advantage of contributing to the achievement of extraordinary events due to the natural scenario as background to the representation. The audience lives a singular experience that induces special emotional effects and to transform the viewers from simple spectators in the real protagonists.
For both analyzed karst complexes, people become the key point of the representation. They are spectators and actors at the same time because, following the actors along a route, they become an integral part of the show itself.
Both caves are limestone, formed by porous material absorbing sound, while the stalactites and stalagmites being periodic surfaces in the environment allow the diffusion of sound in an optimal way. This explains why these places are characterized by a good sound diffusion. The diffusion, however, is relative because the sound generated in a room spreads only in its immediate proximity, without reaching the farthest rooms; this phenomenon could be used to optimize the performances, because at different points of the caves may be performed simultaneous shows.

References

[1] Iannace G., Trematerra A., Ianniello E. _ Computer Simulation Of The Acoustics Of The Ear Of Dionysius (Syracuse-Italy) In Order To Evaluate Objective Descriptors Of Speech Intelligibility - Aia-Daga 2013
[2] Iannace G., Trematerra A. (2013) - "The Acoustics of the Catacombs of San Callisto in Rome" Vol.134, No.5, Pt.2, November 2013- 166th Meeting: Acoustical Society of America. Issn: 1939-800x
[3] ISO 3382-1: 2009(E) Acoustics: Measurement of room acoustic parameters Part 1: Performance spaces
[4] De Paola G. “La grotta di Pertosa, paradiso di meraviglie”, Jovene, Napoli, 1939
[5] Boegan E., Anelli F., De Angelis M. “La grotta di Castelcivita nel Salernitano”, 1930

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THE ECO-ORIENTED REDEVELOPMENT OF THE OPEN SPACES: THE CASE OF JUAZEIRO IN BRAZIL

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Abstract
The redevelopment of open spaces contributes to the achievement of urban quality, especially in the presence of unfavorable microclimatic conditions or when the ecological balance is compromised. This plays a strategic role in the activation of architectural, environmental and social revitalization processes. In accordance with this premise, the authors propose a reflection eco-oriented transformation on strategies for the open spaces of the city of Juazeiro, in the Bahia region of Brazil, starting from the identification of the variables that affect the control of comfort in its various declinations. In fact, the natural areas in contemporary cities are ever smaller in their size and density, and insufficient to ensure benefits that come from nature for a physical and mental wellbeing of the urban population.
There is a need to integrate the issues that could be called "acquired", that is, related to the accessibility of the site in relation to its specific functions, issues related to security, lighting and cleaning, with further areas of reflections due mainly to environmental sustainability. In this sense, consider the creation of open spaces in the city of Juazeiro would mean reconsider, in a sustainable key, the social functions, the ecological contribution addition to aesthetic and economic enhancement which are resulting.

Keywords: quality of open spaces, comfort, green areas.

1. The case study of Juazeiro: the urban context (Rossella Franchino)
To intervene on the development of the urban territory in order to find an alternative to the model that has emerged in the twentieth century, all planning and redevelopment of open spaces needs to be addressed with particular attention to the control of a comfortable environment so that these places can be seen as important attractors of the urban context. In this perspective, the vision of urban territory changes, with it being conceived as a structure with a dynamic balance achieved through the technological control of complex functions. Such a framework should be set up, therefore, as a safe enjoyable environment with high standards of quality and special attention to the social dynamics and relationships that develop in the area. The urban territory must be conceived as a complex tissue in which the boundaries between the artificial and natural environment cannot be seen and in which each process is controlled so that its impact and consequently, the irreversible degradation induced, is the minimum possible in relation to the constraints of the process.
The urban territory, which creates an “urban ecosystem”, with its complex of interrelated structures and relationships determines its own path in the surrounding environment which is primarily determined by the huge, interpersonal and informational energy flows that characterise such a system. Its is therefore very important to orient the transformation processes as controlled interventions of

these flows so that the irreversible impact is contained as much as possible. The qualitative and quantitative description of the flows, i.e., how people move, how information is exchanged, how they interact, how energy uses are sustained, how supplies and services are organized, is used to characterise the urban environment as well as to speculate interventions that have the goal of making these flows compatible with the sustainable transformations of environment in which they are located. Thus, the aspects that must be taken into consideration for the comfort control of urban open spaces are those of mobility and viability, of the greenery and furnishings, of plant networks, of social spaces in order to achieve the objectives of qualifying life, protect health, increase safety, promote the relationships of the population.
Starting from these considerations, we consider the eco-oriented transformation of open spaces in the city of Juazeiro in the northeast of Brazil, identifying the main strategies aimed at controlling comfort in its various forms. Juazeiro, in the State of Bahia, runs along the São Francisco river (fig. 1) in front of the city of Petrolina and constitutes an urban reality of particular importance from an ecological and natural perspective. The São Francisco river, which marks the state boundary, is approximately 830 km long with a reservoir of approximately 641,000 km² and plays a very important role in the urbanization of Juazeiro and Petrolina, which are situated on its banks.



Fig. 1: Urban canal that flows into the São Francisco river. Photograph by Matteo Nigro.

The town of Juazeiro, built just over a hundred years ago and thanks to the presence of the river is on a strip with a very high urbanization. It is surrounded by tropical forest and unspoilt Caatinga biome which is an exclusively Brazilian biome (characteristic of the region called Sertão), which means that much of its biological heritage cannot be found anywhere else on the planet. Caatinga means “grey forest” and can be explained by the vegetation that characterizes this forest, making it look dry for most of the year, with no leaves, while becoming green in the winter, in the rainy season. The Caatinga occupies an area of about 750,000 km^2 and is dominated by various types of dry vegetation, a rugged landscape with grasses, shrubs of about 3-7 m tall, deciduous, with many thorny plants, such as legumes, interspersed with other varieties such as cacti and bromeliads. [1]
The reference climatic context is semi-arid, typical of inland northeast Brazil and, therefore, characterised by high temperatures and a dry climate for most of the year. The open spaces currently present in the city of Juazeiro are characterised, in most cases , by the presence of vegetation almost

always spontaneous and water, in the form of small superficial channels that cross the city transversally.

2. The uses and potentialities of green areas in Juazeiro (Matteo Nigro)

One of the most existing worries when dealing with the issue of urban planning and architectural design in the contemporary city is the space allocated to urban green spaces.
Today, in the context of this reference case study - a city in the northeast region of Brazil, the urban population is more aware of the consequences caused by the accelerated growth of urban centers. This uncontrolled growth has resulted in, among other events, the lack of space for recreation in the open air and increasingly worst air quality in the medium and big Brazilian towns, such as the case of the city of Juazeiro-Bahia.
In this territory, the loss of the remaining areas with native vegetation, stimulated engineers and designers involved in the production of urban spaces, to act with more attention to the quality of the design of public green spaces, in the process of construction of municipal plans and programs.
The research that is being developed on the green areas of Juazeiro has as main objective to stimulate a critical view on the current state of the areas with vegetation found in the urban landscape and the lack of appropriate spaces for leisure, sport and contemplation of nature; these latter are only three of the many possible activities to do in contact with nature.
It is relevant that the green regardless of the geographical context where is located, it helps to maintain a healthy physical and psychological balance of man and offers moments of relax in contact with the elements of nature. In addition, there is a significant aesthetic function of the natural elements present in the city that elevate of much the quality of the urban landscape; in the considered case study (Juazeiro-BA), green as an element which constitutes the urban landscape, plays a role of connection with the principle of contextualization. To explain this principle which is directly associated with climatic and environmental conditions of Juazeiro, we use the example of native and endemic plants that are resistant over time to the type of semiarid climate.
The proper use of green areas suited to the context, it becomes the basis to fundament any attempt of action for cohabitation with the semiarid climate.
In addition to the uses and the social, aesthetic, economic and ecological functions of the green, Camponogara et al. [2] introduce the theme of human health related to nature: "of a general way, we can recognize the complexity that characterizes the environmental crisis and the nearness with the branch of health, starting with a visit to the many spaces and actors in the extended social structure."
In this sense, the importance of the connection health-nature becomes an increasingly cited theme, especially with a view to enhancing urban green spaces and to preserve the existing vegetation in the cities. Over the last few years, even in the context of the north-east of Brazil, where is located the city of Juazeiro, in addition to the destination of green spaces which are contemplated in the projects of architecture of the city, both the technical and civil society have developed a greater perception of the environment due to the benefits that these spaces reserve for the population.
According to Loboda and De Angelis [3], "the green areas have become the main icons for the defense of environmental degradation and the little space which is intended for the green in the urban centers." To exemplify this statement we can cite an example: thinking in terms of urban environment constraints or urban ecology, means in the common sense immediately make reference to the green, the native vegetation, the trees, the parks, all areas which have assumed a symbolic representation in defense of nature, especially in the city.
In the perspective of urban sprawl of the city of Juazeiro, the first results of this research show that the civil society is developing a greater awareness of environmental issues, and especially a recognition of the importance of green in the city, these factors make it possible the creation of sectoral public policies for the planning of squares, public gardens and parks in urban centers.
Currently in the city of study, there are several open public areas without a due use of destination but with a potential of urban green areas, dictated by the configuration of the spaces that are placed in strategic points of the city; the lack of space for the practice of open-air gym, jogging and other modality of sports and entertainment promotes the little contact with nature in the city and does not represent a form of action to establish a cohabitation with the intense heat in the region during most of the year.
Specifically, in Juazeiro does not exist a municipal public park; in the city center there are just a few squares fitted with trees which constitute a shady shelter to defense of strong end direct sunlight; the presence of trees in the urban road system is scarce and not contextualized, with exotic species not adapted to the type of climate and with a low standard of resistance. The figure 2 shows the typical structure of a city street not equipped with trees.
Given the conditions of the case study and the basics for understanding about the importance of green areas in the city, it can be summarized the main factors which would justify the actions directed to the realization of green areas: the first is the intent to make general improvements to the quality of life of the urban population; the second factor is the need for open spaces for recreation and leisure,

currently almost absent in the urban area; the third is the advantage of increasing the economic value of the properties next to green areas and the value of the city in general; the fourth is a legal obligation to environmental preservation of the remaining natural areas and areas of preservation of water resources (such as APP-Areas of Permanent Preservation), these last present in city of Juazeiro along the margins of the river São Francisco; the last factor identified is that of the practice of socialization that it needs to public, open and equipped spaces.



Fig. 2: Lack of trees in the district Quidé in Juazeiro-Bahia, Brazil. Photograph by Matteo Nigro.

3. Urban open spaces: environmental - technological issues (Caterina Frettoloso)

The planning of unbuilt spaces as well as the prospect of requalifying existing open spaces, often disused due to neglect or absence of a plan which clearly describes the forms of use, poses a number of questions about not only the formal and functional aspects of the project but also to the conceptual ones, i.e., “to some invariants - nature, art , memory, society - that from time to time, prevail and give value to the proposed interventions” [4]. Interpretive criteria related to the role that open spaces have traditionally held within the city system as nodal elements, not only in relation to the usability and comfort, but also to cultural identity , thus giving an added value to the urban fabric.

A value that is also expressed in terms of the capacity, of these open spaces, to play a significant role in the activation of the revitalization processes of the city, both within an architectural-environmental perspective as well as a social one, especially in contexts in which the environmental, social and economic balance is compromised. The open spaces of the city of Juazeiro are configured, in most cases, as urban spaces devoid of infrastructures, both natural and artificial, which support their use. They are mostly public areas even if, in the case of the abandoned ones, it is not always easy to identify the owners (public/private). Undoubtedly, the city of Juazeiro has been affected by very similar socio-spatial dynamics to those identified by Memoli for Salvador Bahia, “standardized policies, cultures trivialized by the tyranny of the demand for land, fragmented or overlapping functions at a territorial level” [5] that have not therefore allowed for a balanced urban development between solids and voids, between public and private, between the points of transition and meeting places.

The climate of this area of Brazil, semi- arid and characterized by high temperatures and low rainfall, is the main obstacle to the use of open spaces, not only as comfortable places in which to spend leisure time, but also, as a transition space to be used in a short space of time and safely. The almost total lack of vegetation which was discussed in the previous section is mainly due to the particular climatic characteristics of Juazeiro and is one of the factors with the greatest impact on the lack of suitably designed open spaces.

The role of vegetation in the context of requalification strategies aimed at the livability of those places which currently seem to be urban voids is a very delicate aspect. In fact, from the point of view of the micro- climate, if it is true that the presence of trees, properly selected and placed in reference to the

microclimate of the area, would contribute to the creation of shaded areas and paths channeling the flow of air and increasing humidity, on the other hand, the equally thorny question of the proper fluid intake to ensure their survival arises.



Fig. 3: Disused railway line. Photograph by Matteo Nigro.

The organizational patterns of requalified open urban spaces should meet specific functional requirements dictated by the collective way of life, more and more oriented towards increasing flexibility that does not mean, as often occurs, the lack of a design choice. It means working on the performance characteristics of spatial elements in an integrated approach to the project where the technical and functional aspects are interwoven with social and environmental issues. This will make it possible to integrate the issues that could be called “acquired”, i.e., related to the accessibility of the site in relation to its specific functions (also with respect to different types of flows that cross and overlap the open space), to the issues associated with security, lighting and cleaning, with further areas of consideration being mostly due to environmental sustainability.
In Europe, the comparison with the quality of life in its most all-encompassing meaning, has addressed the interests of local governments and planners, on the one hand, to qualify (and quantify) the contribution of the greenery in micro-climatic and ecological terms. While on the other, to work on the integration - systems engineering function of systems with high technological content (energy production systems, infrastructures for sustainable mobility, performing surfaces).
Proposing an approach that shares these strategic principles requires a careful analysis of the oriented status quo in order to highlight the potential of the urban environment trying to recover those elements that are critical points of the city. In this context, it is possible to consider, for example, disused areas or infrastructures that are often characterized by a strong degradation of the environment and that can be interpreted as strategic nodes for the redevelopment of open spaces. The city of Juazeiro is no exception in this sense, it is worth considering the disused Alagoinhas - Juazeiro railway line which crosses the city, in some sections parallel to the main traffic routes (fig. 3).
Linear infrastructures offer, in fact, significant insights related to possibility to realise not only the new network of paths with a view of sustainable mobility (walking, cycling , ..), but also a type of “corridor” characterized by the inclusion of natural and artificial elements (technological systems to support the use). The concept of equipped corridor, recalling the main function of connecting, allows to introduce,

from a methodological point of view and design, the ability to put into the system and connect more open spaces and significant places of the city.
In fact, as part of a redevelopment strategy aimed mainly at improving the urban quality of Juazeiro, the reuse in an eco-technological context of these disused linear infrastructures could provide significant input oriented to the appropriate use of open spaces understood in the widest sense of shared sites.

4. Urban open spaces: ecological issues (Raffaela De Martino)

“In anthropised landscapes, the urbanization and infrastructuring of the territory has determined, together with the activities of agricultural mechanization and control of flowing waters, a tendency towards the simplification and homologation of the landscape” [6].
The phenomena of settlements, infrastructures and manufacturing, have therefore produced profound alterations to the ecological structure of the territory causing fragmentation of natural and/or semi-natural areas, which have lost with the passage of time the elements of contiguity and have been depleted of their environmental features. The phenomenon of fragmentation causes, from an ecosystemic point of view, a compromise of the “structure” and “function” of the elements of the anthropised landscape. The “structure” refers to the spatial characteristics, therefore, shape, size , number of habitats that make up the landscape pattern, while the “function” defines the relations (energy flows, transfers of material) that develop between the elements that make up the environmental system under consideration. A system capable of keeping a balance of structure and function is called stable. Stability, which is a property related to biodiversity, allows the system to react to any kind of natural and anthropogenic disturbances. Fragmentation is a strong threat to biodiversity: man-made areas and artificial linear structures (roads, highways, railways, power lines) in fact, represent low permeability barriers to the movement of many species that may be extinct either due to the reduction of the surface of the remaining habitats available, or because the increase of their isolation. The urban landscape is the place where this process has occurred more prominently .
“The city, from an ecological point of view, can be considered a complex artificial ecosystem that like any other ecosystem consists of habitats with different degrees of naturalness: artificial habitats (buildings, industries, infrastructures), semi-artificial habitats (gardens, trees, urban allotments), semi-natural habitats (urban forests, parks). The urban ecosystem degrades seamlessly from the city centre towards the peripheral area , blending in agro- ecosystems and natural ecosystems” [7].
Semi-artificial and semi-natural biotopes, in particular, can play a crucial role within the city in terms not only of usability and comfort, but also, from an ecological point of view.
“Green areas are, in fact, important habitats and valuable ecological niches for the protection of biodiversity in the city. The survival of many plant and animal species depends precisely on the presence of natural areas even small where they can find the ecological conditions necessary to carry out their vital biological functions” [8].
In this case, the open spaces of the city of Juazeiro , as well as those of many other cities in the same geographical region and climate , are public areas that are often without a precise intended use and sparse vegetation. Urban fragmentation is evidently clear: the open spaces are completely isolated in a hostile matrix formed by the settlements and infrastructure links which are slightly permeable barriers to the biological flows. The elements constituting the environmental system are therefore completely disconnected from each other and are characterized by poor ecological/ecosystemic quality due to the low levels of vegetation and faunal biodiversity. In this situation, there is also the poor “state of health” of the river system that should be the main ecological connection system of the territory. This drainage network consists of the São Francisco river that borders the city of Juazeiro and three canals that after cutting across the urban area territory converge into a single channel that flows into the river. Over the past 40 years, the São Francisco river has been the subject of a series of interventions that have fundamentally altered the ecosystemic and hydrogeological characteristics: the destruction of the forests that covered the banks, water pollution caused by urban and industrial waste, the monoculture of soy and sugar cane and the construction of seven hydroelectric power plants have contributed over time to its degradation.
The canals in the city (fig. 4) are partially covered by large slabs of stone, in the uncovered stretches, there are poor condition of the banks and the floodplains are often completely dry because of the very high evaporation rate that exceeds the water supply coming from the rain. In the design and/or requalification phase, in order to ensure the ecological functions of the urban green spaces, it is necessary that they are characterized by an adequate environmental quality and above all that they are connected to each other. This means ensuring a network of elements that can be useful to maintaining an appropriate level of biodiversity through the presence of connection and continuity elements between the physical and functional areas, both urban and peri-urban. It is obvious that these conditions, in the case of the open spaces of the city of Juazeiro , are not satisfied: this indicates the need to prepare a series of environmental measures to improve, on the one hand, the regeneration of the already compromised ecosystems, while the other, the reconstruction of the

connections between the natural habitats and remaining pockets of vegetation with a focus on protecting them from the São Francisco river and the existing channels. The environmental requalification of the area should also aim to restore the balance between the urban and hydrographic network. This will be possible if a sufficient level of quality is restored to the water and if the cemented stretches are re-natured, thus producing positive effects both from an ecological as well as perceptive and use points of view.



Fig. 4: Canal in Juazeiro. Photograph by Matteo Nigro.

Bibliographical References

[1] FRANCHINO, Rossella; AMORIM, Miriam; NIGRO, Matteo. *Le reti ambientali come incontro tra due complessità-Environmental network as a match between two complexities.* Napoli: La scuola di Pitagora editrice, 2011. Collana Fabbrica della conoscenza, numero 11. ISBN 9788889579411.

[2] CAMPONOGARA, Silviamar; KIRCHHOF, Ana Lucia Cardoso; RAMOS, Flávia Regina Souza. *A systematic review about the scientific production with focus on the relation between health and environment.* N° 13. Rio de Janeiro: Ciência & Saúde Coletiva, 2008, p. 427-439.

[3] LOBODA, Carlos Roberto; DE ANGELIS, Bruno Luiz Domingos. *Áreas Verdes Públicas Urbanas: conceito, uso e funções.* Guarapuava, PR: Ambiência - Revista do Centro de Ciências Agrárias e Ambientais. 2005, vol.1, p. 125-139.

[4] LATINI, Luigi. *Spazi aperti urbani. Percorsi progettuali e metodo di lavoro di tre progettisti contemporanei*. In FERRARA, Guido; RIZZO, Giulio; ZOPPI, Mariella; (a cura di). *Paesaggio: didattica, ricerche e progetti (1997-2007).* Firenze: Firenze University Press, 2007. ISBN 978-88-8453-646-4 (online), ISBN 978-88-8453- 645-7 (print).

[5] MEMOLI, Maurizio. *La città immaginata: spazi sociali, luoghi, rappresentazioni a Salvador de Bahia.* Milano: FrancoAngeli, 2005. ISBN 9788846467355.

[6] PAOLINELLI, Gabriele. *La frammentazione del paesaggio periurbano*. Firenze: Firenze University Press, 2003, p. 17. ISBN 88-8453-070-9.

[7] MININNI, Mariavaleria. *Ecologia urbana.* In AA.VV. *Costruire sostenibile*. Firenze: Alinea Editrice, 2000, p. 55. ISBN 9788881254545.

[8] CHIUSURA, Anna. *Verso una gestione eco sistemica delle aree verdi urbane e peri-urbane. Analisi e proposte.* Roma: ISPRA Settore Editoria, 2010, p. 31. Rapporti 118/2010. ISBN 978-88-448-0386-5.

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LIVING LANDSCAPE IN THE ARCHAEOLOGICAL SITE "LA BASTIDA DE LES ALCUSSES"

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Abstract
The priceless landscape of this Iberian settlement consists in its unique site in an exceptional natural environment on a mountain ridge called "La Serra Grossa". Although the site's degree of conservation is very good, the basements of the buildings are the only structures conserved in situ and similar to what occurs with other deteriorated architectural artefacts, reading the volume of the buildings is difficult based solely on the conserved ruins. In addition, the itinerary conditions in this wild natural setting make it necessary to develop resources which provide an architectural interpretation and in an overall sense, define the meaning of the visit.
The main objective of this intervention has been to contribute in a progressive way to the conditioning and sustainability of this archaeological site to improve its visits, stimulate its appreciation and include new groups of visitors. The implemented actions have contributed to the progressive definition, conditioning and enjoyment of the route and the landscape by making use of a site boundary system and several tactile accessibility devices which did not exist until now. At the same time, they enhance the experience of the specific qualities of this natural setting, aromas, temperature, irregularity and variety of the environmental conditions among others, as stimuli which encourage a significant and unforgettable haptic perception for some visitors such as the case of persons with visual disabilities or children.
The tactile representation of this settlement in its natural context represents an innovative initiative and solution in its role as a means of useful communication for diverse audiences and particularly for the above mentioned groups.
The main value of this intervention consists in its contribution to improve the communication and accessibility to the cultural heritage, especially the rich archaeological heritage of the Iberian age (6th - 1st Centuries B.C.) which is little known among the general public.

Keywords: interpretation, accessibility, design, cultural landscapes, archaeological site

1. The Iberian Settlement of Bastida de les Alcusses: Value and Meaning

La Bastida de les Alcusses (Moixent, València) has been known since 1909. This site is an Iberian settlement occupied from the end of the 5th century BC to the mid of the 4th century BC. The Site. It is an upland site located on a ridge in the Serra Grossa mountains at 741 meters above the sea level. It is strategically located at the intersection of two natural routes of major historical significance from the interior to the coastland. The current environment of the site is a forest area with major ecological value with a pine wood and low Mediterranean scrubland. The current fruit tree cultivation in the plain have transformed many plots, but it is still possible to observe a landscape, essentially characterised by the traditional rhythm of agricultural labours with hardly any modern buildings.
La Bastida de les Alcusses is interpreted as an *oppidum* or fortified central place of a political territory. The *oppidum* is a crucial part of the settlement pattern throughout all the Iron Age in Iberia. Integrated

in their immediate environments and within the rural economy, they are the highest range of the hierarchy in the settlement pattern which, in this area, is formed by a number of *oppida* as centres of small regional territories. [1] [2] [3]. The site is a major reference for the study of Iberian culture and an exceptional case to learn about this type of settlements due to various reasons: first, it was occupied during a very short time period, not exceeding three or four generations, before it was abandoned. The conservation level of the structures is very good since there is no overlap with buildings from other time periods, and the wall itself has contained and sealed the artefacts of the occupancy in the interior. Secondly, the abandonment was triggered by a violent episode, which caused fires and pillage where the inhabitants left behind the majority of their daily life implements, tools in perfect condition and personal objects, which were discovered in situ in the excavations. And thirdly, a spacious zone of the site (approximately one third) was the object of an extensive excavation between 1928 and 1931 with a meticulous inspection method which was exemplary for that age.



Fig. 1: General Aerial View of the Site in its environment.

The settlement covered four hectares and was surrounded by a walled enclosure that followed the contours of the hilltop. This wall is some 4 metres wide and there are four gates: three located to the western area (South, West and North gates) and one to the eastern area (East gate). In its final phase of occupation there are three towers (two between the West and South gate and another larger one, by the East gate), probably because the site was under structuring before being definitely destroyed and abandoned. The gates provide access to the streets with variable widths, however they did permit road traffic, above all designed to channel the surplus crops and commercial goods. The organisation of the buildings has been structured along a central street which crosses the entire settlement and several perimeter roads next to the wall sections. Other nearby perpendicular streets organise lateral areas and spaces without buildings laid out as squares. There was a large granary where the excess agricultural goods were stored and houses of diverse size and complexity which were organised in neighbourhoods.

La Bastida was abandoned around the third quarter of the 4th century BC following a violent episode with other Iberian groups of the area. The extensive excavations carried out by the Museum of Prehistory in Valencia since 1928 and the fact that its inhabitants abandoned the settlement leaving a number of daily life implements in there make this site the best example for an understanding the internal organisation of an Iberian oppidum during the 5th and 4th centuries BC. The causes of its

destruction and abandonment are still subject to doubt and controversy, however they must be placed in the context of the activities and conflicts which arose between specific Iberian groups in their competition for resources.
The significance of the site is extraordinary. It was declared a Historical Monument in 1931 because of the size and outstanding quality of the upstanding remains and finds. The latter include Iberian inscriptions on lead tablets, bronze figurines, most notably the so-called Moixent Warrior, and a large number of iron tools and pottery. Today, the Museum of Prehistory of Valencia continues its research activities at the site with extensive excavation, restoration and educational projects around the Valencian archaeological heritage. It is open to the public all year round and there are guided visits. The objects recovered in the excavations are on display in the Museum of Prehistory in Valencia, although the archaeological museum in Moixent also exhibits a selection of findings.

1.2 Context of the intervention: conservation and use status

The site is located in a relevant landscape context, in a mountain area with a high ecological value surrounded by an agricultural environment devoted to grape cultivation. The plots are the property of the Town Council of Moixent which has ceded their management and the implementation of the research projects -archaeological excavations and laboratory to the Museum of Prehistory. The museum develops educational and experimental archaeological projects - simultaneously with the consolidation and the restoration of the structures for their enhanced experience and their inclusion in order to revitalize the local tourism industry.
Although the site's degree of conservation is very good, the basements of the buildings are the only structures conserved in situ. Similar to what occurs with other architectural ruin artefacts, reading the volume of the buildings is difficult solely based on the observation of the conserved ruins. Accordingly the Technical Team from the Museum of Prehistory has implemented resources to facilitate this architectural interpretation to visitors in various work phases since 1990. The main criteria has been a deep respect for the valuable landscape of the settlement in its particular site and the protection of the heritage of these ruins with minimal invasive interventions.
Since the sole conserved structures are the basements of the walls (both in the houses, walls and gates), always made of stone masonry, the consolidation works have been focused on their protection in various phases, by means of their partial reinforcement with masonry screens, taking into account the reversible nature of the actions. In this way, they aim to facilitate the spatial interpretation and prevent its progressive theft with the replacement of the floors at the original level. These actions were implemented in several phases between 1990 and 2010, in the entire West front of the wall, including the three gates (North, South and West) and in five house complexes.
In the preliminary studies conducted to carry out this project such as the analysis and overall action, we highlight the following issues:

- To improve the horizontal accessibility and the walking obstacles in the entire complex and especially in the zones of interest which help to define the route
- The safety in several traffic zones or premises which proved to be especially conflictive since they involve exceptional sites.
- To enhance the potential scenic value of its interior and exterior landscape.
- The identification of the built and/or consolidated complexes as well as the outstanding milestones.

2. Objective and relevant elements of the intervention process

The primary objective of this intervention has been to make a progressive contribution by means of design [3], to the development of the refurbishment and the sustainability of this archaeological environment and the improvement of its visit, by promoting its appreciation and the inclusion of visitor groups, such as the case of persons with a visual disability. The developed project implemented the concept of creative heritage management [4], in the framework of strategic planning in which the sustainability of the cultural site is linked to the quality of the visitor's experience, the diversification of the financing sources, the reinvestment to improve the heritage as well as contribution to the local development and job creation.
The criteria of the research team in charge of this archaeological complex have shown a major sensitivity towards the priceless landscape of the settlement in its particular site and the protection of the existing artefacts with minimal invasive interventions. This fact combined with the limited economic resources available made it necessary to establish several priorities and in the end, the scope of the original project had to be cut back.

Guided by these parameters, the decision was made to develop and implement simple resources which permit the enhancement of knowledge, the identification of the complex's perimeter area, the safety conditions and in turn, create a comfortable context to enjoy the magnificent scenic views. For this purpose, several site boundary elements were designed which limit access to the site zones, specifying the transit areas and the excavation sites and they also serve as the temporary support for the visitors. Three tactile scale-models were executed which provide new resources for the accessibility, the perception and the interpretation of the site. In both cases, the aim was to make an impact on the design options by means of forms and materials [5], in order to act as a mediator in the appreciation of this archaeological setting, the quality of this landscape, and visitor's exploration of the itinerary with greater autonomy.
As a relevant aspect, it is worth mentioning the difficulty of implementing this intervention in the work site, derived from the geographical location of this site in the ridge of the "Serra Grossa", without electrical lines, precarious conditions for vehicle access and works execution, the ground variations in order to perform the multiple drilling tasks as well as assuring the care of the original ruins. The soil removed in this process was used to fill in the gaps in several points of the visitor route, thus improving the ground conditions.
We highlight as an essential methodological aspect, the crucial involvement of the specialists, in this case, the archaeology team responsible for this site, in the selection of the contents for the tactile scale-models and in the assessment and the suitability of the solutions implemented by means of the simulated display images.

2.1 Description of the elements implemented in the archaeological settlement

Site boundary elements at two levels permit a different type of tracking, zoning and definition of the space which facilitated its configuration as well as the dynamic *wayfinding* in the site [6]:

- Safety and Support rails to be installed in the three zones of the settlement with steep slope changes, which required protection to hinder accidental falls: two rail sections in conflictive points of the visit perimeter (behind the panel called *Barri del Sector Sud* and *L'entorn i l'explotació agrària*) and a third rail section on an existing summit in the settlement's interior. The first sections were longitudinally dimensioned according to the minimum required space and also adjusted to the available budget.



Fig. 2: Site Boundary elements in different applications.

Several of the design considerations that were raised and solved in this site boundary include: simplicity and formal austerity, economy, resistance, low maintenance, surfaces and materials without shiny finish which contribute to their integration in the environment. The element is characterized by the oblique angle of the fastener struts which discourage climbing, the horizontal level of its front view and the height difference of the gaps which invite informal support for people of different heights.

- Continuous demarcation boundary of the work zones and/or archaeological remains in order to protect them from transit as well as frame or define the boundary of the wayfinding and the artefacts of interest. This element can be detected and followed by the white cane of blind persons and can also be used as a temporary rest for young people and children.

Accessible tactile representation supports which extend the resources allocated to the communication and experience of the site focused on the active perception and construction of the space. These scale-models contribute features of overall and partial representation of the site and the outstanding milestones along a specific route.
Three tactile scale-models have been defined and implemented as resources, available for people with visual disability and other potential users such as children in particular and the general public. They have been installed in strategic locations in the current visit conditions, which include the planimetry location data and descriptive texts in relief and Braille.
We highlight that the design feature of these scale-models has been executed based on the analysis and preliminary research for this type of 3-dimensional resource. This study has revealed the non-existence of equivalent examples of these specific accessibility resources: tactile scale-models in landscape environments and tactile scale-models for buildings and archaeological ruins. This has required monitoring the experimental and participative research process focused on users with visual disability, with the aim to determine their formal volumetric features and textures.
The three implemented tactile scale-models were manufactured in cast bronze on display tables and accessible supports. All of them include the overall representation in the same layout of the settlement comprised in the wall's perimeter, the position of each one in the complex and a compass for spatial orientation.
Each one displays different aspects and levels of information about the settlement as explained below.



Fig. 3: Tactile Scale-model of the entire Archaeological Settlement.

- Representation of the whole settlement in its environment, maintaining the shape and proportions of the Mountain ridge on which they are located. The dimensions of this overall scale-model and the selected scale were determined by the comfortable and accessible width by extending the arms and touching it with the hands. This scale-model displayed the perimeter wall in the consolidated section and in the ruined section with their entry doors, their main traffic roads, the wooded area in which it was built, the general layout of the settlement, differentiating the consolidated areas, the archaeological remains areas and the unexcavated zones of the settlement. These elements are reproduced with different texture and reliefs which are accordingly depicted in a legend which permits blind persons to previously identify them for their subsequent discrimination. In some cases such as the wooded area, geometric symbols in volume were used which facilitated their discrimination and memorization. Location: in the exterior of the wall entrance.
- Representation of House 1 reproduced in the exterior area as the interpretation centre. The scale-model comprises its relief in a ground plan in order to observe the interior layout and identify it in

relation to the consolidated section which it represents and its volumetry with the sectioned roof in a corner, displaying the construction system, its form and finishes. It is located in the central route aligned with the view of the consolidated house 1 which it represents.
- Representation of the North entry gate. The scale-model comprises its relief in a ground plan in order to observe the interior layout of this tower with the lateral surveillance benches of the entry and its volumetry in the original form. It is located in the lateral service/secondary route or the carts entrance laid out in the wall interior next to this entrance.
We especially highlight that compared with other types of representations such as drawings or photographs, the 3-Dimensional nature of the scale-model provides certain advantages: it permits the observation from different perspectives and at different levels of detail, at the same time that it facilitates a panoramic view of the whole and how the different elements that integrate it are related to each other. In addition, in the case of blind persons or with severe visual limitations, they are essential for the communication and learning of the concepts of the different scale or magnitude [7] [8] [9].

3. Living Landscape in the Bastida de les Alcusses

The project's main contribution is the enhancement of the experience and accessibility to this cultural archaeological heritage and specifically to the heritage of the Iberian Age (5th-1st Centuries B.C.) which is hardly known by the general public. The implemented resources undoubtedly improve the conditions and quality of the visits to the site and increase the socialization and integration of people with disabilities in this unknown heritage. This action is framed within the Iberian Route of Valencia called *Ruta dels Ibers de València*, in which work is currently in progress, whose aim is to increase the knowledge and improvement of the tourist use of the archaeological sites from the Iberian Age in nine inland municipalities of the Valencia province.
One of the aspects which contribute innovation to this project has been that for the first time, an intervention has been executed in this cultural asset in the framework of a subsidy in which social, cultural and economic agents from the area co-participated in the decision-making process.
On the other hand, we highlight the maximum respect for the values of natural landscape by combining its projection as a cultural landscape by means of history and the current uses of the environment. Accordingly, the implemented actions have deepened the relation of this setting with the appreciation, knowledge and enjoyment of this local scenic landscape. The project has especially considered the environmental and landscape values of the specific promontory setting on which it is located and the rural scenery of "Les Alcusses" comprised by isolated buildings on mild mountain slopes and stream beds (farm estates called "masías" from the 18th and 19th centuries) and the traditional farmlands with grape vines and cereal crops.
The intervention was focused on enhancing the experience of both heritages: the definition of the itineraries which make it possible to free the woods and the excavation itself from the random routes which tend to deteriorate them; and the presentation of landscape elements linked to this settlement as a historical site. The relevance and essential preservation of this complex adds associated environmental values to the landscape's own value, such as the outstanding presence of wildlife species, whose protection is directly linked to the active maintenance of the current existing mosaic of land uses, air quality, aromas etc. This relation is established from diverse perceptive scopes that reinforce the valuation and respect for the landscape.

Accordingly, the landscape is identified as the surrounding key and meaningful environment in this settlement, which acquires relevance with the creation of scenic viewpoints which promote leisurely halts and contemplation. The specific qualities of the natural landscape are enhanced, such as the aromas, temperature, irregular terrain and variety of the environment, thermal sensations, etc. which represent stimuli that encourage the meaningful and unforgettable haptic perception for some visitors, especially for people with a visual disability or children.

On the other hand, the representation of the landscape as a natural context of the setting in terms of the tactile perception constitute an initiative and innovative solution as a means of useful communication for diverse audiences and very specifically, for blind people. The settlement's overall scale-model has been designed with a composition which includes different scales and forms of symbolic and figurative presentation of the multiple elements which comprise this landscape at the present time; nature, paths, buildings, ruins, etc. This facilitates its interpretation and comprehension as a specific space at a specific scale in relation to its environment.

3.1 Conclusions. New Uses, Management and Maintenance.

The positive impacts of the intervention are directly focused on the improvement of the qualitative aspects of the tourist visit, the interpretation of the site [10] and consequently, the assessment of the cultural heritage of this settlement from the Iberian age.

In varying degrees, the performed actions have contributed to the progressive definition, conditioning, safety and enjoyment of the itinerary at the same time that tactile accessibility devices were installed which had not existed until that time. Specifically, the installation of the handrail has contributed to the enhanced experience of the zone's landscape by creating two scenic viewpoints which today represent two small visitor rest and observation areas.
Another positive impact has been achieved by installing the tactile accessibility devices since they significantly improve the understanding of the conserved archaeological remains (observation from different perspectives and at different detail levels and in turn, facilitate a panoramic view of the complex and the way in which the different elements which integrate it are related to each other) and to facilitate the communication of concepts and information to sectors of the population which have been traditionally excluded, such as persons with visual disabilities.



Fig. 4: The elements installed in this environment demonstrate the potential of objects as the mediators of the visitors' experience of the site

In relation to the accessibility devices, it is fitting to highlight that the 3-dimensional nature of the scale-models provide specific advantages over the existing drawings in the panels: observation from different perspectives and at different detail levels and in turn, facilitate a panoramic view of the complex and the way in which the different elements which integrate it are related to each other. In addition, in the case of the blind or people with serious visual disabilities, they facilitate the communication and learning of concepts, which is a central feature in the consideration of the management of public heritage asset according to an inclusive design [11]. As a whole, these equipment facilities extend the resources allocated to the communication and the experience of the site focused on the perception or the active construction of a space for the general public, and hence its immense interest for the public presentation of the heritage.
We wish to highlight that the design of the accessibility devices have been executed based on the exhaustive analysis and preliminary research of this type of 3-dimensional resource. This study has revealed the absence of tactile scale-models in reference to landscape environments with archaeological remains, which has required following an experimental and participative process involving users with a visual disability, with the aim to determine their formal, volumetric features and textures, especially the scale-model of the entire settlement in its environment. The result has been the development and implementation of an innovative and pioneer resource in the scope which concerns us.

The entire intervention has been guaranteed by the continuous works executed by the Prehistoric Research Service team of the Museum of Prehistory of the Provincial Council of Valencia [12] and the results of their educational and communication project for the use and enjoyment of this setting. Based on the tracking data which has been recorded, an average of 14000 annual visitors has been estimated in recent years, which have been enhanced by regular and original educational activities such as the aforementioned visit workdays which were attended by 1500 persons in a single weekend. In addition to the already loyal visitor groups, this action has now included groups of visitors with visual disabilities. In fact, ONCE, the Spanish Organisation for the Blind at the Valencian Community has already promoted organised visits to Bastida de les Alcusses in their annual activities schedule, which has been successfully used by the project's technical heads in order to evaluate and test the implemented scale-models and the verification of their usefulness.

Simultaneously, the presented intervention has become an essential support resource for the Communication and Educational Project of the Bastida de les Alcusses included as an educational program in the Secondary Education centres; the scale-models are milestones in the route which reinforce the oral lectures and the possibility to touch represents a sensory stimulus for the students. In addition, the scenic viewpoints are recovered spaces to transmit knowledge about the landscape; these spaces are invitations for discussion and debate, encouraging the participation and interaction with the teacher, regardless whether this involves visits in the framework of training cycles or general visitors.

The link with the research has another exponent in this intervention based on the novelty of the implemented resources and the type of context, where the framework of the experiences were implemented in the Ph.D. thesis of J. Gual Ortí [13] with tactile resources for blind people in natural open environments.

Finally, this intervention contributes to improve the tourism options in the framework of the Iberian Route of Valencia (*Ruta dels Ibers de València*). This project has been specifically promoted by the Museum of Prehistory of Valencia and covers the enhanced experience and tourist use of the archaeological sites from the Iberian Age in the inland municipals of the Valencia province in which the Bastida de les Alcusses forms a part. This intervention contributes to the work to guarantee the free access and enjoyment for all the people in this heritage site, as well as the creation of new resources for the economic and cultural development in the local scope in a privileged environment, complementing the landscape, gastronomy and enology opportunities which the district offers.

Bibliographical References

[1] BONET ROSADO Helena; and VIVES-FERRÁNDIZ SÁNCHEZ; Jaime. *La Bastida de les Alcusses. 1928-2010*. 1ª ed Valencia: Museo de Prehistoria, 2011. 328 p. La Bastida de les Alcusses. 1928-2010. ISBN 978-84-7795-590-0

[2] BONET ROSADO, Helena; MATA PARREÑO, Consuelo. 2001: “Organización del territorio y poblamiento en el País Valenciano entre los ss. VII al II a.C.” In: Berrocal-Rangel and P. Gardes eds., Entre Celtas e Iberos: las poblaciones prehistóricas de la Galias e Hispania, Real Academia de la Historia. Madrid, 161-174.

[3] RUIZ RODRÍGUEZ, Arturo. 2007: “Los Iberos”. In: Francisco GRACIA, ed., *De Iberia a Hispania*, Ariel, Barcelona, 733-839.

[4] PADRÓ, J. “Territorio y gestión creativa del patrimonio cultural y natural”, en *Ábaco Revista de Cultura y Ciencias Sociales*, nº34. Madrid, 2002, pp. 55-60.

[5] PUYUELO, Marina; MERINO, Lola et al. *Access to World Heritage Sites: Design Products that Transform Sites into Collective Spaces for Enjoyment and Interactive Learning*. DESIGN PRINCIPLES AND PRACTICES: AN INTERNATIONAL JOURNAL. Vol 4 in Champaign, Illinois, USA by Common Ground Publishing LLC. 2010, pp. 409-433. http://ijg.cgpublisher.com/product/pub.154/prod.364

[6] MEUSER, P., POGADE, D. Construction and Design Manual Wayfinding and Signage. Berlin: DOM publishers, 2010.

[7] CONSUEGRA CANO, Begoña. Maquetas accesibles a las personas con discapacidad visual. *Integración: Revista Sobre Ceguera y Deficiencia Visual*, (28), pp 16-20. Madrid, 1998.

[8] CONSUEGRA CANO, Begoña. El acceso al patrimonio histórico de las personas ciegas y deficientes visuales. Madrid: ONCE. 2002.

[9] Scribner, S. “Thinking in action: Some characteristics of practical thought”, en Sternberg, J. y Wagner, R. K., Practical intelligence: Nature and origins of competence in the everyday World. Cambridge, Cambridge University Press, 1986, pp. 13-30.

[10] Design Council, “An Introduction to inclusive design”, url:http://www.designcouncil.org.uk/en/About- Design/Design-Techniques/Inclusive-design/, Londres. 2009.

[11] Ripollés, Eva; Fortea, Laura. (2004): “El patrimoni arqueològic com a font d’aprenentatge: tallers didàctics al jaciment de la Bastida de les Alcusses (Moixent)”, *Archivo de Prehistoria Levantina*, XXV, 385-406.

[12] http://www.museuprehistoriavalencia.es/ficha_publicacion.html?cnt_id=33

[13] GUAL ORTÍ, Jaume. Tesis Doctoral: INCORPORACIÓN DE SÍMBOLOS TRIDIMENSIONALES EN PLANOS TÁCTILES PARA LA MEJORA DE SU USABILIDAD. Universidad POLITÈCNICA DE CATALUNYA, Programa PROJECTES D’INNOVACIÓ TECNOLÒGICA EN L’ENGINYERIA DE PRODUCTE I PROCÉS. 5 Julio-2013, Barcelona.

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Anima valens in corpore aegro: Paths of the Spirit in the Places of Health-Care

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Abstract
This paper aims to present recent experiences, conducted between research and application, concerning the so called "paths of the spirit", to deepen, update and articulate places of worships in hospitals.
The goal was not only to offer a private place for praying, but also to create a 'radiate spirituality' in the entire complex. This means that the thought and the soul dimension constitute powerful experiences, which are constant and shared, not being relegated to a few moments of the day or week. A dimension that helps us to accept the personal troubles of living people, not only to add material quality to our lives, but also to find common values in the mutual comparison, respecting the complex system of religious differences. The project has been embodied in the book 'Anima valens in corpore aegro', presented twice: on December 3rd, 2013 in Turin at the Molinette hospital; and on January 14th, in Vatican City, by invitation of Monsignor Zygmunt Zimowski, president of the Pontifical Council for the Pastoral Care of Health Care Workers.
Through the examination of case studies, critically and disciplinary selected and analyzed, the project aims to demonstrate that, in addition to therapeutic screened positive results, a "sustainability of the spirit" could exist, together with the well-known idea of "eco-technologic" sustainability.

Keywords: Multiculturalism, Dialogue among Faiths, Human-friendly Hospitals.

1. Introduction
The Italian Constitution (art. 4) acknowledges to all citizens "… the right to work, (…)", but also states "the duty to carry out (…) an activity or function, which may contribute to material or spiritual progress of Society". These words imply the effort towards a deeper, more aware and complex spirituality, both in the individual and in the collective dimension. The same need of interior meditation is decisively strengthened by the confrontation with the disease, even in its worst conditions.
The project – which is described here – has been characterized by a unique path: taking off from an experience in Turin, it has become a proposal of national and international relevance, with a high degree of attraction and participation.

2. Halls of Silence at the "Health Care and Science City" in Turin: the Origin of the Project.
The origin can be found inside other wider and more complex initiatives for the reorganization and restructuring of the Hospitals in Turin, with particular focus on the so-called "Health Care and Science City". On February 4th, 2013, the contract of research related to the "Halls of Silence" project was signed by the *Agenzia Regionale per i Servizi Sanitari – AreSS* – and the Department of Architecture and Design – DAD, Polytechnic of Turin. The Scientific Responsible of this project is Anna Marotta (DAD), the author of this paper.
The "Halls of Silence" project is a part of the AReSS strategic initiatives, and can be considered as a thematic development of the general design and planning criteria established in the Health Care and

Science City master plan. The main themes it faces regard the relation and interaction among "function and Health Care places" and "function and Sites of Worship", in a hospital context characterized both by a great complexity of relations and services, and by a great variety of users, from the anagraphic, social and cultural point of view.
Thence the aim is to define criteria and guidelines for the individuation, articulation and design (functional, conceptual, structural and relational) of possible reliable "paths" for a "Health Care of the Spirit", on the background of the design modes related to Health Care and Science City of Turin. The starting point is the state of the art of the master plan; meanwhile, hospital paths already proposed for the "Cultures and Religious" project at the Molinette complex in Turin will work as a model for the realization of the Halls of Silence.
The incentive to the development of the analytic and elaboration process related to these themes comes from the specific concern, expressed by Don Marco Brunetti (Director of the Diocesan Pastoral Health-care Office of Turin). In the actual process, he has seen the opportunity to identify the models and criteria to realize a "Health Care of the Spirit path" (or even more paths) in the "City", on the base of the individuation and analysis of the various religions (meaning also the condition of laicality) to be taken as a reference.
Apart from the catholic places of worship, there is the need to evaluate the possibility to realize Halls of Silence, multi-faith places, or even places dedicated to specific forms of worship. On this account, places of worship will have to take into consideration the various needs and features of the users, for which they exist; and to find their correct localization, towards functions and activities located in Health Care and Science City of Turin.
Considering the general objectives and background, the theme related to paths and places of "Health Care of the Spirit" must be connected to the wider theme of "communication systems", meaning not only specifically informative aspects, but the modality of organization and transmission of contents and sense. In particular, the last one is a very complex matter, due to the users diversity and sensibility, only in part referable to the theme of humanization of the Cure.
In this respect, while securing criteria and examples of spatial-functional organization and characterization, the design guidelines (whose elaboration has been object of the agreement between AReSS and DAD) will not do without finding possibilities and modes to favor intercultural and inter-faith dialogue. Among the inspiring ideas, the Pastoral [2] had particular relevance, especially when it says that: "beyond differences among the various Nations of the World, and in front of the great number of defies in the sector of Health Care, the Church and the christians are called to bring loving cure and assistance to all people, and to convey the message of hope, finding their source in the God of Life, Love and Mercy", and this can be said for any place of worship.
The guidelines elaboration and the proposal of possible solutions of general design will have to leave aside – as already stated – the overall organization and distribution of the Molinette hospital complex, in order to pursue the objectives of the project described in the Master plan. In this respect, general criteria of design, related both to the functional configuration and to the modalities of localization, spatial organization and relation with the context, will be likely taken into consideration.
Hypotheses of plan and volume articulation, which have been taken as a reference (developed by AReSS and Metropolitan Urban Center), will not be considered as strict design bonds: they will act as possible modes of interpretation and actuation of the intervention policies and guidelines stated in the Master plan (even in relation to operative and organizational needs regarding the planning and programming of the works).
Inside the past experience, considering what has been stated up to now, the concept and value of the "Path of Mind and Soul" has been strongly confirmed. It will not only gather people needing recollection, reflection and meditation in a specific place, but also "Irradiate Spirituality" in the whole Health Care and Science City of Turin. The idea of "Sustainability of the Spirit" is then strengthened: sustainability is not only ecologic and/or technologic, but ethical and cultural. In this context, the dimension of Mind and Soul is a strong experience, constant and shared, not limited to just a few moments during the day or the week. This dimension helps us to accept the personal difficulties of Life, adding spiritual value to our existence; to find common values in the collective dialogue, respecting the complex system of religious differences; and to "act as a community". This is education to condivision, framed along a pathway which might be divided in the following phases: to inform, to know, to understand, to share. For these reasons, while planning the guidelines, the author meant to entitle the project "Anima valens in corpore aegro".

3. Itineraries of the Spirit in Health Care places: research and design

The author was responsible for the scientific coordination of the project, assisted in this work by a group of research composed by DAD PhD fellows, PhDs and graduates, among who Gaetano De Simone, Serena Abello, Rossana Netti, Chiara Cannavicci and Paolo Ceresa can be named. The research results have been published on the volume entitled "Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale

multiculto, chiese" [1]. The text is organized in seven chapters, leading from the project premises to the definition of some guidelines, derived from methodological approaches and in-depth studies.
In a first introductive phase, the project of the Halls of Silence for Health Care and Science City of Turin has observed the formal context, defining the main objectives. The general features of the operative background were described, with a specific focus on indications and information given by previous initiatives at a regional level. A series of preliminary analyses allowed to trace the formal features of the functional and structural context, leading to the comprehension of the actual status and of the possible variances to the project.
In this respect, some researches related to the definition of a repertoire of theories and experiences, as an initial reference, have been made. These have been catalogued according to the related case-studies, suitably selected (figg. 1-5).
The spotting of guidelines among design and analysis methods, criteria and parameters was made by monitoring the targets, derived from the inspirational principles of the "Cultures and Religions Project", which originated the general criteria for the definition of the "Needs Framework".
The "Halls of Silence" project was worked out according to the general features of the complex, respecting the specific context of application, outlining the level of priorities and hypotheses definition and hierarchy, and never neglecting the relation between the Halls of Silence and the whole complex. Everything was done without forgetting the dimension of sustainable building, and of an overall sustainable approach. The volume recalls the main normative orientations, mainly for what regards the use of sanifying colors, according to European rules. The design approach analysis ends with the spotting of the first guidelines for the definition of a procedure for the preliminary analysis and design. Metadesign is originated in the context of these first analyses. Its development takes into consideration commands and suggestions, derived from rules and experiences of already realized projects (fig. 6).
The scientific connotation of the research could not do without the description of documentary apparatus (bibliography, list of rules related to hospital, and glossary). In the same way, some paragraphs derived from design experiences, already performed by the author, together with her group of research, in relation to themes like vision, color and decoration. These features can not be considered as random factors in architectural design, particularly dealing with hospitals. Among the approaches and the methodological in-depth analysis, some parts have been devoted to the following subjects: color, color in motion and decoration, psycho-geometric/gestaltic modes of vision, neurosciences, vision and therapy, sustainability.

4. Paths of Faith in the humanized hospital

A strong point is represented by the "Inspirating principles: a decalogue", also defined as the "Commandments", approved and widely accepted by the ministerial commission. These are the "rules" which any "new Hospital" must respect.

1	HUMANIZATION	Centrality of the Person
2	URBANITY	Territorial and urban integration
3	SOCIALITY	Belonging and solidarity
4	ORGANIZATION	Effectiveness, efficiency and noticed ease
5	INTERACTIVITY	Completeness and aid-continuity
6	APPOSITENESS	Correctness of health-care and use of resources
7	RELIABILITY	Security and peace
8	INNOVATION	Diagnostic, therapeutic, scientific, technologic renewal
9	RESEARCH	Inducement to intellectual and clinic-scientific in-depth examination
10	FORMATION	Professional and cultural updating

Any informative principle is made clear in different modalities, and can be expressed in various actions. The first principles shows a very important concept, according to which a new hospital must be conceived on a human scale, focused on the person and his/her needs (especially if sick, than feeble); it must be a Place of Hope, of Healing, of Cure (if healing is not possible), of Welcome and Serenity related to trust.
The difficulty lies in harmonizing the complexity and technology of a "machine" – that might appear totally hostile and unmerciful – and aspects like the human dimension, trust – not fear – reception, health care, in other words "Humanization".
Privacy, Comfort, Reception, Hearing, Orientation, Transparency, Communication, Information must be granted. Fight against pain in all its form has to be secured as well. The current idea of hospital as a place of pain, suffering and death will have to be transformed in that of "open" hospital, meaning a place of hope, fight against grief and suffering relief, healing or cure. In this respect, there is a need to

guarantee to the users not only an adequate sanitary answer, but also a psychological, social and religious one. Religious assistance is among the integrative services that the hospital must give itself.
Among its primary objectives, religious assistance has to guarantee the possibility of worship in one's own religion, with active assistance by the faith ministers. On the other hand, the possibility of granting adequate spaces of worship for the different religions – especially for the main ones – is privileged among the design guidelines. In this respect, the projects tends towards the idea of "multi-faith" halls, which flank the catholic chapel, as already seen in other social contexts, such as the airports.
In addition to this, we have to cite article 4 of the "Intesa fra la Regione Piemonte e la Conferenza Episcopale per il servizio di assistenza religiosa presso le strutture di ricovero del Servizio Sanitario Regionale", which reminds of the kind of service requested for religious assistance. In the definition of the object of the service, it is said the religious assistance includes: the institutional cooperation of the National Sanitary Service for the inclusion of religious assistance in the therapeutic path of the patient; the relation of psychological assistance, at a human and social level; the spiritual ministry, executed in individual and/or common form (with means of communication used in ecclesial activity, respecting the needs of the hospital environment) through the celebration of the divine cult, the Sacraments, the catechesis, the organization of pastoral, cultural and religious activities; the ethical and religious contribution in ethical committees and in the formation of the personnel in activities of service; administrative services for office organization and needs (certifications, correspondence, archive, care of chapel, liturgical furniture…).
The ultimate users, meaning those which will use the building during its lifetime, can be divided in three main categories (targets): users, patients and internal workers. The first can be divided in: "temporary" users, that is, using the structure for "temporary" services, sometimes repeated in time; users needing continuity and completeness of assistance from the social and sanitary point of view; users needing first aid with continuity during the day; healthy users, looking for periodical checking; users involved in burocratic duties; users, whose health is compromised by illness. Among the internal workers, we can remember: social and sanitary professionals; local doctors (general practitioners, pediatricians…); specialist doctors; nurses; social workers; students and postgraduates; technicians. Other categories of personnel involve administrative, front-office and auxiliary workers.

5. The Project Implementation

The idea of "Anima Velens" has been vividly appreciated both in general and in the sector of Health Care, so much that it has deserved a specific initiative of dissemination: the project described above was presented on December 3rd, 2013, at a convention, in the lecture hall of the Molinette facility of the Universitary Hospital Firm "Health Care and Science City of Turin": on this occasion, the theme of the "Paths of the Spirit" has been exposed, with particular focus on design ideas presented for the Health Care City of Turin. Among the interventions, we might remember the greetings of the intervening authorities, the introductive considerations by Monsignor Nosiglia (archbishop of Turin), the description of the State of the Art by doctor Angelo Del Favero (former general director of the Hospital firm), and, in particular, the contribution of doctor Mario Airoldi, regarding the experience and results brought by the project "Halls of Silence" inside the division of Oncology, and by the "Paths of the Spirit" in hospital context, thought and realized under the scientific coordination of the author (who has exposed the related results on that occasion).
The meeting had a gratifying outcome, both because it resonated with the words published on "La Stampa" and for the invitation by Monsignor Zygmunt Zimowski, President of the Pontifical Council for the Pastoral Care of Health Care Workers, to present the results of the work on January 14th, 2014, in Vatican City. On this occasion, all the themes related to the description of the project have been faced: Introduction and Opening (Brunetti, Di Marco); The Outcomes in the Legislation: Regione Piemonte's Protocol and Resolutions for the Institutional Actuation (Lombardo); The Accrual of the Shared and Compared Experience. Architectural Design for the Paths of the Spirit in Health Care Places: "Anima valens in corporea aegro" (Marotta), involving the "Discussion of design themes related to the quality of life in hospitals". The meeting was over with an agreement on the "Possible future outcomes in the territories of Mind and Soul: the dialogue among specializations and institutions, nations and cultures". In particular, hypotheses bound to bilateral cooperation to continue initiatives and researches have been developed, with evaluation of contingent requests of funding at a national and European level. Moreover, the possibility has been advanced, to promote a series of national and international conventions, which might be followed by publications.
After the Vatican meeting (at the presence of Don Marco Brunetti, and doctor Mario Lombardo and Lia Di Marco), doctor Angelo Del Favero, had the occasion to present the initiative to the actual Minister of Health, Beatrice Lorenzin, who showed interest for the great potentials of the project and its possible results.
Among the possible outcomes related to the themes of the "Paths of the Spirit", it was possible to introduce another project, which joins different fields of research, in which the author and her group of research are versed. Our Pope Bergoglio bears the same name has the district, which now hosts the

Citadel of Alessandria. In this respect, this second project involves this important fortified complex of Piedmont (free from military occupation) in a proposal, which intends to convert a site of war in a place of Peace: a sort of museum, dedicated to multi-faith, tolerance and spirituality, through the realization of a Path of the Spirit, not different from that conceived for the Hospital. It is based thence on some main principles: information, knowledge, comprehension, condivision.

6. First conclusions

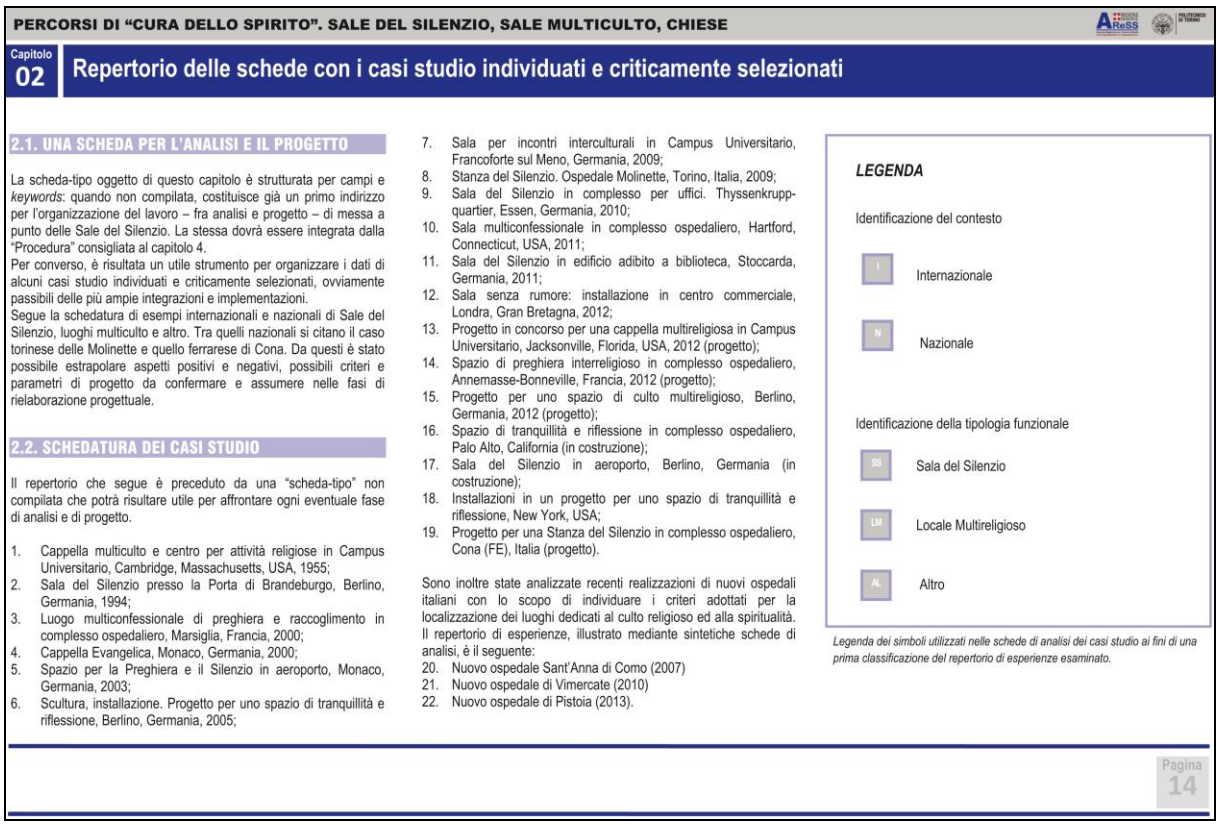
How might these paths develop? Some design proposals expect the insertion of information point (according, for instance, to different Feast calendars), simbology of the various religions, temples and houses of pray, thanks to the realization of digital interactive projections, which might involve the users in multicultural experiences, with great affective sharing.

Among the first references, we might remember the Nobel Centre for Peace, which has its seat in a former railway station in Oslo, host the Nobel Field, a suggestive installation of Art, which symbolizes a garden (fig. 7). This is composed by a thousand sharp light beams, forming a sort of radiant lawn: various monitors emerge from it, showing the story of the winners of the Nobel prize; the soundtrack of the installation changes according to the moves of the visitor. “it’s a garden in evolution – say the directors of the Centre – whose fruits are the ideals which the Nobel prize winners leave as a legacy: this is the right place to reflect on the idea of Peace”.

Another example – which cannot be forgotten – is the Centre for peace (Peres Peace House) of Jaffa, commissioned in Israel by Simon Peres (Nobel prize for Peace), whose design is due to Massimiliano Fuksas (fig.8). The center was conceived as a place, destined to become the main seat of discussion of arab-israelian initiatives, in the perspective of a gradual process of appeasement in the Middle East, promoting projects for the empowerment of local groups and individuals. The first event taking place in the building was the ceremony for the graduation of twenty-one women, most of them Arabic. This example implements the idea of Peace through the alternation of layers of concrete and layers of translucent glass. In this way, the structure is enlightened during the day, to give the light back during the night, offering an almost magical image, which convoys the spiritual message expressed by architecture. “I thought of a stratification – says the roman architect – of a building which could represent Time and Patience (…) a stone basement, which keeps the building lift over the meeting place, from which one enters through two long staircases to a place of rest, in which dimensions, height and light coming from above help us to forget earthly troubles, and put us in the right, positive mood to meet other men and women”. The Centre of Peace is a parallelepiped, obtained by the stratification of irregular plans of concrete and glass, founded on a monolithic basement, on which edges the entrances for cars and pedestrians open. The six floors are served by stairways and elevators.

As a concluding remark, if architecture can be “therapeutic”, it can be inclusive as well and can (must) be a place to build peace; peace of the soul, but not only individual. This can be achieved through the Itineraries and Paths of the Spirit, that – for now – have been proposed in the Health Care Places, but could be implemented in other situations involving the collective.

We may agree with Gandhi, when he states: “Maybe it will take time, before the Law of Love is adopted in international affairs, but if we want to save ourselves and give an important contribution to the progress of the World, we must tread with determination the Way of Peace”.



PERCORSI DI "CURA DELLO SPIRITO". SALE DEL SILENZIO, SALE MULTICULTO, CHIESE

Capitolo 02

Repertorio delle schede con i casi studio individuati e criticamente selezionati

2.1. UNA SCHEDA PER L'ANALISI E IL PROGETTO

La scheda-tipo oggetto di questo capitolo è strutturata per campi e *keywords*: quando non compilata, costituisce già un primo indirizzo per l'organizzazione del lavoro – fra analisi e progetto – di messa a punto delle Sale del Silenzio. La stessa dovrà essere integrata dalla "Procedura" consigliata al capitolo 4.
Per converso, è risultata un utile strumento per organizzare i dati di alcuni casi studio individuati e criticamente selezionati, ovviamente passibili delle più ampie integrazioni e implementazioni.
Segue la schedatura di esempi internazionali e nazionali di Sale del Silenzio, luoghi multiculto e altro. Tra quelli nazionali si citano il caso torinese delle Molinette e quello ferrarese di Cona. Da questi è stato possibile estrapolare aspetti positivi e negativi, possibili criteri e parametri di progetto da confermare e assumere nelle fasi di rielaborazione progettuale.

2.2. SCHEDATURA DEI CASI STUDIO

Il repertorio che segue è preceduto da una "scheda-tipo" non compilata che potrà risultare utile per affrontare ogni eventuale fase di analisi e di progetto.

1. Cappella multiculto e centro per attività religiose in Campus Universitario, Cambridge, Massachusetts, USA, 1955;
2. Sala del Silenzio presso la Porta di Brandeburgo, Berlino, Germania, 1994;
3. Luogo multiconfessionale di preghiera e raccoglimento in complesso ospedaliero, Marsiglia, Francia, 2000;
4. Cappella Evangelica, Monaco, Germania, 2000;
5. Spazio per la Preghiera e il Silenzio in aeroporto, Monaco, Germania, 2003;
6. Scultura, installazione. Progetto per uno spazio di tranquillità e riflessione, Berlino, Germania, 2005;
7. Sala per incontri interculturali in Campus Universitario, Francoforte sul Meno, Germania, 2009;
8. Stanza del Silenzio. Ospedale Molinette, Torino, Italia, 2009;
9. Sala del Silenzio in complesso per uffici. Thyssenkrupp-quartier, Essen, Germania, 2010;
10. Sala multiconfessionale in complesso ospedaliero, Hartford, Connecticut, USA, 2011;
11. Sala del Silenzio in edificio adibito a biblioteca, Stoccarda, Germania, 2011;
12. Sala senza rumore: installazione in centro commerciale, Londra, Gran Bretagna, 2012;
13. Progetto in concorso per una cappella multireligiosa in Campus Universitario, Jacksonville, Florida, USA, 2012 (progetto);
14. Spazio di preghiera interreligioso in complesso ospedaliero, Annemasse-Bonneville, Francia, 2012 (progetto);
15. Progetto per uno spazio di culto multireligioso, Berlino, Germania, 2012 (progetto);
16. Spazio di tranquillità e riflessione in complesso ospedaliero, Palo Alto, California (in costruzione);
17. Sala del Silenzio in aeroporto, Berlino, Germania (in costruzione);
18. Installazioni in un progetto per uno spazio di tranquillità e riflessione, New York, USA;
19. Progetto per una Stanza del Silenzio in complesso ospedaliero, Cona (FE), Italia (progetto).

Sono inoltre state analizzate recenti realizzazioni di nuovi ospedali italiani con lo scopo di individuare i criteri adottati per la localizzazione dei luoghi dedicati al culto religioso ed alla spiritualità. Il repertorio di esperienze, illustrato mediante sintetiche schede di analisi, è il seguente:

20. Nuovo ospedale Sant'Anna di Como (2007)
21. Nuovo ospedale di Vimercate (2010)
22. Nuovo ospedale di Pistoia (2013).

LEGENDA

Identificazione del contesto

I — Internazionale

N — Nazionale

Identificazione della tipologia funzionale

SS — Sala del Silenzio

LM — Locale Multireligioso

AL — Altro

Legenda dei simboli utilizzati nelle schede di analisi dei casi studio ai fini di una prima classificazione del repertorio di esperienze esaminato.

Pagina 14

Fig. 1: The repertory of tables, regarding the case-studies, spotted and critically selected, is introduced by an explanation of the methods applied for the selection itself, and of the "legenda" which guides the reading of the tables and the drafting of a general table. Image taken from: MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese.* Torino: AnanKe, 2013. p.14.



Scheda 01

CAPPELLA MULTICULTO E CENTRO PER ATTIVITÀ RELIGIOSE IN CAMPUS UNIVERSITARIO

IDENTIFICAZIONE DEL CONTESTO

Funzione dell'edificio/complesso
Campus universitario

Denominazione dell'edificio/complesso
Massachusetts Institute of Technology (MIT)

Località
Cambridge, Massachusetts - USA

Dimensione del contesto
680.000 mq di estensione del campus
11.000 impiegati (compreso il personale docente)
11.200 studenti (a.a. 2012/2013)

Committente
Massachusetts Institute of Technology

IDENTIFICAZIONE DEI "LUOGHI DELLO SPIRITO"

Denominazione
MIT Chapel and Religious Activities Center

Progettista
Eero Saarinen

Anno di realizzazione
1955

FONTI

- *http://web.mit.edu/eventguide/cacfacilities/mitchapel.html*
- *http://web.mit.edu/eventguide/cacfacilities/religious.html*
- *http://web.mit.edu/facts/faqs.html*
- *http://studentlife.mit.edu/cac/spaces/mit-chapel*

IDENTIFICAZIONE ED ANALISI DEGLI APPROCCI METODOLOGICI DEL PROGETTO: ESIGENZE, REQUISITI, CRITERI

I N SS LM AL

DIAGRAMMI FUNZIONALI SINTETICI

Identificazione dei locali
L'edificio del culto è costituito da un'ampia sala circolare, alla quale si accede attraverso un corridoio di ingresso. Al piano interrato sono presenti dei locali di servizio, raggiungibili con una scala dedicata. Nella sala sono presenti 115 posti a sedere, incrementabili sino a 140.
Il centro per le attività religiose, situato nell'edificio antistante, include gli uffici dei cappellani, i locali per le associazioni studentesche religiose e tre piccole sale multifunzionali (posti a sedere per 48, 18 e 12 persone).

Attività previste
La cappella è disponibile per funzioni religiose relative ai culti autorizzati, oltre che per la meditazione privata, quando non ci sono attività in svolgimento. Su autorizzazione, le confraternite universitarie possono utilizzare la sala per le cerimonie di iniziazione e i membri della comunità possono impiegarla per cerimonie religiose private.

Utenza
Personale impiegato nel campus (amministrativo e docente), studenti e visitatori, appartenenti ai culti principali (cristiano, mussulmano, ebraico, buddista, induista), oltre che ulteriori organizzazioni autorizzate dalla direzione del campus.

LOCALIZZAZIONE

Posizione/relazione rispetto alle attività principali del sito e dell'intero complesso di pertinenza, comprese le relazioni rispetto ai flussi di utenza e di attività
La cappella e il centro per le attività religiose sono situati a fianco dell'isolato occupato dall'edificio principale del MIT, nell'area dove si trovano le strutture e le attrezzature dedicate alle attività commerciali e di servizio, allo svago ed all'attività sportiva. L'edificio del culto è circondato da un piccolo giardino alberato.

Modalità di accesso
L'accesso all'edificio di culto ed ai locali del centro per le attività religiose avviene direttamente dall'esterno, poiché situati lungo una delle vie principali del campus.

ASPETTI PERCETTIVI DEGLI ELEMENTI COMPOSITIVI ED ARCHITETTONICI

Visibilità del luogo
n.r.

Forma
Sinuosa, priva di spigoli.

Materiali
Materiali naturali, caldi, dall'aspetto solido.

Luce
Diffusa e uniforme, da fonte zenitale.

Colori
Colori caldi

Suoni
Assorbimento sonoro da parte delle pareti in laterizio.

VALENZE SIMBOLICHE

Organizzazione dello spazio
Organizzazione a pianta centrale.

Segni grafici
Texture generata dalla disposizione degli elementi in laterizio che formano le pareti perimetrali.

Valenza degli elementi compositivi ed architettonici
Ambiente a pianta libera, privo di vincoli percettivi. La luce zenitale forma un fulcro percettivo e simbolico.

Arredo
Sedie di fattura semplice, non fissate al pavimento per permettere configurazioni flessibili.

Simbolo: significante/significato
Attraverso l'uso di materiali naturali, del focus percettivo dato dalla luce zenitale e dalla pianta centrale e libera la sala acquisisce un aspetto spazio neutro e raccolto.

COMPLESSITA', SEMPLICITA'

Si rimarca una particolare attenzione all'aspetto tattile delle pareti. Nella sua essenzialità formale, il sistema materico-spaziale conferisce delle suggestioni di calma e leggerezza.

Contenuto:
Esame dei modelli concettuali, organizzativi e strutturali sviluppati nell'ambito di recenti esperienze nazionali ed internazionali, relative alla progettazione e costruzione di sale del silenzio e luoghi di culto multireligioso.

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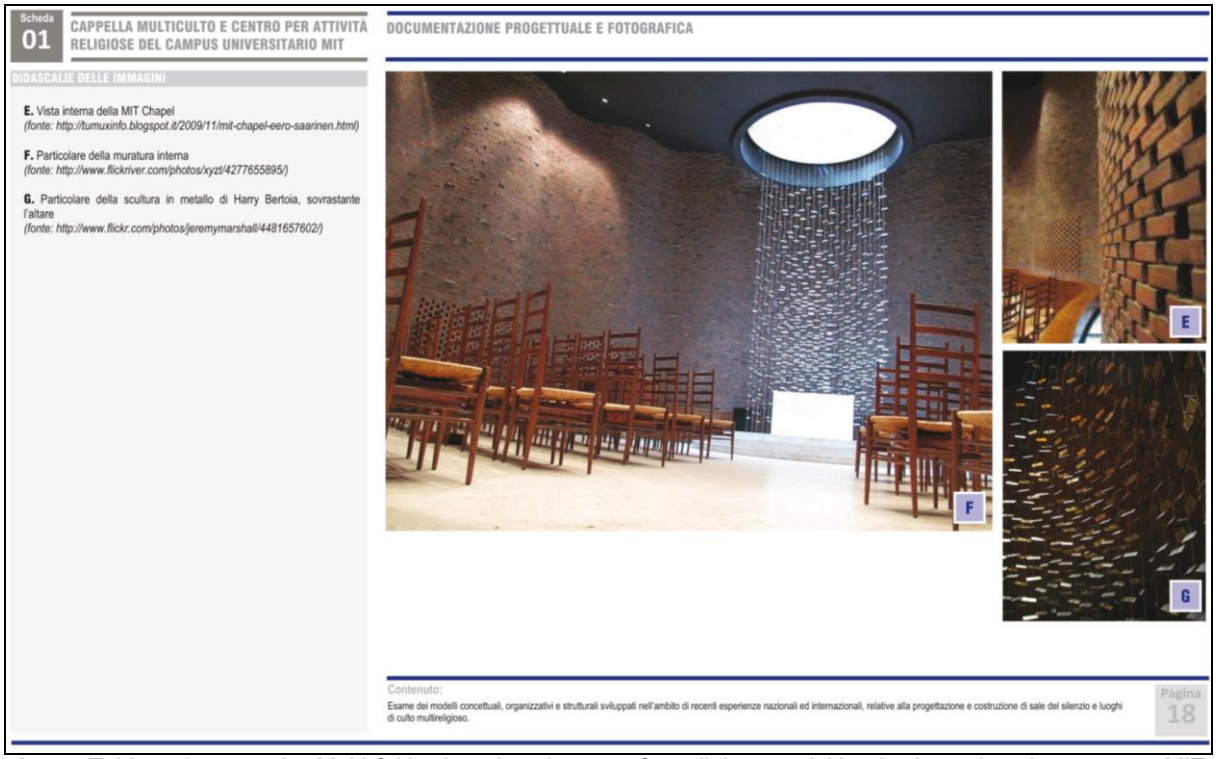
Fig. 2: Table n.1, example. Multi-faith chapel and center for religious activities in the university campus, MIT, Massachusetts, USA. Image taken from: MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese.* Torino: AnanKe, 2013. p.16.


Scheda 01

CAPPELLA MULTICULTO E CENTRO PER ATTIVITÀ RELIGIOSE DEL CAMPUS UNIVERSITARIO MIT

DIDASCALIE DELLE IMMAGINI

E. Vista interna della MIT Chapel
(fonte: http://tumuxinfo.blogspot.it/2009/11/mit-chapel-eero-saarinen.html)

F. Particolare della muratura interna
(fonte: http://www.flickriver.com/photos/xyzt/4277655895/)

G. Particolare della scultura in metallo di Harry Bertoia, sovrastante l'altare
(fonte: http://www.flickr.com/photos/jeremymarshall/4481657602/)

DOCUMENTAZIONE PROGETTUALE E FOTOGRAFICA

Contenuto:
Esame dei modelli concettuali, organizzativi e strutturali sviluppati nell'ambito di recenti esperienze nazionali ed internazionali, relative alla progettazione e costruzione di sale del silenzio e luoghi di culto multireligioso.

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Fig. 3: Table n.1, example. Multi-faith chapel and center for religious activities in the university campus, MIT, Massachusetts, USA. Image taken from: MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese.* Torino: AnanKe, 2013. p.18.


Scheda 15

PROGETTO PER UNO SPAZIO DI CULTO MULTIRELIGIOSO

IDENTIFICAZIONE DEL CONTESTO

Funzione dell'edificio/complesso
Edificio per il culto e lo scambio multi religioso.
Denominazione dell'edificio/complesso
House of Prayer and learning
Località
Berlino - Germania
Dimensione del contesto
n.r.
Committente
Associazione "The House of Prayer and Learning at Petriplatz Berlin"

IDENTIFICAZIONE DEI "LUOGHI DELLO SPIRITO"

Denominazione
House of Prayer and learning
Progettista
Kuehn Malvezzi
Anno di realizzazione (progetto)
2012

FONTI

- http://www.abitare.it/it/architecture/kuehn-malvezzi-house-of-prayer-and-learning-berlin/
- http://www.dw.de/berlin-plans-prayer-house-for-three-religions/a-16314461
- http://europaconcorsi.com/projects/210505-Bet-und-Lehrhaus-Petriplatz-Berlin

IDENTIFICAZIONE ED ANALISI DEGLI APPROCCI METODOLOGICI DEL PROGETTO: ESIGENZE, REQUISITI, CRITERI

I N SS LM AL

DIAGRAMMI FUNZIONALI SINTETICI

Identificazione dei locali
Tre locali dedicati ciascuno al culto una religione monoteista (cristianesimo, ebraismo, islam) e un locale comune di accoglimento e incontro.

Attività previste
Preghiera e celebrazione di riti nei locali dedicati ai culti religiosi.
Il locale comune è pensato con l'intento di favorire un dialogo non solo tra gruppi religiosi ma anche laici.

Utenza
Credenti delle religioni Critiana, Ebraica e Musulmana, e laici.

LOCALIZZAZIONE

Posizione/relazione rispetto alle attività principali del sito e dell'intero complesso di pertinenza, comprese le relazioni rispetto ai flussi di utenza e di attività
L'edificio per il culto è posto nel contesto edificato, risultato di fasi successive di sviluppo urbano.

Modalità di accesso
Una strada conduce gli utenti all'ingresso del complesso.

ASPETTI PERCETTIVI DEGLI ELEMENTI COMPOSITIVI ED ARCHITETTONICI

Visibilità del luogo
L'edificio sorgerà nella Piazza di San Pietro sui resti dell'antica chiesa omonima.

Forma
Il perimetro dell'edificio ricalca in pianta quello della chiesa sottostante di San Pietro. L'aspetto cubico dell'esterno contrasta con l'interno, suddiviso in quattro ambienti, tre dei quali destinati ai singoli culti (cristiano, ebraico e musulmano) e il quarto a pianta circolare, coperto con cupola centrale a due piani, comunicante con gli altri tre, che rappresenta il punto di unione.

Materiali
L'interazione di muratura a vista e luce del giorno sono i materiali da costruzione della Casa di Preghiera.

Luce
Per ogni ambiente vi è una specifica progettazione della luce determinata dalla perforazione della muratura.

Colori
Colore neutro, rilassante.

Suoni
n.r.

VALENZE SIMBOLICHE

Organizzazione dello spazio
L'accesso è consentito da tutti i lati dell'edificio, consentendo di percorrere l'edificio come se le strade non fossero state interrotte. Le tre stanze sacrali autonome sono raggruppate attorno alla sala a cupola comune.

Segni grafici
Assenza di segni grafici.

Valenza degli elementi compositivi ed architettonici
L'edificio rappresenta un'occasione di negoziazione tra aree di culto eterotrope, che formano una piccola costellazione intorno a uno "scolpito" spazio comune *in between*.

Arredo
La qualità e gli arredi delle tre sale saranno concordate specificamente con le comunità religiose.

Simbolo: significante/significato
Il concept progettuale vuole mettere in evidenza le divergenze e le somiglianze delle tre religioni, nella convinzione che facilitare l'espressione all'interno di questo spazio unico crei le basi per uno scambio rispettoso e alla pari.

Contenuto:
Esame dei modelli concettuali, organizzativi e strutturali sviluppati nell'ambito di recenti esperienze nazionali ed internazionali, relative alla progettazione e costruzione di sale del silenzio e luoghi di culto multireligioso.

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Fig. 4: Table n.15, example. Project for a place of worship and inter-religious exchange, Berlin. Picture taken from: MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese*. Torino: AnanKe, 2013. p.46.



Fig. 5: Table n.15, example. Project for a place of worship and inter-religious exchange, Berlin. Picture taken from: MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corpore aegro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese*. Torino: AnanKe, 2013. p.47.

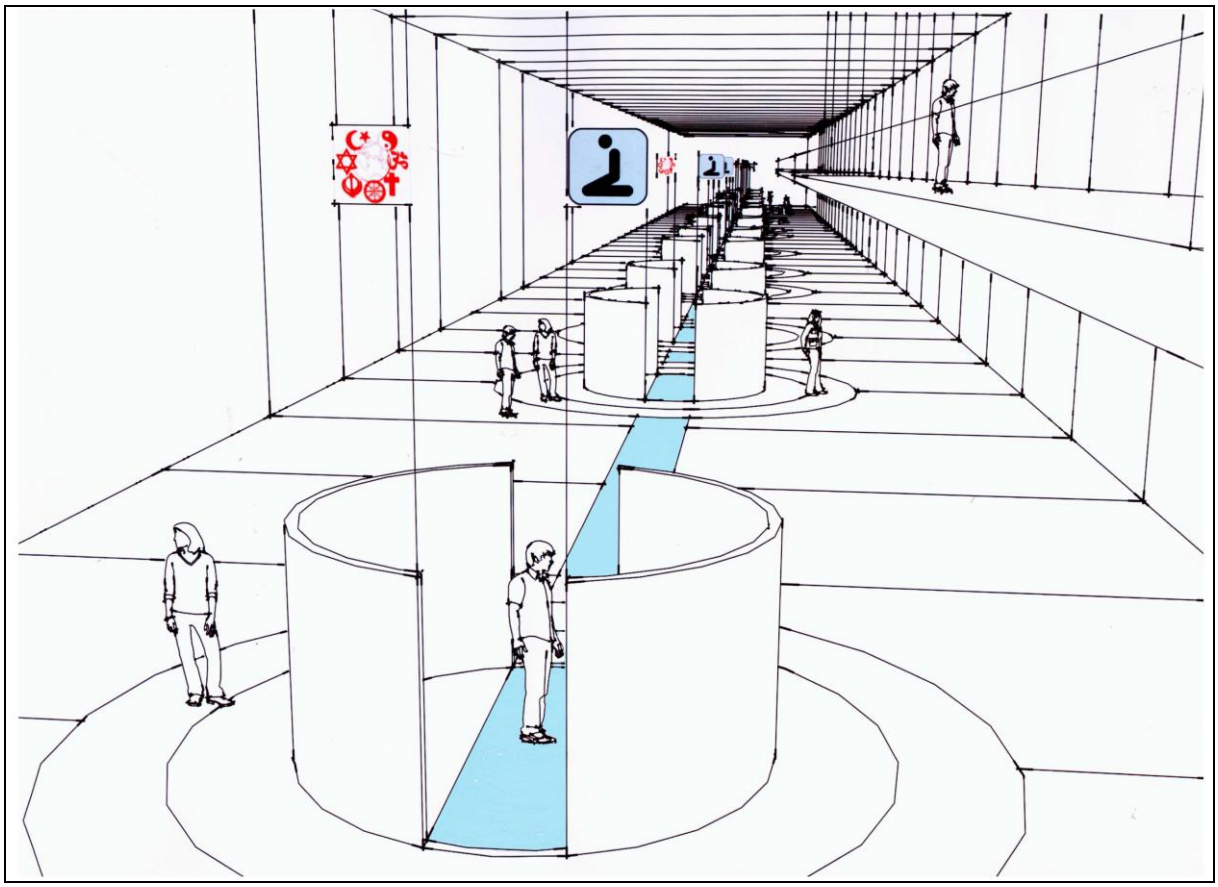

Fig. 6: Metadesign sketches of the Paths of Silence. First ideas, among instruction and suggestion. Graphic elaboration by arch. Gaetano De Simone, Department of Architecture and Design, Politecnico di Torino (2013).



Fig. 7: Nobel Centre for Peace, Oslo. “Nobel Field” installation, inside the Centre. Picture taken from: http://www.visitnorway.com/it/attivita/attrazioni-e-cultura/norvegia-nazione-di-pace/

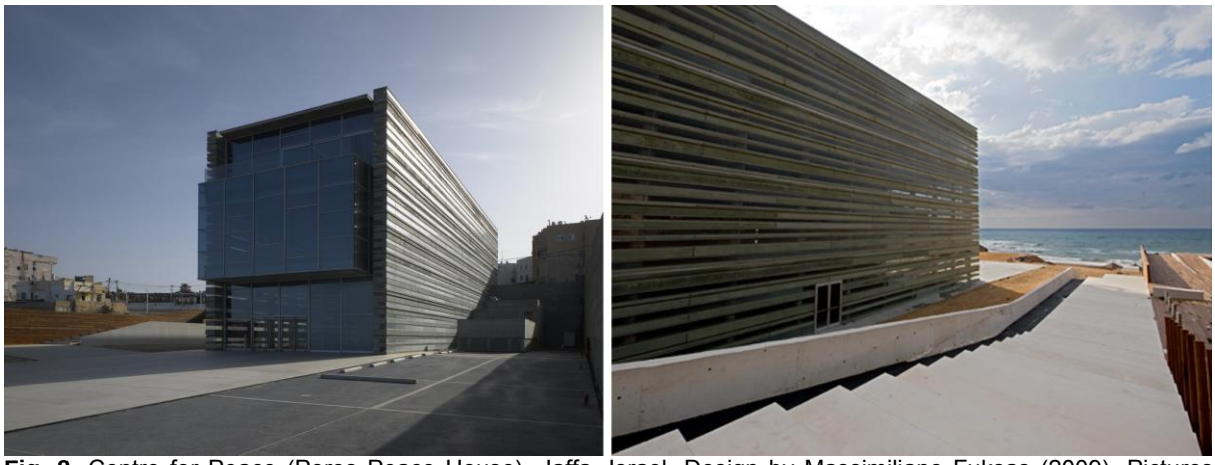

Fig. 8: Centre for Peace (Peres Peace House), Jaffa, Israel. Design by Massimiliano Fuksas (2009). Pictures taken from: (on the left) http://www.arthitectural.com/massimiliano-and-doriana-fuksas-peres-peace-house/peres_peace_house_019/ and (on the right) http://www.dailytonic.com/peres-peace-house-jaffaisrael/.

Bibliographical References

[1] MAROTTA, Anna. LOMBARDO, Mario. *Anima valens in corporea egro. Luoghi dello spirito nella Città della Salute di Torino. Percorsi di cura dello spirito. Sale del silenzio, sale multiculto, chiese.* Torino: AnanKe, 2013. p. 1-94. ISBN 978-88-7325-541-3.

[2] Pontificio Consiglio per gli operatori sanitari. *La Pastorale sanitaria e la nuova evangelizzazione per la trasmissione della fede*. Gorle: Editrice Velar, 2013. p.1-47.

[3] MAROTTA, Anna (a cura di). *Qualità dell’architettura qualità della vita*. Torino: Celid, 2008.

[4] FUKSAS, Massimiliano. *Una vita per la qualità dell’architettura*. In MAROTTA, Anna (a cura di). *Qualità dell’architettura qualità della vita*. Torino: Celid, 2008. p. 25-36.

[5] TERRANOVA, Ferdinando (et al.). *La casa della salute. Idee di progetto*. Firenze: Alinea 2007.

[6] MAROTTA, Anna. Teorie comparate del colore nella cultura della visione / Comparative colour theories in the culture of vision. In AA.VV. *Proceedings of XXXIV Convegno dei Docenti della Rappresentazione "Elogio della teoria: identità delle discipline della Rappresentazione e del Rilievo"*, Roma: Gangemi Editore, 2012. p. 433-441.

[7] MAROTTA, Anna. Imagination applied to European norms in "humanized" hospitals. More research, less cost. In AA.VV. *Proceedings of Less More Architecture Design Landscape. Le vie dei Mercanti. X Forum Internazionale di Studi*. Aversa – Capri: La Scuola di Pitagora, 2012. p. 906-914.

[8] ABELLO, Serena. CANNAVICCI Chiara. Colore e percezione visiva nel progetto di umanizzazione dei luoghi di cura tra teoria e prassi. In *AA.VV. Proceedings of VIII Conferenza del Colore 2012*. Santarcangelo di Romagna: Maggioli Editore, 2012. p. 88-95.

[9] ABELLO, Serena. CANNAVICCI Chiara. BALZARRO, Marta. "Life flourish again" for San Lazzaro Hospital in Turin. More sustainable colour, less stress. In AA.VV. *Proceedings of Less More Architecture Design Landscape. Le vie dei Mercanti. X Forum Internazionale di Studi*. Aversa – Capri: La Scuola di Pitagora, 2012. p. 915-923.

[10] CANNAVICCI, Chiara. *Il Colore come Bene Culturale nell'Architettura. Cromie per il benessere nell'ospedale umanizzato*, tesi di dottorato, Corso di dottorato di ricerca in Beni Culturali, Ciclo XXVI, Tutor Anna Marotta, Politecnico di Torino, 2014.

[11] ABELLO, Serena. *Dalla tradizione all'innovazione: la virtualità a supporto di memoria e conoscenza*, tesi di dottorato, Corso di dottorato di ricerca in Beni Culturali, Ciclo XXV, Tutor Anna Marotta, Politecnico di Torino, 2013.

[12] MAROTTA, Anna. "Architettura terapeutica": colore, decorazione, movimento nell'umanizzazione degli ospedali. Telemediaitalia, 2013, n.IX

[13] BALLERINO, Alberto. Papa Francesco salverà la Cittadella? Proposta per trasformarla in luogo-museo di pace, tolleranza e fede. Il Piccolo. Giornale di Alessandria e Provincia. Prima pagina. 24 gennaio 2014.

[14] BALLERINO, Alberto. *Cittadella tempio della pace grazie a papa Francesco?*. Il Piccolo. Giornale di Alessandria e Provincia. 24 gennaio 2014.

[15] MAROTTA, Anna. *Cittadella: un progetto nel quale credo molto*. Il Piccolo. Giornale di Alessandria e Provincia. Attualità. 31 gennaio 2014.

[16] MARTINENGO, Maria Teresa. *Come si pregherà alla Città della Salute. Il progetto: luoghi di meditazione aperti a tutte le confessioni*. La Stampa. Cronaca di Torino. 3 dicembre 2013.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Valencia Region La Luz de las Imágenes Foundation: a specific way of managing heritage

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Abstract
The Valencia Region La Luz de las Imágenes Foundation was created in 1999 with the aim of restoring and disseminating Valencian cultural heritage. However, the most distinctive aspect of our Foundation is the manner in which it manages this heritage. It follows a model that is not based solely on restoration. It not only focuses on the restoration of works of art and buildings in short periods of time (usually less than one year) in order provide Valencian citizens with a return on the investments carried out within the shortest possible time. It also strives to disseminate information relative to the work carried out as part of each restoration campaign undertaken by the Foundation.
Throughout the ten restoration campaigns undertaken in the last 14 years, this institution has recovered 57 buildings, including the main architectural sites in the Valencian Region, and 2,976 artworks (paintings, silverwork, documents, sculptures, etc.). It has organized 10 exhibitions in different towns throughout the Valencian Region in order to advertise and promote this vast array of heritage and which have been visited by almost 4,000,000 people. Motivated by its vocation to educate, the Foundation has organized workshops to demonstrate the importance of restoration work and the need to preserve heritage. As part of this objective, it has published dozens of works, such as catalogues, restoration books, audiovisual and music cds, etc.
In addition, our Foundation encourages the towns in which its campaigns are developed to become involved with the heritage in question in order that it may occupy a central place in the area's cultural tourism and create wealth, not only with the arrival of visitors to the exhibitions, but also with the recruitment of local staff.
This intervention model, combining heritage and social profitability, enhancement of cultural heritage and the improvement of local economies, was awarded by the European Union's Europa Nostra Awards for its exemplary contribution to the preservation of cultural heritage in 2009, and the International Cicop Award for exceptional and relevant work in the field of World Cultural Heritage in 2012.

Keywords: heritage, restoration, exhibitions, management, social profitability.

Introduction
The Valencia Region La Luz de las Imágenes Foundation was created in 1999 as an ambitious, exciting project aimed at recovering the Valencia Region's movable and immovable cultural heritage. Under Article 5 of its Statutes, "the purpose of the Foundation is the restoration of movable and immovable assets representing the historical and artistic heritage of Valencia, as well as the organization of exhibitions and displays of artistic and historic character, obtaining, by means of the same, the collaboration of all the public, ecclesiastical and corporate stakeholders for the dissemination of the region's rich heritage among ITS citizens."
This is a project that has, from the outset, worked with a multidisciplinary team to address the task of enhancing the value of the Region's main buildings and works of art, not all of which are well-known

and recognised, but which hold an emotional or sentimental value for THE inhabitants of the towns and villages to which they belong.
Thus, some 14 years ago La Luz de las Imágenes set off on a long journey, during which it has shed light on the Valencia Region's main architectural and artistic treasures with the aim of involving the largest possible number of stakeholders in the project. We consider the implication of the greatest possible number of institutions and individuals in the recovery of the heritage an asset.
On the other hand, the manner in which we deal with the recovery of our heritage is not limited to the restoration of movable and immovable assets, but rather from the beginning we have made a great effort to raise awareness not only of our work, but also of all the heritage recovered through exhibitions, publications, the organization of training workshops and the participation in conferences.
The factor that we believe sets us apart from other institutions or organizations dedicated to the protection and restoration of heritage is the manner in which we manage that heritage. The sum of heritage and social profitability is fundamental to us. That is, that the restored heritage becomes an economic engine within the area in which each action is undertaken, especially during the time in which we keep the exhibitions open, and also upon their conclusion: on numerous occasions we have been able to place hidden villages and remote locations that were relatively-unknown to the majority of the Region's citizens on the map and seen how, following their involvement with the Luz de las Imágenes, they have become attractive destinations for potential visitors.

1. La Luz de las Imágenes Foundation: 57 buildings and 2976 movable assets restored

In 1999, the Valencia Regional Government decided to launch the La Luz de las Imágenes Foundation with the aim of "organising artistic and historical exhibitions in different points throughout the Valencia Region in order to disseminate the Region's rich heritage among its citizens. To this effect, the successive editions of the same shall be itinerant throughout the Valencia Region".
During this 14-year period, La Luz de las Imágenes has restored a total of 57 religious and civil buildings and 2,976 movable assets, including paintings, sculptures, documents and jewellery, and artistic heritage "in situ", such as keystones, frescoes, sculptural decorations and altarpieces in the buildings in which the actions have been carried out in 123 locations within the Valencia Region. Some 100 million Euros have been invested to date, and the restoration campaigns carried out during this period have included the participation of 954 restorers, 179 architects and engineers, 43 archaeologists and 606 historians.



Fig. 1: Restoration of a large canvas in the Church of Saint Mary in Alcoy (Valencia)

The actions carried out by La Luz de las Imágenes have returned the splendour to authentic architectural gems from the Valencia Region, including the cathedrals of Valencia, Segorbe (Castellón), Orihuela (Alicante), the co-cathedral of Saint Nicholas in Alicante, the collegiate basilica cathedral of Saint Mary in Xativa (Valencia), and the archpriest church of Vinaròs (Castellón), architectural examples that have subsequently served as temporary headquarters for the exhibitions organized by the Foundation upon completion of its restoration campaigns.

In addition to religious buildings, La Luz de las Imágenes has also carried out work on various civil buildings. In such cases, the interventions are always carried out in agreement with the buildings' owners, usually institutions such as town councils, which indicate the future use to be given to the properties. The actions undertaken are thus adapted to these uses, with the aim of reaching a dual objective: that the Foundation, upon the conclusion of the action, may use the buildings as part of its expository itinerary (for example, as a visitor reception centre or as a venue for educational workshops), and that the owner has access to a finished space that is adapted to the intended use, with the social benefit that this represents. In most cases these properties, upon which we have acted in many cases after they have remained abandoned and closed for many years as a result of a lack of municipal funds, are converted into municipal museums or conference centres following restoration, thus forming part of the Valencia Region's cultural circuit. In this way, they contribute to increasing the cultural offer within our geographical area.

In the case of movable assets, La Luz de las Imágenes has its own Movable Assets Conservation Centre, which is located in the town of Bétera (Valencia). The centre works with a complete technical team of restorers who are specialised in painting, sculpture, gold-leaf, jewellery, paper, woodworking, etc., and who apply the most advanced restoration methods suitable in each case. From museums, private collections, churches and convents, after being located and selected for one of the Luz de las Imágenes' exhibitions, after exhaustive research by the exhibitions' curators, in the majority of cases these movable works are transferred to the centre, although in others, due to their size, the interventions are carried out by the specialist restoration team in the locations in which the works are situated. The same applies to cases of restoration of artistic heritage "in situ", when the geographical mobility of La Luz de las Imágenes' team is constant. The restoration teams spend weeks travelling to locations in which their restoration skills are needed.

On the other hand, La Luz de las Imágenes does not limit itself to restoration carried out as part of its own campaigns. Its scope goes beyond this limit. During 2012, the Foundation was charged with the restoration of the church of Saint Christopher in Lorca (Murcia), which was severely affected by the earthquake that struck the city in May 2011 and left the temple out of service. This was an act of solidarity to which the Foundation assigned a budget and staff (architects and restorers), and which allowed the temple to be reopened in 2013. It has also carried out the restoration of the walls of Xativa (Valencia) and Segorbe (Castellón), the castle at Vall de la Gallinera (Alicante) and the Valldecrist Charterhouse in Altura (Castellón), all financed by the 1% Cultural programme of the Spanish Ministry of Culture.



Fig. 2: La Luz de las Imágenes Movable Assets Restoration Centre in Bétera (Valencia)

1.1 Ten restoration campaigns in fourteen years

La Luz de las Imágenes Foundation develops its work through restoration campaigns that usually last between 10 months and 1 year. One of the Foundation's maxims is to minimize the length of the interventions on heritage. Once the budget has been approved and the contract awarded, agreements are reached with the different professionals - builders, restorers, architects, etc. - in order that they may carry out their work within a predefined period (never exceeding one year) subject to the opening date of the exhibition which closes the campaign.

For La Luz de las Imágenes, the social profitability of the work carried out is fundamental, i.e., that the investments effected provide the quickest possible return for the region's citizens in the form of the opportunity to contemplate movable and unmovable heritage that has been restored in the shortest time possible as part of a process that places great priority on the complexity of the interventions and their implementation in accordance with rigorous standards. It is a well-known fact that, on many occasions, actions of this kind can be never-ending. With this in mind, the Foundation operates with a further objective: the search for consensus between all the technicians and institutions involved in each case, in order that the processes may be carried out quickly and the final result of the investment is available for the public's contemplation and appreciation in the shortest possible time. The only factor that can lead to delays in the restoration work are contingencies that may arise during archaeological excavations.

Those responsible for the Foundation (the Foundation's manager, the head architect responsible for the works and those responsible for restoration of works of art and movable assets) subject the progress of each project to a weekly control. On scheduled days they visit the works and those responsible for carrying out the same in order to obtain first-hand knowledge of the progress and to ensure that there no deviations from the schedule. This coordination and detailed monitoring also allows the Foundation to fulfil another of its objectives: cost control, aimed at avoiding budget deviations. We must never overlook the fact that the work we carry out is financed via taxes, that is to say, it is the citizens of the Valencia Region that enable us to reach our goals and, therefore, we scrupulously manage these funds in order to provide results within the deadlines and budgets established.

These efforts to meet our deadlines and to work in accordance with our budgets have enabled the Foundation to complete 10 restoration campaigns in 14 years. These campaigns have culminated in the following 10 exhibitions:

"Sublime" (Valencia, February - August 1999): 398,463 visitors
"Desconocida, Admirable" (Segorbe, September 2001 – August 2002): 204,321 visitors
"Semblantes de la Vida" (Orihuela, March 2003 – April 2004): 532,448 visitors
"Paisajes Sagrados" (Sant Mateu, March 2005 – January 2006): 510,975 visitors
"La Faz de la Eternidad" (Alicante, March 2006 – January 2007): 548,722 visitors
"Lux Mundi" (Xàtiva, March 2007 – January 2008): 574,232 visitors
"Espais de Llum" (Castellón, Borriana, Vila-real, October 2008 – August 2009): 250,000 visitors
"La Gloria del Barroco" (Valencia, December 2009 – October 2010): 572,658 visitors
"Camins d'Art" (Alcoy, March 2011 – March 2012): 232,000 visitors
"Pulchra Magistri" (Culla, Catí, Benicarló and Vinaròs, December 2012 – in progress).

In total, the exhibitions staged by La Luz de las Imágenes have been visited by nearly four million people.

An innovative aspect introduced by the Foundation in the last three years is the fact that it is the institution's workers themselves who are responsible for the creation of the design and installation of each exhibition, taking into account the expository narrative previously defined the exhibitions' curators. This has enabled cost savings, since the materials (exhibition panels, structures, etc.) are reused and adapted to the demands of each new design, and the transfer of the works is controlled directly by the Foundation, which has its own vehicle and expert staff for the handling of each exhibit.

1.2 Dissemination and education

The exhibitions staged by La Luz de las Imágenes represent only one of the visible aspects of the work undertaken to bring the region's citizens into contact with their cultural heritage. In addition to the exhibitions, which are always organized in buildings that have been previously restored, thus increasing the visibility of both the restored works and the buildings themselves, the Foundation uses two other ways to engage citizens with their heritage: the organization of educational workshops and publication of different works.

Each exhibition offers educational workshops, usually in one of the restored areas, aimed at all audiences, and especially at young people and children. Through the use of manual and multimedia tools, attendees discover the details of the restoration processes and are able, through various activities designed specifically for each exhibition, to put the skills learnt into practice. Since 1999, some 370,000 users have attended these educational workshops.



Fig. 3: Visitors to "Camins d'Art" (Alcoy-Valencia) (left) and educational workshop held during "Lux Mundi" (Xàtiva-Valencia)

Moreover, since 2012, La Luz de las Imágenes has run a permanent educational workshop in its Movable Assets Conservation Centre in Bétera, which is operative during the periods between exhibitions and is overseen by the Foundation's own restorers. When attending this permanent workshop, users are able to obtain first-hand experience of the restoration of works and to carry out complementary manual and multimedia activities related with a chosen area of interest (gold-leaf, stone sculpture, wood carving, chromatic repair, mural painting, artistic and textile techniques).
This contact between the uninitiated and the tasks associated to the restoration work is fundamental to the Foundation, as it enables users to understand the importance of investing in the conservation of heritage, as well as allowing people without expertise in this area of knowledge, and especially the young, to discover for themselves that this investment in heritage and, therefore, in culture enables citizens to continue to enjoy that which already belongs to them.
Since its inception, the Foundation has also published dozens of works, including those corresponding to the various restoration campaigns and the catalogues detailing the movable assets that have been restored as part of each exhibition. In total, the Foundation has published:

- 10 catalogues corresponding to each of the exhibitions.
- 15 books about the architectural and artistic restorations carried out during each campaign and on different aspects related to each exhibition.
- 10 Cds of early music performed by the Choir of the Generalitat Valenciana.
- 17 DVDs on the restoration work carried out and on diverse historical and artistic aspects related to each exhibition.

The contents of these publications, especially the restoration books and the catalogues, are created by the historians involved in the selection of pieces for each exhibition and by the architects and restorers who carry out the architectural and artistic interventions. The coordination, translation, layout and publishing of each publication is carried out by the Foundation's staff. In this way, the institution is able to control and monitor the entire process.

2. Heritage and social profitability: an internationally-recognised management model

After 14 years of work, the Valencia Region's La Luz de las Imágenes Foundation has managed to create a multidisciplinary team of experts representing more than thirty occupations, including architects, restorers, archaeologists, stonemasons, glaziers, gilders, goldsmiths, historians, archivists, documentalists, administrative staff, journalists ... all of whom are highly-skilled and capable of proposing technically-appropriate solutions that are respectful towards the heritage and adapted, in terms of budget and deadlines, to the problems that may arise when addressing heritage interventions.
During this time, La Luz de las Imágenes has been able to complete a circle that allows it to manage the assets in a comprehensive manner: project-restoration-dissemination-socio-economic profitability. The last aspect is the factor that differentiates our institution from other agencies involved in heritage management.
In 2011, Valencia University's Inter-University Local Development Institute produced a report on the "Socio-economical impact of the recovery, intervention on and dissemination of heritage by La Luz de las Imágenes based on the "Camins d'Art" case" ("Camins d'Art" is one of the exhibitions staged by the Foundation). According to this report, in the case of "Camins d'Art" public expenditure of 7.8 million Euros, primarily financed through taxes, generated wealth in the Valencian economy to the tune of 8.3 million Euros, which represents a rate of return of 6%. These same ratios, when applied to previous years and under the conservative assumption that the effects on tourism are more or less the same, give an average rate of return on public spending of 11%. This means that, on average and over the

period considered, for every Euro of public expenditure on the Foundation's activity, an increase in wealth of €1.11 has been generated in the Valencia Region's economy.
Thus, according to the report on the generation of wealth, the activities derived from the restoration processes, the production of the exhibition and the attraction of visitors activate, through the payment of salaries, the acquisition of assets and the contracting of services, economic processes which generate income and employment in an incremental manner, in accordance with the forward (clients) and backward (suppliers) links. These effects manifest themselves in direct, indirect and induced ways due to the income effect. Therefore, in addition to the overall effect of 8.3 million Euros in terms of wealth, almost 300 (296) jobs were generated.
In the case of the "Camins d'Art" exhibition, the aggregated multiplier effects of La Luz de las Imágenes' activity were 4.0 for added value and 5.1 for employment. The contribution of tourism to the overall effect was 19% for added value and 30% for the generation of employment.
According to the report, the aggregate effects can be used to demonstrate that the sector that obtains the most benefit from the Foundation's economic activity is the cultural sector (57.4%), followed by the business services and the industrial sectors. By contrast, the main benefactors in the case of tourism are logically the areas of hotel and catering and retail trade (63.6%).
This report allowed us to corroborate that the Foundation's heritage management enables the investments made to be re-channelled into society and that such investments in culture are worthwhile. This is the line that the Foundation has intuitively followed since its creation as, although such scientific data was not available until 2011, the feedback obtained from local institutions pointed in this direction.
A great many municipalities request interventions by La Luz de las Imágenes centred on their heritage and the staging of exhibitions. As mentioned, the Foundation makes a direct investment in movable and environmental heritage that enables us to enhance their value and, therefore, their reuse. And sometimes even to put certain locations on the map. This is possible because our institution acts not only in big cities, but also in small towns, thus enabling them to enter the cultural and touristic circuit.
Given that the restored assets serve not only as attractions for visitors during the exhibitions staged by La Luz de las Imágenes (let us remember that each exhibition attracts an average of 400,000 visitors), but that they remain in their places of origin and that, following the conclusion of the exhibitions, the local authorities continue to exploit their presence. This provides a direct benefit for local shops, hotels and restaurants. Most of the time these establishments become fully involved in the exhibitions, offering special hotel rates and menus for visitors to the exhibitions.
The collaboration of local institutions and companies with the La Luz de las Imágenes has always been positive, as they recognise the economic benefit they obtain. By means of an example, we may consider the case of Sant Mateu, a village of less than 2000 inhabitants, which was one of the hosts of the "Paisatges Sagrats" exhibition between 2005 and 2006. According to data provided by the Sant Mateu Town Council's Tourism Department, 'if before "Paisatges Sagrats" 30,000 people visited the town annually, now we receive 140,000 tourists. Between two and three bus loads of visitors arrive in Sant Mateu each day, a figure that is doubled at the weekends, when all the local hotel and catering establishments are fully-occupied. This was not the situation prior to the exhibition, and as such the presence of La Luz de las Imágenes has created a direct impact in the life of the people living here". [1]
Similarly, the press also highlighted the impact of La Luz de las Imágenes on the tourism industry. On July 27, 2005, the journalist Emili Fonollosa published an article in the newspaper *El Mundo* in which he stated "the municipalities that host "Paisajes Sagrados" exhibition venues have seen a considerable increase in the number of visitors since the opening of the exhibition". [2]



Fig. 4: "Pulchra Magistri" exhibition in Catí (Castellón) (left) and "Lux Mundi" exhibition in Xàtiva (Valencia)



Fig. 5: *Mare de Déu* Chapel, Alcoy (Valencia) before (left) and after the restoration carried out by La Luz de las Imágenes

Furthermore, during the restoration works, La Luz de las Imágenes attempts, in so far as is possible, to contract the services of local companies in order to produce a return on the investment in the community.
Local staff for the venues, guides, maintenance and security staff, etc., are also contracted for each exhibition. In accordance with the number of venues employed for each exhibition, between 20 to 30 people are contracted for the duration of each project.
Another aspect to be noted is the presence of La Luz de las Imágenes in the media throughout the each restoration campaign. The Foundation has its own press department that issues weekly reports on the progress of the work undertaken and which creates interest in upcoming exhibitions as the respective inauguration dates approach. Press releases are issued on the progress of the work and press conferences are held over several months to report the latest news. Following the inauguration of each exhibition, domestic media sources are invited to guided visits, which in turn give rise to press articles and audiovisual presence throughout the Spanish territory, increasing the dissemination of our work throughout the state.
In order to raise interest in the exhibitions, the last restoration campaign was the first occasion on which the works were opened and free, guided visits were organised under the supervision of the architects participating in the project. This line of faction enables visitors to receive accurate, technical information adapted to a public that does not always possess expert knowledge of our activities. The experience has been extremely positive and all the scheduled groups were fully booked.
This is another aspect on which the Foundation places great importance: the attraction of segments of the public that are not related to the art world. We are able to capture the public's imagination and interest in heritage through the previously-mentioned educational workshops and with initiatives such as the guided visits to the works and the organisation of concerts in the exhibition venues in order to present the music that we have recovered. By means of example, during the "Espais de Llum" exhibition we organised an organ concert during which pieces that were selected for the occasion were interpreted and which saw, for first time after many, many years of silence, the Baroque organ of the archipriestal church of Vila-real (Castellón), constructed by the Salanova family in 1724 and considered the best example of a baroque organ from the ancient Kingdom of Valencia, played once more in public. The organ had previously been restored by La Luz de las Imágenes.
Recent years have seen La Luz de las Imágenes' commitment to the region's heritage and its constant work aimed at the dissemination of knowledge about the same recognised in the form of two important international awards: the Europa Nostra Award 2009, in the category of "Dedicated Service", in which the jury highlighted the Foundation's exemplary contribution to the conservation and diffusion of information about heritage, and the CICOP Foundation Award 2012, endorsed by the UNESCO Forum, for its exceptional and relevant work in the field of World Cultural Heritage.
As part of this congress, three further communications will be presented providing greater detail on certain of the aspects outlined in this communication.

Conclusion

Since its creation, the Valencia Region's La Luz de las Imágenes Foundation has striven to bring cultural heritage closer to the region's citizens in order that they may feel it as their own and through it recognise their own symbols of identity.
The conservation and restoration of movable and immovable assets for their own artistic interest and that of other, less tangible assets or those of lesser artistic importance but equally deserving of being preserved by virtue of the esteem in which they are held by the region's citizens, precisely because they represent certain symbols of identity, is the first step. However, if we are unable to capture the

interest of all sectors and publics from an educational and inclusive perspective, in order that they may interiorise the fact that without heritage there is no past, the considerable investments required will not be understood, and less so in the current situation of economic crisis, and society, and specifically the sectors without expert knowledge of this field, will turn their back on history and lose the opportunity to discover their roots in today's current, ephemeral world.

La Luz de las Imágenes has demonstrated that heritage can be managed in such a manner as to educate and to interest, and that the corresponding investments are not only reflected in the conservation actions, but also in the social and economic revitalisation of the towns and villages in which the Foundation acts. There is no doubt about our commitment to heritage, but we are also committed to society, with those who are not experts in architecture, painting, restoration, etc., because, if we do not include these citizens, we will lose the opportunity for all of our projects to be understood and supported.

Bibliographical References

[1] FERRER, Iván. Increase in Tourism in Sant Mateu, interview with the head of the Sant Mateu Town Council Tourism Department. Sant Mateu, April, 2009.

[2] *El Mundo*. Emili Fonollosa. «The Regional Ministry considers an extension of "La Luz de las Imágenes" in the face of the success obtained among visitors". Castellón, 27 July, 2005.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The restoration of the church-fortress of Vinaròs

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Abstract
The archipriestal church of Vinaròs is the latest building to be restored by the Valencia Region La Luz de las Imágenes Foundation to host the "Pulchra Magistri. The splendour of El Maestrazgo in Castellón" exhibition. This building was built at the end of the 16th century to fulfil the dual role of a parish church and a fortress in order to protect the town of Vinaròs from possible attacks of Berber pirates.
The restoration of the building is based on three intervention principles: the consolidation of the external image of the church, the recovery of the unity in the central nave and the recovery of the ambulatory for cannons. The outstanding feature of this church as a fortress makes this building special and different from the vast majority of the contemporary churches.
In the exterior of the church, the intervention has consolidated the strong image of the fortress wall which is completely polychromed with a trompe l'oeil architecture, unique in Spain. The interior of the church is very heterogeneous due to different interventions carried out in the past century. These interventions weakened the coherent contemplation of the central nave, so the unity of this space has been recovered through a global intervention and individual actions in the lateral chapels.
Regarding the ornamentation, the important sgrafitti on the walls and in the lateral chapels were recovered. The frescoes, with great artistic value and in poor conservation status, were also restored in several chapels. In the exterior, the Baroque entrance door was also restored bringing out its compositive aspect made of several kind of limestone.

Keywords: architecture, restoration, trompe l'oeil, church-fortress

Introduction
Vinaròs is a small coastal town in the north of the Valencia Region. In 2013, the city's main building was restored by the *Fundación de la Comunidad Valenciana La Luz de las Imágenes*, which researched the remains found on the site in order to restore their original historical and artistic value.

1. Vinaròs Archpriest's Church: the architectural duality of a temple-fortress

1.1 Vinaròs, a border city
Located at one end of what was the old village of Vinaròs and marking the beginning of the main street leading to the sea, we find the stunning archipriestal church of Our Lady of the Assumption. The power of the monument remains intact despite the passage of the years: it is a sturdy-looking building, which both acted as a key element in the defence of the old town and served as a focus for the

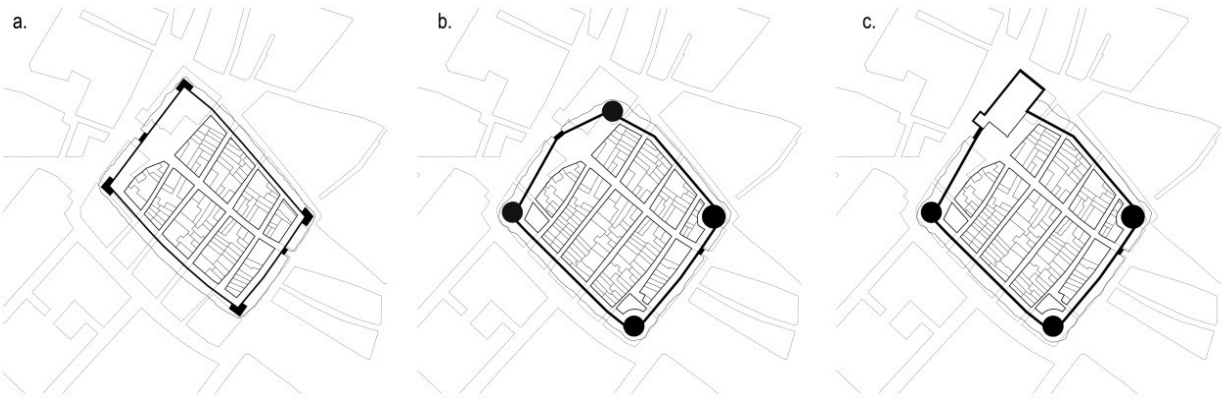

Fig. 1: The archipriestal church and its development alongside the defence system: a. 18th century; b. mid-16th century; **c**. 1586_construction of the temple

inhabitants' spirituality. A monument whose history and transformations have always been linked to the town's urban and historical development.
In Vinaròs' old street layout (which is still evident today in the distribution of the streets, if not so much in the architecture), the temple stands as a border element, located at the northern end of the town and forming part of its defences since the end of the 16th century.
In its origins in the early 13th century, the town was located in reconquered Christian territory and was characterised by the standard morphology of this type of *exnuovo* settlement, based on a grid of small, perpendicular and parallel streets. The main thoroughfare, Calle Mayor, ran across the town from northwest to southeast, running from a small square in the extreme north that was host to the present archpriest's church and ending at the sea. From the beginning, it was surrounded by defensive elements of varying quality designed to protect the territory, as its condition as a border town represented a determining factor in its urban development.
Coinciding with the refortification campaign carried out in the Valencia Kingdom, the walls were extended during the 16th century, followed by the posterior construction of the church. This represented a significant development along the entire coastline of the Kingdom of Valencia, as evidenced in 1579 by the engineer Bautista Antonelli when referring to Peñíscola, situated a few miles south of Vinaròs, and the great concern relative to the seafront boundary:

> (...) it is surrounded by its enemies, the Tagarins of Aragon and the Moors of the Kingdom (...), it lies five leagues from a Muslim port, from which those on land could be serviced by sea. [1]

1.2 The temple/spiritual vs. fort/defence duality

> (...) a church that has been built in the fashion of a fort, necessary both for divine service and worship and for protection against the enemies of our Catholic faith (...). [2]

This quotation from the builders responsible for the new church explicitly describes the programmatic duality of the temple from its conception. A temple designed by Joan d'Ambruesa, in a style typical of the religious architecture of the time, whilst at the same time successfully incorporated into a fortress. Complying equally well with both requirements (religious and defensive), as if it were a mechanism, the archpriest's church of Vinaròs is an interesting typological example of hybrid architecture capable of combining two uses and two aesthetics in a single body: the exterior, compact and prepared for the defence of the town from attacks; and the interior, devout, perfectly designed to accommodate moments of divine worship and created in the style of the time.

1.3 Formal reality of a church connected to the defensive system

The archipriestal church was built in 1586 on new foundations, precisely in response to its dual requirements: a large temple capable of hosting the faithful living in the town, which had seen a significant increase in its population, and the need for an icon to complete the city's defensive system.
Much of the new temple's surface was constructed outside the city walls, thus leading to an alteration of the defence system upon its completion. This fact would determine the monument's exterior image, above all in its northeast and northwest facades, which were placed beyond the walled city and which resemble those of a fortress more than of a temple. The corners were equipped with guard posts and a double strategic and defensive area for the protection of the city: a semi-exterior walkway along the building's perimeter on top of the lateral chapels, from which artillery was deployed, and a flat roof connecting with the wall and used for changing the guard. The rooms in the tower, which was built at a

later date, offered a connection to the walls, with the tower itself serving as the main observational point due to its great height.
The interior, dedicated to worship, has been designed in a formal, “Roman” style, highly-characteristic of Valencian architecture of the period, with the nearest vaults finished in the region’s characteristic Gothic style.
Thus, the archipriestal church represents the town’s most important and best preserved monument. The outer strength of the building, which became a key point for the town’s defence, remains virtually intact: the passage of time has taken its toll on its surfaces, but the walls’ morphology remains unchanged. The interior, more disjointed and altered over the years, required a study and investigation, which in turn revealed the successive layers deposited throughout history on the temple.

1.4 The meaning of the present and the recording of the past

Prior to an architectural intervention in this type of building, it is the knowledge of the past that reveals the manner in which to carry out the project. The definition of a series of operative guidelines becomes the *modus operandi* that establishes the form of the intervention.
The intention of enhancing the programmatic duality has governed the process from the beginning of the project. It is precisely the defensive exterior of the temple that converts it into a unique type of building, a character that has been conserved despite the different alterations carried out during its history.
The operational form of the project’s development and its subsequent implementation has been closely linked to the research into and the knowledge of the building. The learning process, the construction stages of which were related to the historical context, has marked the course of the project’s development. The passage of time has been incorporated into the strategy, enabling the discovery of the monument’s historical reality to serve a means of reflecting its past, whilst simultaneously conditioning and enabling the incorporation of new installations more closely linked to the present.

2. The interior intervention

2.1 The initial image and understanding of the order of the interior spaces

Prior to the intervention, the interior of the temple presented a heterogeneous aspect due to the overlapping of different periods and previous elements and decorative styles. The central nave presented an image dating from the early 20th century, with many plastered elements, structural elements with marbled strips decorated with pastel-toned borders and plasterboard-covered keystones. The chapels, the majority of which were damaged during the civil war, had been refurbished with paintings and emergency alters that did not respond to the building’s character. And finally, the presbytery had been subject to a restoration several years earlier, during which layers of stucco and paint had been removed in an attempt to reconstruct building’s possible original image.
Therefore, the exterior of the building represented an amalgam of hastily-executed actions, eclectic decorations and restorations that conferred a banal aspect to the elements they were intended to recover.
Once the elements necessary for establishing criteria and targets had been understood, and aware of the relevance of each of the decorative layers, work was begun on interpreting the treatment to be applied in order to enhance the building. The image of the central nave had to respond to a criterion of unity, capable of being understood as an indivisible element in which the globality of the whole dominates. This is the spine from which the lateral chapels are articulated, the latter in turn requiring consideration as individual, unitary elements: whilst each chapel maintains its own unity of elements, it is not necessary that it maintains unity with the adjacent chapels. And for this system to work, every new element introduced must be neutral and fully discernible from the surrounding context.

2.2 Study and determination of different surface layers

Thus the building’s hierarchy was established and its parts were located within the scheme of the actions to be undertaken. The different layers present in each of the elements determine the final image, with those of greater value (historical and artistic) determining the nature of the intervention. Two predominant layers were found in the central nave: the layer of stucco, paintings and borders from early 20th century, and the layer of original decoration lying below, consisting of lime mortars with painted lines in the manner of false ashlars, together with the bare stonework of the structural elements. The decorative layer dating from 1916 had been badly damaged by damp, and in some sections it had disintegrated due to the presence of salts. In order to visualize the original lines on the stone facing as a whole, check their condition and determine the extent to which they could be recovered, a series of stratigraphic tests were conducted to determine the viability of their restoration. Practically all the sections of the vaults that had not been exposed to excessive leaks of water were



Fig. 2: The initial and final condition of the nave

found to have preserved almost all the grooves and brushwork associated with these decorations. The masonry of the ribs, arches and pilasters, meanwhile, was found to be in excellent condition.

The situation in relation to the side chapels was different, with each chapel presenting a different type of decoration and different periods reflected on their surfaces. The predominant style, however, was that of eclectic post-war compositions, in which very poor quality paintings and heavy altars and retablos were mixed with loud plinths made from inappropriate materials. Thus, each chapel was a jumble of objects and colours that were hardly representative of the temple's essence. During the study process, a decorative style which was found in almost all the chapels was studied. It was based on a layer created in the 18th century using the sgraffito method, with a thin layer of plaster standing out over an earth-coloured lime base.

Two chapels contained baroque pictorial compositions painted by local maestros, whilst another was decorated with gold leaf. As occurred in the nave, a strict research protocol, based on soundings carried out in various parts of all the chapels, was implement in order to determine the conservation status of this level and the degree to which the previous layers had been lost. The results showed that the above-described model had been used to cover all the vaults and the bases above the ledges, whilst below there was a border running the entire length of the gold leaf up to a supposedly original plinth.

2.3 Management and combination of ornamental layers

As such, each of the layers applied to the temple's masonry over time were defined and analysed, revealing their degree of preservation, extension, qualities and historical and artistic importance. In view of the combination of all the different layers, the whole was treated as a model of overlapping architectures, each covering one another whilst allowing those decorative elements or details that were deemed interesting to be visible, under the provision that they did not distort the overall picture of the temple or its surrounding elements. A second level hierarchy was thus established, based on a decorative, global background, peppered with curiosities in the manner of archaeological traces. Therefore, reintegrations or additions were treated from a neutral perspective, avoiding their affecting or breaking the unity of their surroundings whilst allowing them to remain discernible from the original parts.

Based on this knowledge, on the combination of the different layers, an order was established for each, with a decision taken on which was to predominate and how they were to be arranged, in order to understand the hierarchy between the elements that simultaneously endowed the space with unity and complexity. All the superficial layers were eliminated from the central nave until the base was reached, thus creating the global image of the central area, composed of bare stone and lime mortar plastering in imitation of ashlar masonry. In certain points, evidence of the presence of soft-toned pictorial remains which decorated the front sides of the bases of the formeret arches and spandrels in the form of borders and bossages were left.

A decision was taken on which of each chapel's layers was be treated as predominant. A disassembly protocol was established for the layers that had suffered the greatest degree of disintegration, coinciding with that of the second half of the 20th century. The operation carried out was very similar to

that of the main nave, consisting of cleaning the stone in order to reveal the structural elements and consolidating the predominant, representative decorative elements, which were highlighted by virtue of the neutral treatment applied to the rest. In the absence of intermediate layers between the sgraffiti and the subsequent decoration, it was decided to reveal the decorative element as the most dominant element within the space.
As opposed to the original decoration of the central nave, a large proportion of these coatings were missing, in some cases representing more than 50% of each of the gold leaf sections. Therefore, the action implemented was defined as a stylistic operation on how to the treat missing sections. Following the criteria established for the overlapping of different layers, the missing sgraffiti was considered as the base level and treated as such, neutral and with a smooth finish and dull background, highlighting the baroque decoration as the main image. In this way, the traces of the drawings were submerged in an atmosphere in which, more than the details of the forms, the general texture was highlighted.

2.4 Reintegration and addition of new components

Once the walls and their coatings had been consolidated, and following the definition of the image of the temple's decoration, it was necessary to determine the manner in which the new elements were to be introduced, as well as the character with which they were to be endowed. The removal of the surface elements and the stripping of the layers in the areas that interfered with the understanding of the space and which distorted the interpretation of the relevant decorative elements was limited to specific areas, with the determination of a system composed of discernible layers related to each other within a global environment, and with the premise that they would be highlighted by the building itself. These additions acted as links between parts of the overall space, enabling the holistic understanding of each of the proposed levels of hierarchy. The new layers, overlaying the ornamental layers, revealed simple, neutral and light forms, occupying a second level as objects subject to the architectural consistency in which they reside. In this manner, both the treatment of missing elements and the addition of new components formed the final layer of the system of overlaps employed during the project. An additive character which time bestows on buildings, without overlooking the effects of different époques or intentions, exposed as a sample by which to understand the temple's experiences and the moments of growth and decline of the society of which it formed a part.

3. The exterior intervention

3.1 The ambulatory and the roof

The ambulatory is the space above the church's side chapels and the sacristy's rooms. It is a long, continuous volume that borders the temple's main nave, separating spaces by means of the buttresses. These rooms are covered with barrel vaults following the longitudinal axis of the nave, and are made from rough stone masonry.



Fig. 3: (Left) Old wooden window used for ventilating the nave, together with the cable duct above the ledge. The window is interrupted by the vault and the ambulatory roof. The lower section of the window was deprived of direct light from the exterior. (Right) Windows after the restoration.



Fig. 4: (Left) The ambulatory prior to the intervention. It was unpaved and the upper surface of the lower vaults can be seen. The wall bears cabling trays and the attachment elements of obsolete facilities, which reduce the space for passage between the buttresses. (Right) The ambulatory after the restoration.

The ambulatory was created in accordance with a defensive function, converting the building into a church-fortress. The fortress facade was of a regular form hiding the structure of the religious building, akin to a huge canvas. Large openings give onto the exterior between the buttresses. They were used for firing larger artillery. This same facade includes a series of smaller openings located at different heights and used for different types of weapons.

Access to the ambulatory and to the roof is gained through the tower's spiral staircase, which is attached to the south-westerly corner of the church. There is evidence of the original access from the interior of the nave, which connected the church to the ambulatory and the flat roof, located within the west wall. This access, which is currently walled in, was used until the tower was built some years later. In the second half of the 19th and the early 20th centuries, the first rooms next to the tower were used as the bell-ringer's accommodation. They were paved with clay tiles. The rest was unpaved, with the upper surfaces of the vaults visible. Subsequently, the ambulatory ceased to be used and was abandoned, remaining as a storage space littered with large amounts of rubble derived from previous works and repairs, pigeon droppings, dust and dirt.

The walls were host to the remains of the fastenings of now-obsolete installations, whilst the corridor was occupied by a cabling duct that semi-obstructed the passage between the buttresses. The larger holes facing the exterior had been sealed with chicken wire to keep out the pigeons. In the interior wall of the church nave there was a series of small wooden windows that served for ventilation, as well as ducts for the cabling supported on the temple's ledge.

Above them, the large windows opened in the walls as part of an earlier restoration process were partially blocked by the vault and the ambulatory's roof. They shed a heterogeneous light between the upper section, which received direct light from outside, and the lower section, which was obscured by the ambulatory roof.

The interventions focused on the removal of debris, the levelling of the floor, cleaning the earth floor tiling and the subsequent paving of the entire surface, the removal of inappropriate elements and obsolete installations from the walls, the installation of grills on the exterior openings, the replacement of windows below the stained glass and the recovery of a homogeneous light in the same.

The new flooring was separated from the original work by means of steel plates anchored to the walls. This metal strip served as formwork for the interior ballast and as a base for the installation of the lighting. Continuous LED were positioned either side of the rooms separated by the abutments to illuminate each of the vaults. The passageways and window sills were surfaced with lime mortar. The interiors of each of the rooms between the buttresses were filled with sandy earth. Continuous layers of lime and sand were applied: the mix was watered and manually tamped down with wooden mallets. The stones that made up the original windows that were replaced when the stained glass windows were installed were embedded in the flooring as historical remains

The original openings in the facades, which had been sealed with rough stone, were reopened, their dimensions unified, the sills recovered with restoration mortar, creating a flat, sloping, waterproof surface to favour drainage.

Small openings were created in the junctions between the vaults and the stained glass in each room in the form of chamfers to facilitate the entry of light from the outside along their entire surface. Irregular polyhedron-shaped, etched, tempered glass skylights were installed to cover the openings in the ambulatory roof.

The small windows under the stained glass were replaced and woodwork elements measuring the same width were installed. The sections visible from the interior replicated the decoration visible in the nave, homogenised the surface and are barely noticeable from the nave. They all have an opening in

their lower sections that serves as ventilation. The openings in the facade were sealed with wire mesh attached to uniform steel-plate frames anchored to the walls.

3.2 The exterior facades

What began as a conventional restoration of facades, adapted to a standard protocol, became, almost immediately, a fascinating adventure that presented us with the challenge of enhancing the value of the most extensive group of wall paintings that exists in the Valencia Region.

The use of scaffolding enabled us to detect the presence of certain lines and coloured stains that we were unable to identify. The first decision was to completely clean the surface, removing all the stains created by fungi and lichens. After cleaning, the number of lines and the extent of the coloured stains was seen to increase, although now certain forms and figures were discernible.

It was decided to employ the same technique used for the graphic survey of the paintings to collect data, consisting of the mapping all noticeable incisions. Once the initial data had been collected, and even with the absence of some segments, the compositional elements of each wall were revealed. A temple was discerned on the west facade, complete with pilasters and a classical order, together with an entrance with a door ajar.

Before the start of the restoration work, the presence of these traces had been lost. Their memory forgotten, these remains were only revealed at certain times when the rain soaked the building's walls, giving rise to the popular belief that the facade had been painted by a patron saint, St. Christopher, together with what appeared to be a globe on the northern facade. The popular imagination had been fuelled largely by the writings of local historians.

During the cleaning process, the areas with and without pictorial remains that matched areas that were very exposed to rainwater were determined, especially in the areas beneath the gargoyles, where even the mortar facing had been eroded.

The cleaning process chosen involved the gentle projection of aluminium silicate in those areas without chromatic remains, and manual cleaning for the areas that did. These operations completed the data collection, with the assignment of the original colour detected in each area. The end result clearly revealed the perspective of a temple with domes at its corners, the buttresses of the new figurative apse.

As the cleaning work progressed, the problems associated to dating the remains arose. At what point in the 18th century were they created? They were carried out via indirect procedures, as there is no associated written documentation. The conclusion was determined by their location, since the paintings were integrated into the expansion of the Communion Chapel, leading us to suppose that they were carried out following the chapel's construction and during the existence of a workshop capable of successfully undertaking such a task. All the indications lead us to believe that they are the work of the Guilló's workshop, which was in a position to carry out such a request. Therefore, we can assume that they were created during the first decades of the 18th century.

The 18th century enjoyed an economic boom following the conclusion of the War of the Spanish Succession and the end of Berber attacks, leading to the growth of the city and the consolidation of several settlements outside the city walls. The church's military functions were no longer necessary and it was used solely for religious purposes, becoming the most important building in Vinaròs. This iconic character was enhanced with the painting of its facades and an architectural programme aimed at presenting the church as a reference in the eyes of the new society of the Enlightenment.

This extensive composition was carried out by applying a fine layer of plaster over the initial defensive stonework, upon which the auxiliary lines and those which were to define the architecture that was to be represented were drawn, whilst simultaneously defining the masses of colour that enabled the



Fig. 5: Photo-drawing of the west facade with trompe l'oeil architecture, inicial (left) and final condition

creation of perspective. The remnants of colour, more than at first believed, have provided highly-precise knowledge of the range of colours employed (different tones of ochre, Indian red, black and white) and the syntax of their use, which in turn served to enhance the different architectural elements.
The decision to enhance the paintings as a whole gave rise to the difficult balance of presenting observers with the original colours without forgetting that the time that has passed since the creation of the paintings has altered the sensitivity of their perception. The pre-existing idea of seeking the solution in modern painting and, more specifically, in the informalists, led us to focus our attention on Jean Foutrier, a French painter and sculptor who was not involved in the Cubist experience, but who experimented with other forms of abstraction that placed him in a leading light when appreciation was first shown for the work of the informalists around 1945, shortly after the end of the second world war.
There was a clear awareness of the intention to recreate an 18th century theme with 21st century sensitivity. Foutrier's working method was well-suited to the concept governing the recovery of the paintings. The colour leaps beyond the limits imposed by the lines, in the manner of Kandinsky in certain of his *Improvisations*, a line which in turn is measured in tone and thickness to enhance specific aspects of the work. The use of colour with texturing, renouncing flat colour, working it by density to obtain depth, at times merging with the adjacent colours, as in the art of watercolour. The control of colour required the use of natural pigments mixed with lime paint, which affords a wide range of resources, densities, fading, tones, etc., although these were achieved at the expense of longevity, as we know that the protective measures employed cannot alter the technique's finite nature.
Facing this challenge, the recovery of a painting covering more than 1500 m^2, was akin to the work of Diego Rivera and Siqueiros and had to be conceived as an act of collective painting in which it was necessary to shed the role of hegemonic management and integrate oneself as another member of the team. Each member of the team, together with the restaurateur who participated in the project and following the general guidelines issued, was called upon for their own, personal poetic contribution, giving rise to a necessary cultural intermesh and, thus, enriching the intervention.
The result has satisfied those who were involved, and it is hoped those who contemplate it, too.

Bibliographical References

[1] A.G.S., Guerra Antigua, leg. 90, fol. 23.
[2] A.C.A., Consell d'Aragó, leg. 864, docs. 1-4.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Conception, design and installation of the Luz de las Imágenes exhibition: 'Pulchra Magistri. The splendour of the Maestrazgo in Castellón'

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The exhibition “Pulchra Magistri. The splendour of El Maestrazgo in Castellón”, captures the uniqueness of this border territory which, for centuries, was the northern stronghold of the old Kingdom of Valencia, an area of experimentation and cultural exchange betwen the neighbouring Kingdom of Aragón and the Principality of Catalonia.
To do so, a mechanism composed of interconnected explanatory levels has been employed, allowing the visitor to participate in the whole narrative, from the restored buildings to the qualities and curiosities of certain of the artworks that cannot be seen at first sight. In this way, all the elements within the exhibition’s itinerary, including the towns themselves, are part of the exhibition as a whole.
Therefore, the system used to generate the spaces connects the several levels of information, adapting the content to the spaces and creating connections between the different exhibition venues. The elements are rapidly and easily deployed throughout the space, allowing all the material to be reused once the exhibition is over.
The system is composed of a modulated structure, with scaffolding supporting DMF panels by means of attachments made from recycled material. The furniture is also made of elements that enable them to be adapted to different spaces and situations.
In addition, accessibility to all the areas which, by virtue of their interest, are an indispensable part of the exhibition, is granted by using a system of platforms and access ramps.
Each element is linked to the overall space, forming part of one of the system’s levels, related, through the different pieces (graphic, artistic or architectonic), to the socio-cultural imporance of El Maestrazgo of Castellón and its relationship throughout history.

Keywords: exhibition, educational, systems, scaffolding, formats

Introduction

The exhibition “Pulchra Magistri. The splendour of the Maestrazgo in Castellón” represents the tenth edition of a global project organised by the Luz de las Imágenes Foundation aimed at the conservation, restoration and dissemination of the artistic and architectural heritage of the Valencia Region. The symbolic nature of this edition has determined the focus of a design centred on explaining the heritage of the Maestrazgo area of Castellón, a border territory within the Valencia Region that has been historically characterized as an area of experimentation and cultural exchanges with neighbouring Kingdom of Aragon and the Principality of Catalonia.
The design of this edition’s exhibition has been conceived in accordance with a very clear objective: to enhance its informative nature in order to increase the interest of visitors in an exhibition that offers more than three hundred works in seven different exhibition spaces in four different villages and towns in the Maestrazgo: Culla, Catí, Benicarló and Vinaròs.

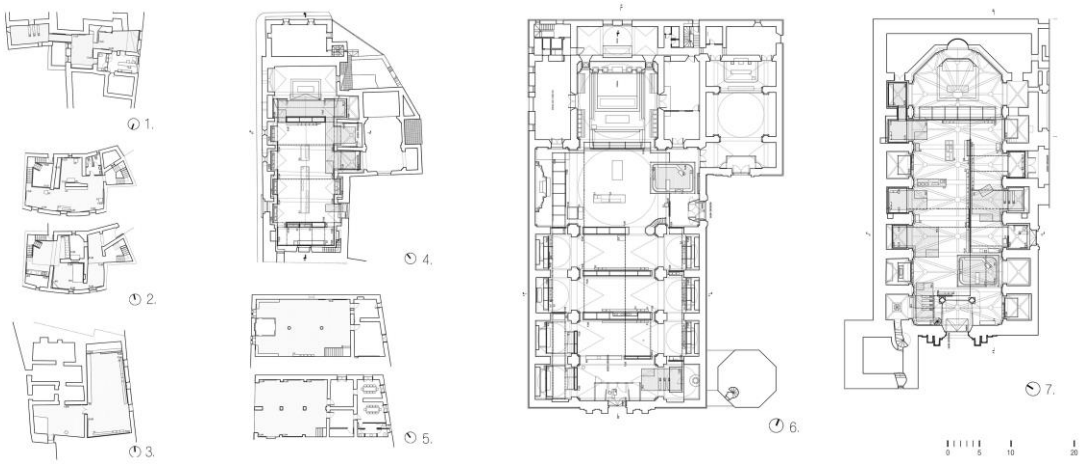

Fig. 1: Comparative scheme of the scale of each of the seven exhibition spaces

1. Expository discourse. The didactics of a route

1.1 Concept, requirements and geographical factors

After the exhibition "*Paisajes Sagrados*" (Sacred Landscapes) held in 2005, La Luz de las Imágenes returns to the Maestrazgo, a Valencian territory of special significance and characteristics, and this time it does so with a different approach. While La Luz de las Imágenes' last two exhibitions were held in only one village, the exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" was born from the desire to function as a powerful bond between two parts of this territory: the Alto Maestrazgo, located inland in the northern extreme of the Valencia Region, and the Bajo Maestrazgo, a coastal area directly related to the communications between the main cities of Valencia and Catalonia. Despite the geographical proximity of the two regions, each has very different constraints. Thus, while the Alto Maestrazgo is formed of small mountain villages, and its main attraction resides in ecological and adventure tourism, the Bajo Maestrazgo is characterized by the beach tourism offered by the larger coastal towns.

The dialogue between these two related, but differentiated, territories is the main determinant of the current exhibition, conscious of the articulating power and socio-cultural and economic importance that the exhibitions staged by La Luz de las Imágenes represent for the towns and villages in which they are held. Thus, the exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" has been conceived as a unitary whole located in four different municipalities: Culla and Catí in Alto Maestrazgo, and Benicarló and Vinaròs in Bajo Maestrazgo.

The geographical fragmentation of the exhibition represents a very demanding starting point in logistical terms and determines a fundamental aspect: the exhibition must offer an interpretation of the whole in order to create the necessity to visit each of the venues whilst, at the same time, it must allow a certain degree of independence between the spaces in order that they may be visited at different times. In this context, the didactic facet has been developed as necessary element in the conception of the exhibition project, as it is the global awareness of the narrative that allows the visitor to understand the relationships that exist between the different spaces and the different exhibits.

1.2 Expository discourse

The main characteristic of the exhibition project, developed by the curators Victor Marco and Josep Alanyà, is the enhancement of the artistic expressions of the Maestrazgo territory which, traditionally, have been relegated to the background. Thus, in addition to bringing together key works from the medieval period, which are normally associated with the history of this area, the exhibition also displays works of art of great relevance belonging to other periods, such as the Modern and Contemporary Ages, as well as the Prehistory. The exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" provides, for the first time, a complete picture of the evolutionary development of the area's art, bringing to light several artistic periods that have remained relatively unknown until today, and without which this global interpretation would be impossible.

The ample time-period covered by the exhibition is complementary to its fragmented nature. Thus, a logical dialogue between the content exhibited in each venue and its geographical location is established. In chronological order, the exhibition shows visitors the evolution of the area's art in consonance with the geographical evolution of the municipalities involved. Thus, the artistic expressions ranging from prehistory to the Middle Ages are located in Culla and Cati, key populations



Fig. 2: Different explanatory formats. Brochure and guide for visitors

during the formation and early development of the historic Maestrazgo, whilst the works derived from the Renaissance to the Modern and Contemporary eras are displayed in Benicarló and Vinaròs, municipalities which experienced their peak precisely in these periods.
This approach gives rise to a relationship between the exhibited works, locations and periods of great interest that is intended precisely to enhance the dynamic connection between the Maestrazgo's two regions. Thus, inland municipalities are host to those medieval and prehistoric works with which the public is initially more familiar, whilst Benicarlo and Vinaròs, which possess an inherent attraction for tourists throughout most of the year due to their coastal location, are host to lesser-known artistic manifestations which nevertheless are highly-relevant in terms of obtaining a global vision of the region's art. The result is a balance between the artistic content and the geographical and architectural containers hosting the exhibition which maintains its interest throughout its chronological development.

1.3 Three explanatory lines. The educational condition of a public investment

In the combination of the need to explain the exhibition as a whole in relatively distant locations and the relational interpretation between works from different periods, education represents a key element. The use of multiple explanatory tools that accompany the visitor along the itinerary is one of the exhibition's fundamental aspects. In this sense, the design team, in constant communication with the exhibition's curators, has developed an educational system divided into three interconnected explanatory lines. The main intent is to enable visitors with very different cultural experiences and artistic interest to obtain a global interpretation of the exhibition. To this end, there are multiple layers of information that allow visitors to voluntarily select the elements that are of greatest interest to the them.

1.3.1 Line 1. The exhibition's articulating instruments

The first educational line has been developed within a global order and serves to explain the exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" as a whole. This first layer of information enhances the interpretation of the exhibition as a socio-cultural instrument of the highest level and serves to relate its artistic content with the different contexts in which it is located, with emphasis on the necessary link between the artistic manifestations and their place of origin and exhibition. The design developed by the project's team for all the exhibition's graphic elements represents a key factor in the implementation of this premise: this initial educational line is mainly composed of printed and digital content that is external to the venues themselves.
Different formats have been employed in such a manner so as to, directly and simply, explain the exhibition as a whole and, particularly, in terms of the content exhibited at each venue. On one hand, a brochure has been designed to be available in all the exhibition areas in order to explain the fundamental aspects of the exhibition as a whole. This triptych highlights the content of each of the venues and enables the visitors to become aware of the relationship between the exhibition's different contents. As a complement to this initial didactic element, the team has created a guide for each space which presents a detailed explanation not only of the exhibition's artistic content, but also the buildings that have been restored for the exhibition and the most relevant aspects of each municipality.

These two graphic elements, supplemented with a catalogue of the exhibition and the information available via La Luz de las Imágenes different digital platforms, offer visitors a comprehensive view of the exhibition and its relationship with the municipalities in which it takes place.

1.3.2 Line 2. Architectural and artistic content of each venue

The second educational line is developed within each venue and serves to explain to visitors the most relevant artistic and architectural aspects of the expository narrative. Within each of the buildings hosting the exhibition there are three main elements whose content has been developed jointly by the exhibition's curators and the design team. Each of these elements serves to explain the fundamental aspects of the selected works on display and their relationship with the exhibition's chronology. Firstly, an audiovisual display located at the beginning of the itinerary presents the exhibition's main characteristics and emphasizes the most relevant factors in each venue. Secondly, a series of vertical text panels accompany visitors at various points along the itinerary, explaining the most relevant artistic content of the works on exhibit. Finally, a series of horizontal panels set on wooden stands display information on the main aspects of the host venue and the architectural restoration processes that have been carried out.

These three media have been designed to offer visitors an overall picture of the material on exhibit in each venue, relating the exhibited works to the exhibition's narrative and linking the exhibition to the restored architectural heritage.

1.3.3 Line 3. Specific characteristics of each exhibited works

The third explanatory line represents an innovation with respect to previous Luz de las Imágenes exhibitions, and forms part of the goal to create dynamic, highly educational exhibitions. This third line runs parallel to the exhibited works and serves to explain, briefly and directly, certain of their curious characteristics and notable aspects. Texts of around sixty words in length are displayed on specially-designed horizontal supports situated at the foot of each work. These texts emphasize certain curious aspects of each work, increasing the visitor's emotional attachment to the artist's work.

By means of this third educational layer, further support is given to an exhibition that maintains the visitor's interest throughout the entire itinerary. The combination of the three explanatory lines presented here forms an open system that allows every visitor to choose the level of information in which they are interested.

1.4 New explanatory mechanisms

The three lines that characterize the educational approach of the exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" are accompanied by two innovative instruments In the form of guided visits of the works during their restoration and a 360º presentation showing the buildings before and after the process.

Between July and October 2013, and in collaboration with each of the municipalities hosting the exhibition, visitors were offered guided visits that enabled them to witness the restoration work carried out in each of the venues. With the contribution of the technicians responsible for each project, the public was afforded the opportunity to participate in the criteria and the works carried out, thus facilitating a greater understanding of the importance of the recovery of immovable heritage as one of the main characteristics of the work of La Luz de las Imágenes.



Fig. 3: Explanatory elements located at the foot of the exhibits

Complementing these guided tours, a new digital tool has been introduced into the current exhibition that enables visitors to contemplate, in real time, the relationship between the initial state of the restored buildings and their condition today. This mobile application offers a 360º view of the space in which the visitor is situated. Depending on the point on which the mobile is targeted, visitors are able to see the building's pre-restored condition on their screens, whilst contemplating the final work with their own eyes. This application is also accessible from the Luz de las Imágenes website, thus making it possible to experience a virtual tour of the exhibition.

2. Exhibition design. The expressiveness of the system

2.1 Project. System and adaptability

The expository narrative of the exhibition "Pulchra Magistri. The splendour of the Maestrazgo in Castellón" is based on a fundamental concept conditioned by the factors described in the previous sections: the construction of spaces which are both analogous and different that enable a joint interpretation of a design adapted to the specific characteristics of each building. The support of the artistic works, which play an undeniable leading role in the exhibition, has been conceived as an element by means of which to enhance the overall interpretation of the exhibition's itinerary in the different host towns by means of a clear, constructive identity. The system's legibility offers visitors a clear view of the project, independent of the space in which they find themselves, and as such the construction of the expository support acts as a means of articulating the narrative in the different venues.

The choice of the system developed was based on an additional goal: the construction of a support that created the smallest possible impact on the host venues in order to enhance the visibility of architecture restored by La Luz de las Imágenes. The restored buildings are thus incorporated into the exhibition as fundamental elements of the same by means of a design that aims, by virtue of its unobtrusive nature, to establish a discourse between the container and the content that enhances the value of the exhibition as a whole. The fact that an art exhibition is staged in a religious building increases the interest of a space that combines architectural representation with the artistic significance of the exhibits. The design of the expository media thus becomes the common thread that unites the different elements and gives rise to a new kind of cultural space.

Together with identity and unobtrusiveness, the third of the concepts that define the expository project's objective is adaptability. This premise becomes evident if we consider that the exhibition takes place in seven different buildings, ranging from small municipal spaces Culla and Catí to large churches in the towns of Benicarló and Vinaròs. The multiplicity of scales in these seven containers converts the concept of flexibility into a necessary requirement for the proposed system. In addition to the diverse morphology of each of these spaces, the nature of the exhibits requires media of a different format. This is due to the presence in the exhibition of pieces of very different character, ranging from paintings and small items of jewelry to textiles and documents. This multiplicity of formats requires the design of a highly versatility media.

The combination of these three requirements lies at the centre of a design based on the following constructive elements: a light structure of scaffolding covered with medium-density wooden panels serving as the main vertical support, and a series of horizontal pine elements that resolve the expository requirements of the items of jewelry and the documents. The use of these two main systems, which share the same constructive base but which are deployed in different forms in each



Fig. 4: View of the exhibition in the archpriest's church in Vinaròs

venue, facilitate a clear interpretation of the design's identity whilst creating a diversity of spaces adapted to the morphological conditions of each of the buildings.

2.2 Elements of the constructive system

2.2.1 Vertical structure. Scaffolding and medium density (MDF) wood paneling

The use of scaffolds for the resolution of the exhibition's vertical supports is, undoubtedly, the most distinctive design element. Through the use of this system, it has been possible to create a space that combines functionality and expressiveness via the repetitive use of standardized elements. In addition to the versatility of this light system, another key factor in its use is the economisation obtained through the elimination from the project's equation of the need to store the constructive elements following the conclusion of the exhibition. To this economic optimisation we must add the reduction in the time required to assemble the system, a necessary factor when taking into account the narrow time margin available between the completion of the restoration work in the different venues and the exhibition's official opening date. In this regard, it is noteworthy that all the design's structural elements were mounted in less than a week.

This light structure is used to support medium density wooden panels that are raised above the floor in order to enhance the unobtrusive nature of the exhibition's support media. Through direct collaboration with the company responsible for the installation during the project phase, these panels were installed with great ease on the scaffolding structure using a attachment system that was specially-designed for the occasion. By avoiding the use of mechanical joints, the work involved in the installation and removal of these panels is greatly simplified.

2.2.2 Horizontal elements

Within this category we may distinguish between three different elements, all of which have been resolved with pine wood to achieve a unified image for the exhibition as a whole: the supports for sculptures and items of jewelry, the elements containing explanatory texts located at the foot of the exhibits and the flooring employed to facilitate access to raised surfaces, such as the side chapels in the churches. The material identity which the pine-wood confers on these three elements contrasts with the pure condition of the vertical surfaces, facilitating a direct understanding of the relationship between the two systems. Thus, while the vertical structure forms a unitary element which occupies a large proportion of the space in each venue, the horizontal elements are arranged in a more relaxed manner in the spaces set aside for the circulation of visitors.

Despite the intended difference between these two systems, it is noteworthy that a lightness was also sought in the design of the support pieces through the use of steel substructures to raise the wooden panels, thus minimizing their impact in relation to the existing container.

2.2.3 The shop. A paper lamp

A special feature of the exhibition is the shop, present only in the two larger venues. As an element that is extraneous to the artistic narrative, but necessary in the configuration of any exhibition today, in this exhibition the shop appears as a lamp located at the end of the itinerary, an enigmatic light that must be traversed in order to leave the exhibition. This volume of light is constructed of fabric hanging from a substructure supported by scaffolding. Given its larger scale, the store becomes a reference for visitors throughout their itinerary, although they do not discover its true role until the end.

2.2.4 Installations

The resolution of the exhibition's lighting and audiovisual installations bears a direct relationship to the scaffolding system employed. Thus, the structure's elevated bracing elements have been used conduct all the electrical wiring, thus avoiding the appearance of linear obstacles on the flooring. The support system's general height of four and a half metres also serves to obtain the ideal positioning of the lights and projectors needed for the exhibition. In this sense, mention may be made of the fact that the exhibition's lighting also employs the building's own lighting in a complementary manner as a result of the need to facilitate the contemplation of the architecture restored by La Luz de las Imágenes.

2.3 Educational workshops. An added factor

Educational workshops have been created in the Catí and Benicarló venues aimed at enabling visitors to learn about, research and play with the techniques and materials on exhibit. These spaces are part of Foundation's dissemination methodology, describing restoration processes using virtual software or carrying out the gold- or silver-plating of materials, such as stars, in situ. These workshops are aimed not only at schoolchildren, but at all visitors to the exhibition, having been met with great acceptance and satisfaction.



Fig. 5: Aerial view of the exhibition in the parish church of Benicarló

3. Installing the exhibition

3.1 Implementation period. Coordination prior to installation

The installation of the exhibition “Pulchra Magistri. The splendour of the Maestrazgo in Castellón” was marked by the tight deadline imposed by the need to open the exhibition during the second week of December 2013 and the completion of the restoration work of the various exhibition venues in early November. This left only four weeks to implement the assembly in the four municipalities involved in this edition. For this reason, the coordination work prior to the installation was centred on compliance with the scheduled deadlines. In this sense, mention may be made, firstly, of the high degree of definition of the exhibition project and, secondly, the coordination work in the workshop with the company responsible for undertaking the work.

In anticipation of the necessary presence of the design team as part of the on-site coordination of the exhibition installation process, the exhibition project, drafted during the three months preceding the start of installation, was conceived as a comprehensive document in which all the design elements are perfectly defined. The measurements of all the elements to be created were technically defined in this document in order to avoid the need for global decision-making relative to the project during the intense weeks of the installation. This also allowed the majority of the horizontal pine elements to be produced in the workshop prior to the beginning of the work at the different venues while the assembly of the scaffolding structure was begun. This operation was fundamental for the success of the installation as it resulted in the initial schedule being reduced by one week and enabled the teams responsible for the installation of the exhibited objects to avoid working at the same time as those responsible for the more aggressive construction work.

The constant coordination between the design team and the company in charge of the installation also enabled, through prototyping, the suitability of the proposed construction systems to be tested prior to their final construction. This interaction led to the introduction of specific modifications to certain models on the indication of the company’s specialist carpenters and to improvements to the attachment systems which resulted in direct reductions of the installation time required.

Specifically, during these meetings the anchorage system for attaching the medium density wooden panels to the scaffolding structure was implemented, enabling the optimization of the design and facilitating considerably the posterior assembly process.

3.2 Assembly Coordination of the work

The unique fragmented nature of the exhibition “Pulchra Magistri. The splendour of the Maestrazgo in Castellón” created the need for special planning and the design of an ambitious logistical support for its installation. Given the distance between the inland municipalities and those on the coast, various working teams were required in both areas. Thus, two general teams were created, one for the inland municipalities and one for the coastal towns. Each team was composed of professionals from all the areas to be developed. Thus, it was possible to undertake the works simultaneously and carry them out in parallel, reinforcing those tasks required by the installation.

This division into blocks of work also gave rise to the need for intense coordination by the design team, whose members were also split into groups in order to establish a constant presence in each of the venues. The need for on-site coordination of the works became evident, above all, during the last



Fig. 6: View of the exhibition in the parish church of Catí

two weeks of the installation phase, during which the works of art were installed at the same time as tasks such as the installation of the graphic elements were being carried out.

In chronological order, the exhibit's installation works were carried in the following order over a period of four weeks. During the first week, almost the entire scaffolding structure was assembled in the venues, with the design undergoing certain modifications in its adaptation to the existing spaces. As these structures were being assembled, they were covered with medium density wood panels, with the work, including painting, being completed in the second week. During this second week, the wooden flooring was also installed in the corresponding areas so that, as of the third week, the specialists from La Luz de las Imágenes were able to begin work on the layout and assembly of the works of art. The furniture that was made in the workshop was also installed during the third week, with all the exhibition's support elements in place within the scheduled deadline. During the fourth and final week of installation, the main efforts of the various teams were focused, on one hand, on the installation of the works of art which, in many cases, required the installation of protective glass, and, on the other, on the deployment of all the exhibition's graphic elements. In this category, in addition to the elements described in the first section of this article, a number of advertising banners were installed in each of the municipalities.

With, when taking into account the exhibition's geographical and logistical conditioning factors, an extremely tight deadline to meet, it may be said that the correct implementation of the works on schedule was possible thanks to the collaboration and constant dialogue between the three main agents involved in the process: the design team, the professional team working for the company responsible for the installation work and the restorers of La Luz de las Imágenes. The success of the exhibition lies in the dedication of all those involved in its installation process.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Benefits of a global project about movable heritage

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Abstract
The importance of the Valencia Region La Luz de las Imágenes Foundation's restoration campaigns lies in the fact that they protect the local cultural heritage belonging to regions of influence in each exhibition.
Ideologically the project is not only focussed on the most notable pieces from cathedrals and museums or on artwork created by well-known artists, but it goes further as it reaches the closest heritage: local artwork from all the towns, even the smallest ones, and heritage hidden in convents, vestries or hermitages. La Luz de las Imágenes targets pieces which have not only conclusive artistic and historical value, as the importance of many cultural assets worth conserving, i.e., restored, may lie in other values: devotional, emotional and symbolic in nature. Therefore, the aware of local people towards their heritage is raised, as La Luz de las Imágenes recovers and restores pieces to which they feel close and which are suitable for inclusion in the exhibition narrative defined by the curators of each season.
A multidisciplinary team (architects, archaeologists, religious operators, historians, politicians, owners, users, and restorers) works on each restoration campaign and provides the necessary data in order to define the most appropriate intervention. This allows the mapping and cataloguing of works that were previously unknown, and on many occasions we make surprising discoveries about authors or dates.
Throughout the 10 restoration campaigns run by La Luz de las Imágenes, 2,796 works of art belonging to 123 different towns have been restored; around a hundred in each exhibition, including documents, silverwork, paintings, sculptures and frescoes.

Keywords: movable heritage, values, conservation, interests

1. Different approaches to the restoration of movable cultural assets
The Luz de las Imágenes cultural project is aimed at disseminating the cultural heritage located in different areas throughout the region by means of large-scale artistic exhibitions. Simultaneously, it is a valuable tool for the recovery, preservation and restoration of movable cultural assets and property.
The importance of the movable cultural assets restoration campaigns lies in the preservation of the local cultural heritage belonging to each exhibition's areas of influence.
During the 10 seasons of restoration undertaken by La Luz de las Imágenes, some 2,976 works of art from 123 different towns and villages have been restored, representing some 100 pieces per exhibition. These objects include documents, jewelry, easel painting, sculptures and murals. This has enabled the cataloguing of works hitherto unknown and, in many cases, the discovery of surprises related to their authorship and dating.
Ideologically, the project not only focuses on the major works of museums and cathedrals that have been perfectly identified, it goes further, reaching the most familiar heritage, local assets from all towns and villages, independent of their size, to the heritage hidden in convents, chapels and vestries, as well as assessing the needs of each work, taking into account the target of the work and priority of



Fig. 1: From left to right, initial condition of the St. Agatha altarpiece, discovering a hidden scene and final result of the scene discovered in the attic

the values to be preserved. For these reasons, each campaign is equipped with a multidisciplinary team.

A clear example of this is a work that is kept in a small mountain village with only four inhabitants, a work that is hidden away inside a small temple that opens only two days a year, a work that is stored in very poor environmental conditions: the altarpiece of Saint Agatha, in La Pobleta de Alcolea (Castellón).

For years, the few inhabitants of this village flatly refused to allow the restoration of the altarpiece for fear of its permanent removal from the village. Following an intense campaign based on raising awareness and on demonstrating commitment, and through the mediation of the diocese's heritage delegate, the regional director of Culture, the director of La Luz de las Imágenes and the local priest, these reservations were overcome. And the work has been restored for the exhibition "Pulchra Magistri".

As a work of great artistic and historical quality, the interventions to which it had been subject in response to changes in fashion, and even as a means of preventing theft, as well as its having been embedded, had given rise to numerous pathologies that endangered its conservation and prevented its enjoyment. The panels of the late-Gothic altarpiece had been relocated, changing their original distribution on a gypsum structure, in the neoclassical style. The intervention has drawn attention to an extraordinary work that was hidden from the eyes of the region's citizens, as well as revealing an unknown scene in the upper section, hidden under a thick coat of paint that mimicked a marbled effect. Naturally, further deterioration was avoided, the original interpretation was returned to the piece by means of its reassembly in the manner in which it was conceived, and finally it was able to register the work within a specific corpus of works upon the discovery of similarities with other pieces.

La Luz de las Imágenes also focuses on assets whose value is not limited to their historical and artistic worth, as the importance of many cultural assets that deserve to be preserved and restored may lie in other values: devotional, emotional or symbolic.

Not only those assets which were formerly considered worthy of conservation, those which were held in historical-artistic consideration due to their belonging to the classical arts, are subject to restoration, but also those which, as the result of human activity, are granted significant value by a person or a group, from a Renaissance masterpiece to an industrial object, including even a pen used to sign a relevant document.

The Charter of Krakow 2000 defines heritage as:

> (...)a complex of human works in which a community recognizes its particular and specific values and with which it identifies. Identification and specification of heritage is therefore a process related to the choice of values.

Therefore, if we grant a different value to that of its nature, the most important of its qualities will naturally be the conservation of the symbolic value, the added value that makes an object relevant. And this is what we have to keep in mind when intervening on an object.

Many of the works in which La Luz de las Imágenes intervenes are devotional objects and acquire the consideration of restorable, the consideration of heritage, due to their being granted an emotional value by a more or less numerous group, even when the object has scarce artistic or historical value.

Our priority is the maintenance of these values above all other considerations. Each intervention must be very controlled, no additions that enhance the interpretation can be removed, and the image will always be reinstated when so required by the object.

A clear example can be seen in the process carried out on the Christ of Salvation in Almudaina (Alicante), a polychrome sculpture of very scarce artistic quality, but one which is highly venerated by



Fig. 2: Final condition of the Christ of Salvation, Almudaina (left) and final result of the St. Bartholomew, Villahermosa del Río

the local people. Even before the transfer of the object and during the packaging process, we were accompanied by religious chants. The importance of this sculpture, the main value which it holds, is its relevance as an icon, and as such our project is obliged to place this quality above any other. The piece had been completely repainted, and it is this repainting that is present in the collective memory of the faithful. As such, the process consisted of adapting the current interpretation of the image without the removal of any additions.

On numerous occasions, devotional images are found to have suffered from changes in fashion and styles over time, human interventions that have gradually hidden the original polychromes in favour of the tastes of the moment. Furthermore, there are cases in which the simple need to enjoy the image made certain adaptations “necessary”, and in most cases these adaptations are found to be unsuitable and to have been carried out by people whose good intentions outweighed their technical knowledge.

The problem arises when we add an object’s value as a religious icon to its historical and artistic quality. In such cases, the decision of what to do is reached by taking into account the opinion of the object’s users, as well as its conservational requirements, the actions that are necessary in order to avoid the asset’s deterioration. Thus, our judgment at the crucial moment of the intervention determines the guidelines to be followed.

Such was the case with a wooden polychrome image of Saint Bartholomew in Villahermosa del Río (Castellón), dating from the early 14th century. The documentation corresponding to the veneration of this splendid medieval carving had been conserved in the village shrine, of which Saint Bartholomew is currently the patron, since 1333. After analyzing the work in detail, different paint layers were detected. The work had been repainted twice throughout its history, thus making it essential that we assess the factors of greatest weight: the historical data of the object’s material evolution throughout the years, its devotional value relative to its current veneration, or the search for the original colour through the elimination of previous values.

The most recent polychroming, that of the venerated image, was stylistically very close to the original, had a certain historical value, was of a certain quality and did not generate any negative pathologies in the work, and as such it was decided to maintain the current image.

In contrast to this case, the intervention carried out on a 16th century Christus Patiens from Valencia’s Royal College and Corpus Christi Seminary, from which the surface repolychromy was removed.

After carefully analyzing the work with relevant studies, and especially when performing different cleaning tests, we observed that the original layer was of high quality. The studies were presented to the owner, and it was agreed that the most appropriate course of action would be to allow the enjoyment of the work in the manner intended by the artist, taking into account that it not an object subject to worship and that the current polychrome was of low quality.



Fig. 3: Initial condition and final result of the Cristo Patiens



Fig. 4: Initial and final detail of the Cristo Patiens



Fig. 5: Initial and final detail of the Cristo Patiens

The decision making, the judgement, would not be correct without the participation of all concerned, without the collaboration of a multidisciplinary team (architects, archaeologists, religious, historians, politicians, owners, users or restorers), capable of providing the data needed for the selection of an appropriate treatment.

An example of this teamwork can be seen in the intervention carried out by the Foundation on the mid-15th century altarpiece of Santo Domingo de Guzmán de Valentín Montoliu, from the village of Vallibona (Castellón). This work arrived at the workshop for a review of aesthetic criteria following an intervention carried out some 15 years previously. The criteria employed in the first intervention was broadly disapproved of by the villagers, the owner, and even the heritage inspectors.

Although the decisions taken were correct, they perhaps did not take into account the needs of the other stakeholders involved, as the object was the village's most important cultural asset and was also subject to great devotion. The problem was therefore how to solve the significant losses of paint layers that hindered the interpretation of the object as a whole. A museum criteria was initially chosen: neutral colour retouching was applied, despite the access to archive documentation indicating the nature of the missing fragments. The missing segments were considered to represent too high a percentage of the whole work, and therefore impeded the reconstruction of the object.

When it was delivered to the workshop and analysed in accordance with strictly technical criteria, taking into account solely the requirements that we, the specialists, apply to such work, an intervention was considered unnecessary, except for the fact that the method and tone employed to resolve the neutral colour retouching were considered susceptible to improvement. From among the wide range of possibilities that we have as specialists to resolve the reintegration of the image, the most aseptic was chosen. However, if we analyse the work taking into account the needs of historians, members of thereligious fraternity and, especially, the users, the missing segments took on a leading role and prevented the transmission of the message: their requirements are not met.

Was the distance between these different requirements capable of being bridged?

Aesthetic concerns (how will we be able to enjoy the asset for decades?) must never take precedence over the conservational requirements; as technicians, we can never reduce the technical demands as a result of external pressures. However, the aesthetic needs can and must be accommodated as far as possible to the requirements of the majority of those involved in the project, without, of course, crossing the boundaries of the hypothetical or disrespectful.

The decision was taken to reconstruct the missing fragments of the drawing and the colour, aided by archive photographs and carried out using a technique that is discernible at close range, thus



Fig. 6: Initial condition of the St. Domingo altarpiece, Vallibona (left) and archive photo



Fig. 7: From left to right, detail of the initial condition of the St. Domingo altarpiece, Vallibona, archive photo, and final result

attempting to unite the positions of both parties and to satisfy the needs of the citizens of Vallibona in relation to their most valuable asset.

Cultural heritage in our society raises great interest among the majority of citizens, it is our symbol of identity, the element that differentiates us form other peoples in an increasingly globalized world. Therefore, any event related to heritage has a special impact, and the different groups of specialists are considered the legitimate guardians and defenders.

The economic interests of collectors, the devotional interests of the parishioners, the catechetical interests of religious groups, the publicity interests of politicians, the functional interests of architects and the didactic interests of historians sometimes collide head on with the artist's interest in preserving the work in the form most similar to that in which it was created. Giving priority to any one of these interests can also become a fatal error.

This does not mean that the restorers must be deaf to any information coming from the outside. On the contrary, we must use the information supplied to us in order to assess all the data we have within our reach, attempting to maintain all the added values held by the cultural asset. The correct critical judgment can be reached if we have access to all the data. Alternatively, if we censor the information in our own interest, we may make a fatal mistake.

2. Conclusion

The events experienced by the works, and the manner in which they are reflected, not only provide us with information about the effects of the passage of time on the works, they also speak to us of the predominant culture at any given time, of taste, of the appreciation of art, devotion, etc. These data are often deleted in the search for the initiatory moment, the moment of creation, the proto-condition, without evaluating other considerations, overlooked in the search to the work's supposed truth.

When we intervene in the restoration of an image, we must take great care to avoiding deleting historically-valuable information, information that is valuable for the memory of the users, as heritage assets are extremely important documents that indicate where we come from and who we are.

By working with an interdisciplinary team, the Luz de las Imágenes Foundation is able to bring together these different sensitivities towards cultural assets and, as a consequence, undertake interventions that would not be considered interesting a priori, carrying them out at the same time with respect for all their values.

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From Daunii Archaeological Park to The Faragola Domus Romana: The New Treasures of The Old *Ausculum*

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Abstract
The present study deals with a very important but not very well-known cultural heritage area, which is located in Southern Italy, in the municipality of Ascoli Satriano (in the Foggia province). The area represents the vestige of one of the principal settlements of the Daunian peoples (VI-IV century B.C.). In this area, the Carapelle Valley represented an ancient communication route between the Campania Region and the Apulia "Tavoliere", ever since a very fertile territory, where many flourishing rural communities established themselves. On the "Collina del Serpente" (the Snake hill) systematic research of the University of Innsbruck allowed to locate the remains of the ancient town of *Ausculum* as well as a large *Necropolis* (IV century B.C.) with very rich funeral furnishings. Not far away, in the Carapelle valley, at the Faragola site, the archaeological excavations unearthed a beautiful luxurious "*domus romana*" of late ancient times (IV-VI century A.D.). Based on the principle that preservation of cultural/archaeological heritage starts from recognition and measuring of the opus, the work presented here treats the first phase of the study of the whole archaeological area. This research proposes the establishment of a GIS (Geographic Information System) which classifies all the information already collected by various study groups, in order to be able to present a "virtual museum" useful for utilization by more extensive audience.

Keywords: GIS (Geographic Information System), archaeological survey.

1. Introduction

The area of Ascoli Satriano (in the Foggia province, Southern Italy) is located in the North of the Apulia region bordered by the Sub-Apennine hilly area and the "Tavoliere delle Puglie" plain **(Fig. 1)** . The site has been home to human settlements and burial from the sixth to the fourth century BC, organized according to a criterion of "occupation spread " over a wide area (about 80 hectares). The burial areas were adjacent to those living with spaces left free for agriculture and livestock. Most likely the "Collina del Serpente" (the Snake Hill), corresponding to the maximum altitude (456 m asl) was the reference of local communities between the fifth and fourth centuries before Christ and was the seat of the houses of the aristocracy of that time. On the " Collina del Serpente " is located the Daunii Archaelogical Park, where systematic research conducted by the Universities of Innsbruck, Foggia and Potenza and the Superintendence for Archaeological Heritage of Puglia allowed to locate the remains of the ancient town of Ausculum as well as a large Necropolis (IV century BC) with very rich funeral furnishings . Since the end of the 19th century, the hill of " Collina del Serpente " is a privileged field for archaeological research on Daunia pre-Roman times, but a little more than a decade, the territory is returning finds that also belong to the age of the Roman republic and empire. The sanctuary, a place to gather and ceremonies pertaining to the cult of the dead, lies within the sacred and dates back to the sixth and fifth centuries BC. The most luxurious funerary objects found in

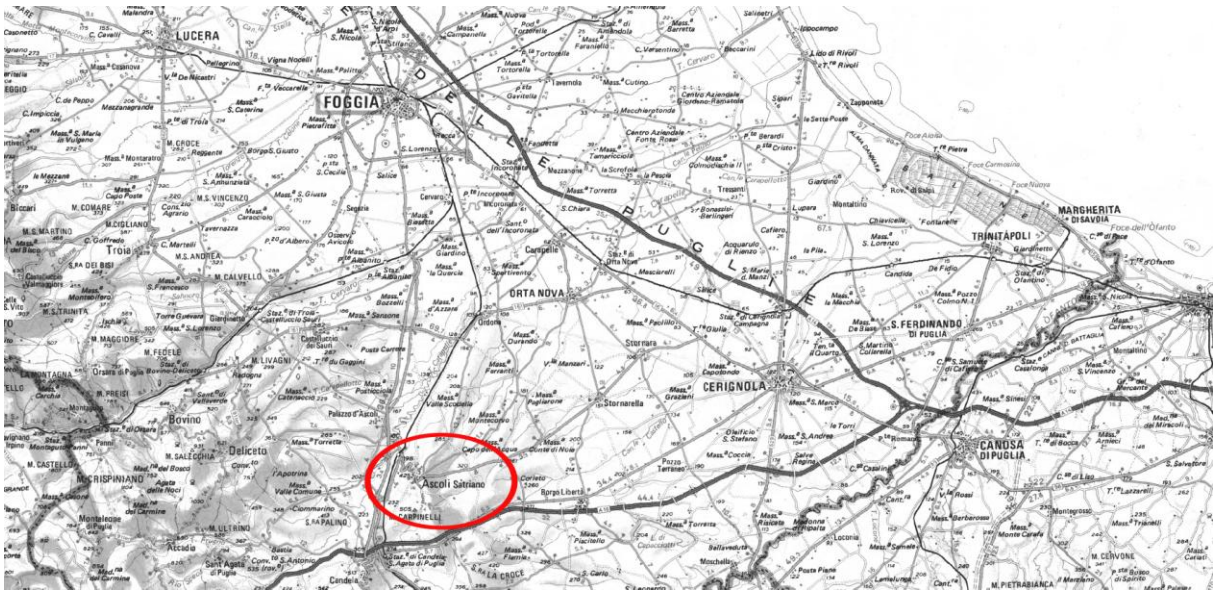

Fig. 1: geographic area (IGM – 1:50000).

the tombs are now exhibited in the Diocesan Museums “Polo Museale”. Of great interest is also the wide pavement with beautiful mosaics of river pebbles, considered a unique by scholars. Some of the most important archaeological sites of the area of Ascoli Satriano were placed in a first draft of GIS as shown in Fig. 2.

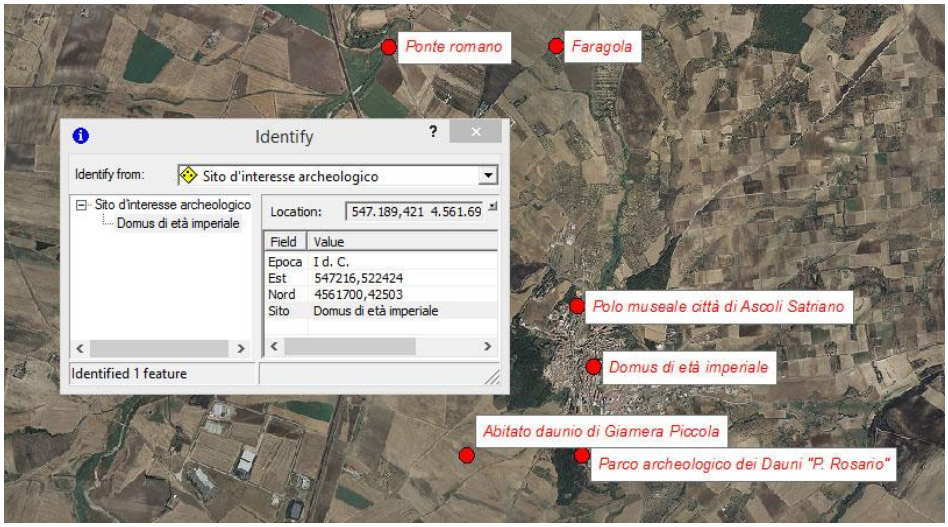

Fig. 2: screen shoot of GIS: archeological sites.

2. “Collina del Serpente” (the Snake Hill)

The hill of the Serpent was a landmark for the community Daune, used as a necropolis between the sixth and fourth centuries BC was affected by the construction of a large building for public meetings and religious services. It was affected also by burials of local aristocrats as evidenced by the tombs of the "Princess", of the "Warrior", et alii, rich in finds and funeral ornaments, now exhibited in the Museum Centre. One of these tombs, with its access corridor (Dromos) is displayed in next Fig. 3



Fig. 3: dromos of askos canosino: grave.

3. Polo Museale ”Diocesan Museums”

The extraordinary collection of polychrome marbles, exhibited in the Museo Civico - Diocesan of Ascoli Satriano, consists of a support table (*trapezophoros*) with two griffins attacking a deer, a ritual basin (*podanipter*), in which is depicted the scene of transport weapons that Hephaestus forged for Achilles at the request of his mother Thetis, a couple of shelves, a large crater marble that not only retains traces of polychrome, but also the negative footprint of a gold decoration that has been recognized as a vegetal decoration with ivy leaves. The uniqueness of these products is due to the vibrant polychrome decoration, high quality marble, the crystalline and transparent tunnel dug in the island of Paros the Greeks reserving to the masterpieces of sculpture, the presence of the paintings, so rare in marbles come down to us, and especially the history of the discovery of these pieces. To these objects of daunian age is added a valuable statue of Apollo from the Roman period (second century AD), also stolen from a Roman villa of the territory of Ascoli Satriano. The "TRAPEZOPHOROS" with “GRIFONI” and “CERVA” (325-300 BC) (Fig. 4) is an integral part funeral objects of a Macedonian tomb and is the only example of a marble group, whose quality and pictorial decoration which were spared by time and odysseys sustained during all these centuries. The unique sculpture, which is the support of a ritual table is 95 cm high. and 148 cm long., consists of a pair of "Griffins" in the body of a lion and the dragon's head crest on the head of a purple-red color and blue wings unfurled upward, and are in action while hunting stuck in the ground with a hind claws that emerges with his nose, lying on the ground with their front legs bent and the rear completely stretched out.



Fig. 4: trapezophoros wiht “grifons and cerva”.

In the '70s (perhaps between 1976 and 1977) were carried out illegal excavations by grave robbers in the local area of Ascoli Satriano. The findings were immediately dismembered. Some of them, fragmented, were seized by the Guardia di Finanza and stored in boxes in warehouses of the Superintendence in Foggia, where they sank into oblivion, waiting for the trial. Other pieces, the most valuable, the trapezophoros and podanipter, were sold by grave robbers to a famous art dealer living in Switzerland. The invaluable pieces finished, then, through a well-known international drug trafficker, in the collection of M. Tempelsman, a Belgian-American mining magnate and diamond merchant. Afterwards, the two extraordinary objects of the IV century BC, paid respectively 5.5 and $ 2.2 million, were sold together with the statue of Apollo (paid U.S. $ 2.5 million) to the J. Paul Getty Museum in Malibu, California.
Meanwhile, one of the grave robbers, Savino Berardi, seriously ill, shortly before his death , in 2002 , pointed to the Police of Ascoli Satriano the site of origin of the furniture in the municipal territory and asking the military to bring the Griffins back to Italy, informed them of the existence of other material that was confiscated at the time.
The police then began a complex investigation in the archives of the former Magistrate's Court of Orta Nova, until, in May 2006, the two events once again intertwined: as part of a process for illegal trade of archaeological finds dr. Angelo Bottini (then Superintendent Archaeologist of Rome) recognizes the high quality of the artifacts found by the Police and establishes a connection with the items purchased by the Getty Museum. After protracted negotiations conducted by the Italian Ministry of Heritage and Culture, 22 years after the purchase made in 1985, the artefacts were returned to Italy on August 1, 2007. In June 2010, the Ministry has authorized the ' homecoming ' of these extraordinary objects that can be admired today in the Museo Civico - Diocesan of Ascoli Satriano.

4. “Domus Imperiale”

Pavement works in the Piazza del Plebiscito in the historic center of the town have uncovered an old "Roman Domus” dated to the first century AD. Mosaics identify three different rooms with characteristics nobiliary residence, as evidenced by the one visible in Fig.5.



Fig. 5: imperial domus mosaic.

5. "Faragola"

The Faragola site is located approximately three kilometers south-west of Ascoli Satriano in the fertile valley of the Carapelle river. The building complex was built up in a strategic location, midway between the two major villages of Ausculum and Herdonia, in an area rich in water, thanks to the presence of the Carapelle river and of numerous springs. Long known, it had already been reported in the course of archaeological surveys conducted in the early 90s by the University of Bologna. Later, preliminary investigations were conducted by dr.Francesco Paolo Maulucci on behalf of the Superintendence for Archaeological Heritage of Puglia, which led to the constraint area, then partly acquired by the Municipality of Ascoli Satriano.

In July 2003 started a campaign of excavations, preceded by geophysical surveys, under the scientific direction of Professor Giuliano Volpe, University of Foggia, in collaboration with the Superintendence for Archaeological Heritage of Puglia and the City of Ascoli Satriano. The results achieved so far are of great interest in the locality Faragola was, in fact, investigated an extended and articulated rural settlement from the Roman period and Late Antique, which is notable for the significant exhibitions of luxury (Fig. 6).



Fig. 6: Faragola "cenazio room".

Some residential environments of a rich villa have been partially brought to light, of which has so far been documented especially the Late Antique period (IV-VI century AC). In particular, it has been uncovered a large room, probably identifiable with a summer dining room, the "*cenatio*", with a fountain decorated with a relief dated to the early imperial age with the depiction of a female dancing and a snake and a floor of marble slabs, all of reuse, enriched by the insertion of luxurious carpets in "opus sectile" made with plates of various marbles and colored glass paste (Fig. 7).

A few meters away from this luxurious dining room were identified other rooms in the residential sector, paved with fine polychrome mosaics with geometric decoration.

The villa is also equipped with a handicraft sector: it was, in fact, also investigated a kiln for firing bricks, part of a larger group of manufacturing facilities. It is a discovery of great importance for the understanding of the organization of the countryside not only in the territory of Ausculum but in the whole Puglia: in fact, although several other Roman and Late Antique Villa were known in the territory of the Daunia, that of Faragola that like one of the most luxurious manifestations of this type of building so far known in rural southern Italy. It is obvious that the villa belonged to a person of high rank, owner of large estates in land area, further proof of the vitality of the agrarian economy dell'Apulia in Late Antiquity.

Furthermore, the presence of numerous materials reused (figurative relief, marble slabs, funerary inscription of the Augustan age inserted into the floor of cenatio, etc..) also raises the issue of both a pre-existing settlement in the same site and the detection of other settlements and monuments in the territory from which the materials were recovered.

The area surveyed so far, covering a surface of over 3000 m^2, is only part of a much larger, extremely articulate rural complex: it is assumed a total area of about three hectares. The site of Faragola was occupied for many centuries, with different ways of life. Archaeological research has so far allowed us to reconstruct the following steps:

- Daunian Village (VI/V – IV/III B.C.)
- Roman Farm (I B.C. - II A.C.)
- Late Antique villa1 (III – metà IV A.C.)
- Late Antique villa 2 (late IV – late VI A.C.)
- Early Medieval village (VII – IX A.C.)
- Agricultural use (IX – XXI A.C.)

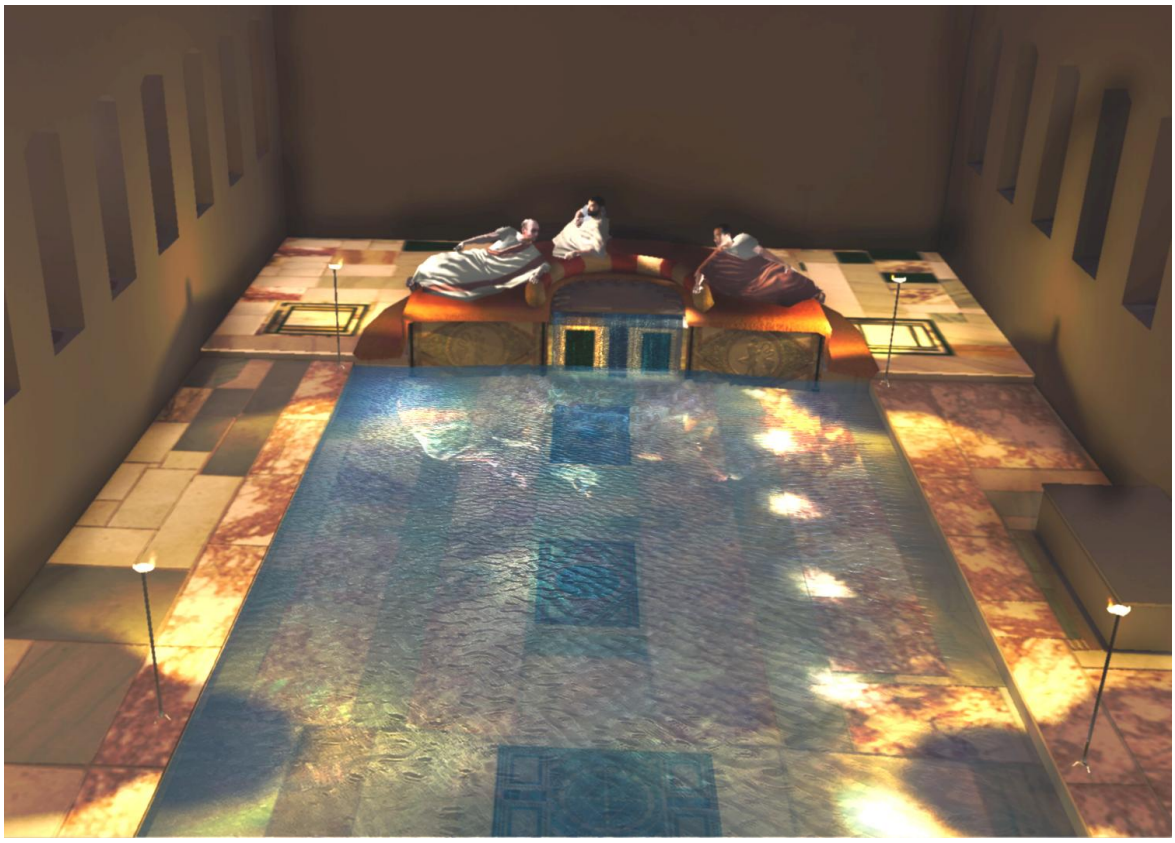

Fig. 7: Faragola "cenazio room" render.

6. “Ponte Romano”

The construction of such a structure refers to the roads in the territory dauno, can be placed between the first and second centuries AD, relative to the nearby city of "Erdonia" and "Aecae" fig. 8



Fig. 8: roman bridge.

7. “Giarnera piccola”

In the valley of Carapelle the excavations conducted by the University of Innsbruck have uncovered a large village of daunia age, with houses, buildings and extensive pebble mosaics as road surface, and religious buildings with architectural decorations (Fig. 9)



Fig. 9: mosaics of river pebbles.

8 Conclusion

Many authors show that the presence of a "Virtual Museum" encourages the curiosity of the web users, who will be induced to visit the "real" places entered into the system.
The present paper in this perspective provides some information on the possibility of establishing a GIS regarding the various archaeological sites of which is particularly rich the Municipality of Ascoli Satriano.
In this regard we would like to thank the Mayor of Ascoli Satriano and especially the Head of Culture dr. Biagio Gallo, for its exquisite competence and availability during the site investigation.

Bibliographical References

[1] G. De Felice, N. Mangialardi, M. G. Sibilano, G. Volpe, Late Roman villa at Faragola (Foggia, Italy). Laser scanning for a global documentation methodology during field research, in CAA 2007 proceedings.

[2] . G. Volpe, Per una 'archeologia globale dei paesaggi' della Daunia. Tra archeologia, metodologia e politica dei beni culturali, in Storia e archeologia della Daunia, in ricordo di Marina Mazzei, Atti delle giornate di studio (Foggia 2005), a cura di G. Volpe, M.J. Strazzulla, D. Leone, Bari 2008, pp. 447-462.

[3] G. Volpe, R. Martines, A. Vella, T. Caroppo, R. Cassano, L. Ficarelli, G. Semeraro, La Carta dei Beni Culturali della Puglia, in Atti della 13a Conferenza Nazionale ASITA (Bari 1-4 dicembre 2009), pp. 1887-1894.

[4] Volpe, G., A Late Roman Villa at Faragola, Italy, in Minerva. The International review of Ancient Art & Archaeology, 17,1, january-february 2006, pp. 44-45.

[5] G. Volpe, G. De Venuto, R. Goffredo, M. Turchiano, L'abitato altomedievale di Faragola (Ascoli Satriano), in G. Volpe, P. Favia (a cura di), V Congresso Nazionale di Archeologia Medievale (Foggia-Manfredonia 30/09-3/10 2009), Firenze 2009, pp. 284-290.

[6] http://www.archeologia.unifg.it/ricerca/labo/labo.html

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The Barco Chigi in Ariccia

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Abstract
Usually the restoration work concerns an ancient church, a historic building, a monastic complex. I want to talk to a park, the barco Chigi.This garden park has recently been restored and given a new lease of life by Virginio Melaranci after five patient years of dedicated work, carried out between 2006 and 2010, at the cost of over one million euro. Originally planned by Gian Lorenzo Bernini for the Chigi, the project was further enriched by Carlo Fontana with additions typical of classical Italian garden layouts. These interventions included the installation of a Barco (an area reserved for hunting) surrounded by a form of sacred forest which echoed antique Greek models. Thanks to the Grand Tour, many travellers had the opportunity to visit and admire the areas. These included Turner, Corot, Goethe, Stendhal, Sand and D'Annunzio. Post its restoration, the place has now been reinterpreted as a walled garden with the installation of a lawn. The starkness and simplicity of which contrasts with the organic plastic qualities of the whole complex. The borders which define the area feature decorative plants such as acanthus, various species of fern, rhubarb, hydrangeas and palm trees which in their autumn colours contrast strongly with the grey tones of the walls covered with capsicum plants.The restoration was how to amalgamate and unify the historical, botanical and forestry aspects of the whole area while retaining the overriding order of its vegetal aspect. The choice was between the previously untamed and natural characteristics of the garden and one of recreating the image of what the park would have looked like in the 19th century based on photographic images of the time. Today, on visiting the park, the imagery certainly evokes the atmosphere of those times while the aromas, the silence, the light and colours which now characterise the project were certainly aspects which would not have been present in the original layout but which would have developed and materialised in the passage of time through different epochs.

Keywords: Barco, Gian Lorenzo Bernini, Park, Chigi, Ariccia

1. Section
Most restoration projects usually relate to historic churches, palaces, and monastic complexes. In this case I will be discussing Barco Chigi which exhibits notable differences from the classic Italian garden. This park has been diligently restored and given a new lease of life by Virginio Melaranci.
The restoration project was implemented between 2006 and 2010, for a total capital outlay of one million euro.
The *Barco* was originally planned by Gian Lorenzo Bernini for the Chigi, a powerful family of bankers. The project was further developed by Carlo Fontana with later additions interpreted in a typical classical Italian garden layout. These interventions included the establishment of a *Barco* (an area reserved for hunting) which was surrounded by a sort of sacred forest or Eleysian fields reminiscent of ancient Greek models. The park itself also created a strong relationship with the surrounding natural

environment, creating a fine balance between the formal layout of the forest itself and undomesticated terrain around it.



Fig. 1. Jean Babtiste Tierce,Chigi Park, 1776, watercolor on paper, Private Collection

In 1661 the Chigi family acquired from the Savellis the feudal title of Ariccia. Within the next fifteen years they embarked upon a series of important works restoring the park and incorporating the existing aviary dating to Roman antiquity and converted in 1682 under the patronage of Bernardino Savelli, Duke of Castel Gandolfo, Marquis of Rocca Priora. In the period 1661-1676, improvement works on the barco were undertaken. The imposing and visually appealing aviary constructed from ancient Roman quarry lava stone by Savelli dates to 1628. During the fifteen year period of improvement works, the Chigis created a fishpond now destroyed, an extraordinary complex of cells and caves for the storage of food, decorative fountains and an archaic system of rainwater collection system for the channeling of spring water, various pathways, a *ragnaia* comprising a dense coverage of high trees intended to support the placements of nets to capture birds.

Sigismondo Chigi (1736-1793) insisted that the park should always retain a natural picturesque quality reminiscent of a wild forest, with trees which had fallen due to the impact of strong winds or had decayed and dried-up over time, being left to stand in their derelict state. During the late- nineteenth and early-twentieth century the Chigi family continued to adhere to this philosophy. We have confirmation of this from some vintage views that show the park in its informal picturesque state. The Chigis were committed to respect the zeitgeist and genius loci of the place favouring an aesthetic sensibility that prevails today in conceptualizing these type of gardens. In synch with these principles is the new image conceptualized for those parts of the *barco* such as the square of the masks, the aviary or the new garden.

These evoke nineteenth-century types such as the intervention in the square where the masks conform to the desire not to disturb the romantic atmosphere of unspoiled nature, the net result of centuries of historical over-layering with traces from the past and with minimal gestures such as the planting of two Sequoias and a Cryptomeria in the middle of a clearing places in front of two fountains dating to the seventeenth century. These serve to update the figurative context of the site.

As a result of the Grand Tour from the seventeenth to the nineteenth century, several foreign travellers had the opportunity to visit and admire this park. The personalities included Turner, Corot, Goethe, Stendhal, Sand and D'Annunzio. In 1787, Goethe wrote as as follows

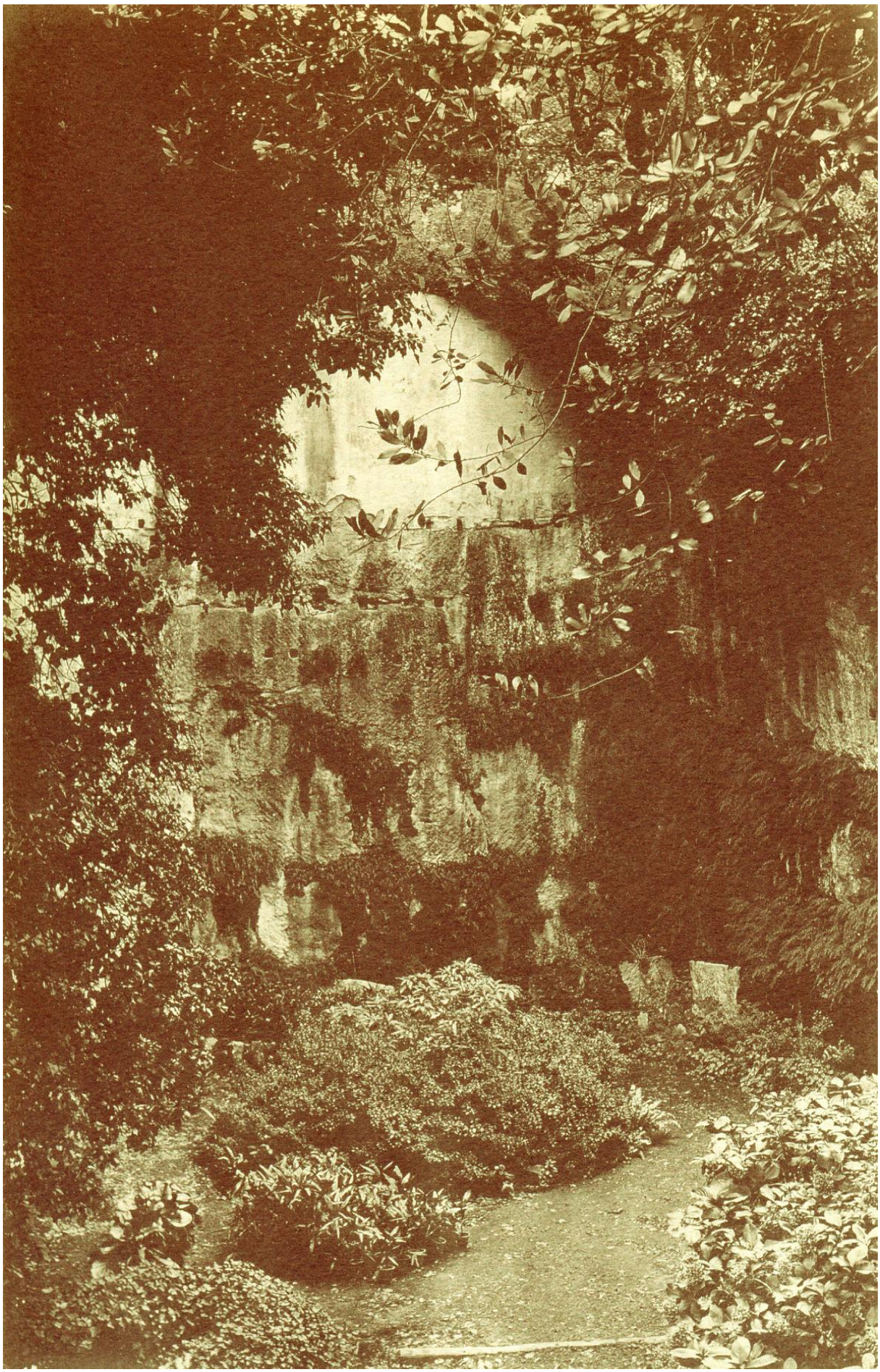

Fig. 2. The aviary to the 900



Fig. 3. The aviary in two images today

"we paused at the entrance of a park which seemed well kept but not controlled by its owner. Strangely enough the proprietor, Prince Chigi seemed keen that visitors should only get glimpses of this private natural environment. In fact, it appeared more as a tangled assembly of trees, roots, and other plants which grew without any form of control. All bushes, shrubs and other vegetal growths were allowed to dry, fall and even rot. The whole ambiance evoked nature and appeared almost as a powerful painting conceived by a great artist."

During the second half of the nineteenth century and the beginning of the twentieth century, the concept of the *barco*, the aviary and the new approaches in landscape architecture strongly evoked the zeitgeist of the age following a philosophy that one should not in any way intervene or disturb the romantic ambiance of untouched nature which manifested the layering and stratification of its evolution over many a century.

The practice of planting exotic trees in relation to man-made architectural features is most evident in this complex at the piazza next to the aviary where a large cypress tree was placed adjacent to the Viale dei Leoni, together with a series of sculptures in terracotta on the side of the arch which marks the entrance to the old Roman remains. Another cypress tree rises at the beginning of the passageway leading to the Barco, while a series of Chamaerop palms are evident in the Giardino Nuovo on the hillock on the route to the aviary.

Subsequent to its restoration, the place has now been reinterpreted as a walled garden with the installation of a lawn, the starkness and simplicity of which contrasts to the organic qualities of the whole setting. The borders which define the area feature decorative plants such as acanthus, various species of fern, rhubarb, hydrangeas and palm trees which in their autumn colours contrast strongly with the grey tones of the walls covered with capsicum plants.

The restoration was based on the premise of amalgamating and unifying the historical, botanical and forestry aspects of the entire area while retaining the primary character of its vegetation.



Fig. 4. Chigi Park from the satellite, the source Google Earth





Fig. 5. Views of the Chigi Park today

The choice of the architecture was between the previously untamed and natural characteristics of the garden and one based on recreating the image of what the park would have looked like in the nineteenth century on the basis of photographic records from that time. Today, when visiting the park the imagery certainly evokes the atmosphere of that era while the scents, silence, light and colours which now characterize the project were certainly aspects which would not have been present in the original layout but which would have developed and materialized with the passage of time through different historical epochs.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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International researchworks about energy efficiency of historical heritage

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Abstract
The actual normative on the energetic efficiency of the buildings stung to performances thought above all for the construction of a new concept. It deals with values which are not easily obtainable over the existing one that requires high impact interventions and often at odd with the spirit of the conservation of historic buildings.
Speaking of retraining of historical buildings, one must remember that every building is unique for its history and above all for its constructive and environmental characteristics and, therefore, different interventions will be made case by case. For this reason, different studies have been conducted to national and international level in theme of energetic retraining, that they propose to appraise the best procedures of development of the energetic efficiency that are compatible with the guardianship of the asset at the same time.
In this contribution is effected a critical analysis that puts in prominence how much these studies ducts give a valid contribution to this search. They are treated either individually or as a whole.

Keywords: Energy Efficiency, Sustainable Use, Historical Heritage

1. The normative outline of reference
The energy upgrading of historic buildings is become more and more a very important professional practice. At present, it is less considered by the current legislation on energy efficiency, because this one points at performaces thought especially for the existing or new building without a particular historical-architectural prestige, where it is possible to implement high-impact interventions which are often in contrast with the spirit of the conservation of historic buildings.
The aim 20-20-20 required by European Union directives, 20% reduction in greenhouse gas emissions compared to 1990 levels, energy consumption by 20% compared to the levels expected for 2020 and the increase of the use of renewable sources for 20% of total energy production, requires both existing buildings, including historic, than on new construction, as recent studies have corroborated that it is not possible to achieve these objectives by applying consumption limits only to new construction.
Currently, the national legislations, following application of the Directives issued by the European Community, report explicitly that "*Sono escluse dall'applicazione del presente decreto le seguenti categorie di edifici: a) gli immobili ricadenti nell'ambito della disciplina della parte seconda e dell'art. 136 comma 1, lettere b) e c) del decreto legislative 22 gennaio 2004, n. 42, recante il codice dei beni culturali e del paesaggio nei casi in cui il rispetto delle prescrizioni implicherebbe una alterazione inaccettabile del loro carattere o aspetto con particolare riferimento ai caratteri storico artistici*" [1], expecting to go in derogation of compliance with the minimum requirements of the law not only for monumental complexs but also for some valuable property landscaped with an explicit reference to the historical centers. However, the reference to the exception is viable only to those interventions that could damage the valuable characteristics of the material and formal of the Cultural Heritage.



Fig. 1: Schematic summary of the regulatory framework.

The excessive costs in terms of energy consumption make it impossible to manage, and then an appropriate conservation of such buildings.
Not undergoing any type of surgery, in terms of energy efficiency, these buildings continue to have excessive leakage which could affect the already uneven public budgets (since the majority of these goods is to use / public property). Especially for unique goods and irreproducible, the ever more pressing need expressed by both the professional world and from a scientific is to identify design solutions that have as their objective to generate a dialogue between permanence and adaptation energy.

2. Projects

The topic of research is in a constant state of experimentation and this is proved by the numerous national and international research in progress.
You can see different types of approach which show Italy led by a more appropriately performance method, while the Anglo-Saxon countries tend to a practical application through the publication of manuals and guidelines. These are turned to designers and the general public with the aim of clarifying the practice of conservation and management of heritage and the most appropriate solutions for energy improvement.
All this is achieved as a result of studies carried out in different buildings located in different areas and with different technical characteristics. Below we will discuss the salient features of the most

significant and innovative research projects carried out in Europe on upgrading the energy efficiency of historic centers. In particular, we analyze:
- 3encult;
- Effesus;
- New4Old;
- Sechurba;
- Brita in Pubs;
- Restart.

The project 3encult - Energy Efficiency for the European Cultural Heritage funded under the Seventh Framework Programme of Research and Development for the period 2010-2014, is born with the purpose of developing and testing innovative solutions to improve the energy efficiency of historic buildings in urban area, with the intent to demonstrate that energy efficiency, occupants comfort, structural protection and preservation of cultural heritage are elements correlated in energy retrofit project [2]. The project is oriented to the creation of a manual with guidelines for design and a pool of technical solutions to designers as an alternative to conventional measures of thermal insulation and replacement plant [3].



Fig. 2: 3Encult case studies, images published on the site http://www.3encult.eu/en/casestudies/default.html

The EFFESUS project studies the energy efficiency improvement of historic centers in Europe built before 1945, they are not necessarily protected by the law of cultural property. It identifies new technologies and products that do not affect the integrity and authenticity of the property with the intent to reduce the environmental impact of the historical heritage through significant improvements for energy efficiency and optimize the sustainability of the well retaining their architectural, historical, artistic and cultural heritage. These technologies are supported by software tools like MDSS (Multicriteria Decision Support Systems) for the assessment of energy improvements in historic districts [4].



Fig. 3: Effesus case studies, images published on the site http://www.effesus.eu/about-effesus/case-studies

Of great interest is also the project "New4Old - New energy for old buildings. Promoting the integration of RES & RUE backgrund in historic buildings" that aims to promote the integration of renewable energy technologies and energy efficiency in historic buildings , by initiating the creation of a network of homes Renewable Energy (REH). During the project technical guidelines have been collected for architects, designers and developers on the methodologies for the integration of renewable energy and the spread of a more rational use of energy. In them are spelled out the problems that are created in old buildings, such as the critical issues, principles of operation, offering suggestions and possible solutions for action on the structures and systems [5].
The project SECHURBA has instead highlighted the possible actions towards sustainability that can be achieved by respecting and preserving the cultural heritage. It was launched to authenticate the historical centers play an important role in contemporary society, helping to reduce carbon emissions and become more sustainable. The objective of SECHURBA is notify, through the results obtained from the case studies, opportunities and potential offered by sustainable energy interventions applied in historic urban areas (communities, towns, monuments blocks) in order to disseminate new technologies into future energy policies and local development programs [6].



Fig. 4: Sechurba case studies (by Progetto Sechurba, 2011)

The integrated project BRITA in Pubs (retrofit Bringing innovations to application in public buildings) is one of the 4 integrated projects financed which is part of project Eco-building, under the 6th Research Framework Programme of the Commission U.E.
The project Brita in pubs aims to increase the market penetration of efficient and innovative solutions for the retrofit of buildings, with the purpose of improving energy efficiency and developping the use of renewable energies, additional costs contained. The whole structured into eight work packages that include research studies also socio-economic character, such as the identification of the real needs of planning, design and financing strategies, evaluation of guidelines for the design, the development of a tool for the evaluation of retrofit measures, a tool for quality control to ensure good long term performance of the building and systems [7-8-9].

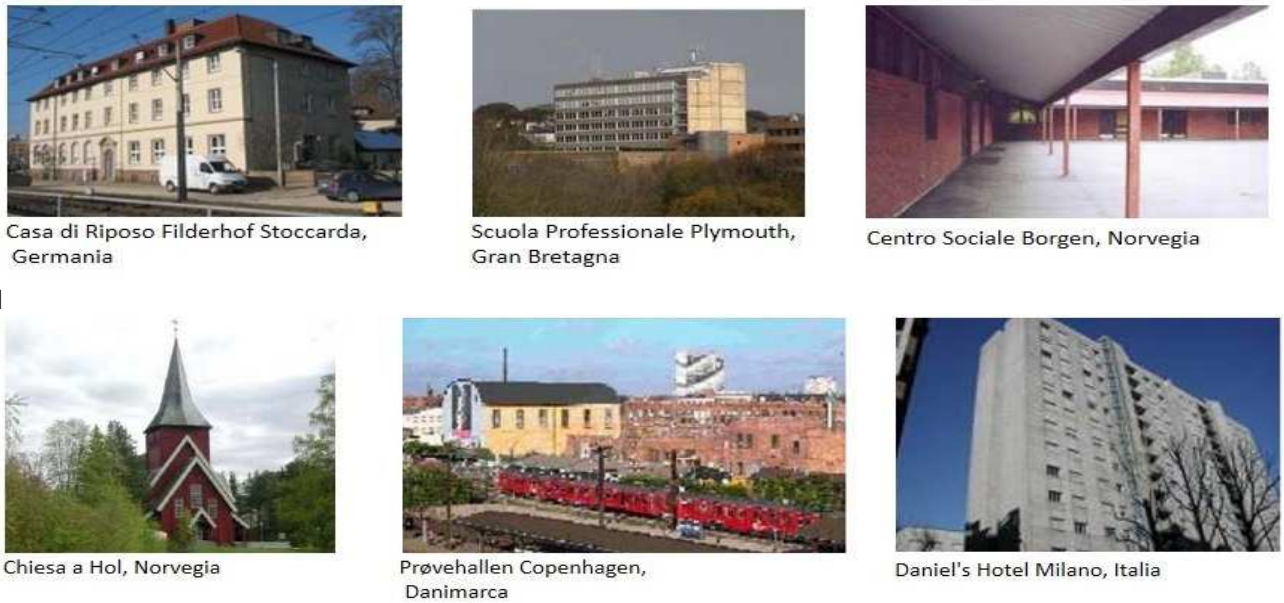

Fig. 5: Brita in Pubs case studies, images published on the site http://www.brita-in-pubs.eu/



Fig. 6: Brita in Pubs case studies, images published on the site http://www.brita-in-pubs.eu/

The project RESTART (Renewable Energy Strategies and Technology Applications for Regenerating Towns 1997-2002) is a demonstration project sponsored by the European Commission and coordinated by RESET (Renewable Energy Strategies for European Towns) in collaboration with the city of Barcelona, Glasgow, Lyon, turin, Rotterdam, Copenhagen, Porto and Dublin.
The project aims to achieve several redevelopment able to reduce the primary energy demand of buildings through the reduction of environmental impacts and the use of renewable energy sources.
The project has drawn attention not only on the more technical aspects of the intervention but also on economic and social aspects of these locations, involving the population, encouraging the penetration of new technologies and rationalizing the use of resources [10].



Fig. 7: Restart case studies, images published on the site http://www.resetters.org/RESET/r-0-restart.html.

In Italy, instead, the studies aim to identify areas for performance improvement that relate to the individual technical element of the building envelope.
Interesting is the research carried out by ENEA, completed in 2011, which had as its objective the identification and evaluation of interventions that would ensure, at the same time, the energy improvement and preservation of morphological characters, material and architectural features of historic buildings, giving as a result of a path that would make schedografico immediately usable and transferable research conducted and the results obtained. As a case study was chosen the *Molino del Cantone*, inside the grounds of the Royal Palace in Monza [11].



Fig. 8: Example of cards Enea (by BORIANI, GIAMBRUNO, GARZULINO, 2001)

At the same time energy and environmental certification schemes are being studying such as the Green Building Council Italy which on the basis of protocol Leadership in Energy and Environmental Design dedicated to the historic buildings is developing the "Protocol LEED Historical Building." The intent is to change the traditional methods of design, construction and management, with the aim to create places in harmony with the environment, healthier and improve the quality of life. The Protocol LEED HB is a complex system of environmental assessment, which takes into account variables on an urban scale and construction. As for the "Protocol LEED New Construction " LEED for HB areas of concern regarding the sustainability of the site, the efficient management of water, energy and atmosphere, materials and resources and indoor environmental quality. For each category, there are the key indicators that allow us to obtain the environmental credits. What we want to achieve is consistency between the policies of sustainability and urban reuse that takes into account the reduction of waste in land management, the implementation of a retrofit adaptable to their reusability future and the importance assigned to managing sustainable energy.
At the time this instrument has been tested on Foscari Palace, a historical palace of the sixteenth century, house of the prestigious University of Venice Ca 'Foscari.



Fig. 9: Categories of environmental impact according to the certification LEED

A new rating system for existing buildings has been developed by the Climate House of Bolzano that work on the issue of energy efficiency in buildings. It had achieved a certification protocol for new construction but, nevertheless, the application of the method to the House Climate Remediation work has highlighted some limitations of the protocol used for new construction so much that this method can not be used for assessment of restructuring measures. For this reason, the project Climate House R had to create an evaluation system that takes into account the peculiarities that characterize the

interventions on existing buildings. In the experimental phase of the project have been subjected to a process of evaluation of 32 projects, during execution, planning or construction, they had to take into account both the technical feasibility of the interventions that legislative requirements that in many cases turn out to be inadequate.
The Protocol Climate House R is aimed to become a technical instrument perfected for the designer, supported by a verification protocol transparent, allowing spot checks organized for the purpose of wanting to get a seal that certifies the quality of the entire construction process of the intervention recovery ranging from design to installation in order to achieve the goal of a true energy efficiency.
Finally, the project ATTESS ended September 30, 2010, is the result of an ' agreement of cooperation between the Veneto metadistrict green building, the Venetian metadistrict of cultural heritage and the regional directorate for cultural heritage and landscape of the Veneto, in the terms expressed in Memorandum of Understanding signed in Venice June 10, 2010.
The aim of the A . T.T.E.S.S. is to improve the energy and environmental performance of historic buildings, taking into account the performance criteria of the restoration of the criteria of green building. The search result ATTESS was the creation of guidelines for the knowledge of the historical building, to determine the method of approach to the project, through the application of new technologies, which seek to operate through the decisions sustainable and less invasive operating a careful evaluation of the existing in order to preserve the value of the housing stock and assess adequately the potential from the point of view of energy-environment [12].

3. Conclusions

From all this it follows that increasing attention is given to the historical buildings, in which the project must take into account a variety of aspects related to the cultural, historical and artistic building, use, length of time, but also to 'energy efficiency and management. The number of data points from all of these projects can serve as a useful guide for professionals, businesses, organizations and citizens to take part in a historic building without altering its value, but taking into account that as well use (public or private) must also be able to follow the rules of economy and efficiency in management.

Bibliographical References

[1] D.Lgs. 311/2006, *Disposizioni correttive ed integrative a decreto legislativo 19 agosto 2005, n. 192, recante attuazione della direttiva 2002/91/CE, relativa al rendimento energetico nell'edilizia*, Art. 3 comma 3.
[2] WP2_D2.1_20110331_P09_*Report on demand analysis and historic building classification* in 3ENCULT, 2011.
[3] Referring Web Pages Web : www.3encult.eu.
[4] Referring Web Pages Web : www.effessus.it.
[5] 3E in collaboration with EREC, GRECT, AEE, ITW, NKUA and NUID, *Technical guidelines for building designers*, 2009.
[6] Progetto SECHURBA. *Una guida per la sostenibilità energetica in edifici e centri storici. Dalla cultura e dalla storia allo sviluppo sostenibile. Assicurare il futuro, conservando il passato*, Gangemi editore, 2011.
[7] *Reports on the concept development of the demonstration buildings* in BRITA in PuBs, 2005.
[8] CITTERIO Marco, *8 Reports on the Realisation and Validation Analysis of the Demonstration Buildings* in BRITA in PuBs, 2008.
[9] Referring Web Pages Web : http://edit.brita-inpubs.eu.
[10] Referring Web Pages Web : www.resetters.org.
[11] BORIANI Maurizio, GIAMBRUNO Mariacristina., GARZULINO Andrea, *Studio, sviluppo e definizione di schede tecniche di intervento per l'efficienza energetica negli edifici di pregio*, 2011, Report di ricerca scaricabile dal sito www.enea.it.
[12] A.T.T.E.S.S. Edilizia Storica e Sostenibilità Ambientale – *La qualità delle prestazioni energetico-ambientali nella manutenzione dell'architettura storica* – Linee Guida, Metadistretto veneto della Bioedilizia – Metadistretto veneto dei Beni Culturali, Ottobre 2010.
[13]CANNAVIELLO Monica, VIOLANO Antonella (a cura di), *Certificazione e Qualità energetica degli edifici*, Franco Angeli Milano, 2012.

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Castra of Benedictine origin in territory of Cassino and in the Upper Volturno Valley

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Abstract
South and Central Italy saw the birth and the development, initially under the Longobardic domination and subsequently under that Frankish, of a series of monastic foundations of Benedictine order. Between them, the predominant role from the socio - political and economic point of view is surely to attribute to Montecassino and S. Vincenzo al Volturno Abbey, tied by an almost analogous history for timespan of the dark ages. On the vast possessions accumulated throughout the course of the centuries thanks to the longobardic and carolingian donations, and described as the Terra Sancti Benedicti and the Terra Sancti Vincentii, starting from the X century they put in place the model of territorial organization of the *incastellamento* constituted by inhabited centralized and strengthened situated at the top, called castra or castles, that became centers propellers of local economies, directed to the recolonization and the reconstruction of the areas. They are born in such way installations with similar characteristics that are still to the origins of the existing urban centers in Cassino and Molise's area. The contribution analyzes the territorial structure from the historical and urbanistic point of view and the development of such installations.

Keywords: Molise; Benedettini; Montecassino; Volturno;

1. Introduction
One of the dominant features of the rural Italian landscape consists of a concentrated and strengthened settlement, usually high ground. Historians and geographers over the years have deepened the institutional, political and socio -economic features analyzing the origins, development and transformation.
Demonstrations of this process of settlement are recognized in a large space that includes the Iberian world, southern France and Italy, in different ways and strong temporal differences between countries: in France for example it shows up between the X and the XII century, in Italy and Spain instead it's more precocious, it's already in place in the ninth and tenth centuries[1].
The historic French medievalist Pierre Toubert was one of the first to shed a global light on the phenomenon of incastellamento, which is the key to the structure, development and organization of Mediterranean societies of the Middle Ages: a theme still widely discussed after forty' years from the publication of his hypothesis[2].
The *incastellamento*, defined by Toubert as la *rèvolution castrale*, is the cornerstone and foundation to analyze the process of deep transformation that occurred in particular in Southern Italy: in Lazio between the tenth and eleventh centuries, but which had been previously caught by other scholars, primarily by Mario Del Treppo by social and economic analysis life of Terra Sancti Vincencii [3], and even earlier by Henri Pirenne that distinguishing between *chateau*(seat of power) and *bourg* (businesses seat surrounding the castle) had drawn up a profile of ' urbanization in medieval Europe [4].
The organic model of battlements identified by Toubert locates in the castle the main structure of the system of organization of rural areas; castles, with all the ambiguity of the term, or even castrated,

meaning fortified villages who settled in areas previously unoccupied by becoming centers of concentration of populations and essential reason for the disappearance of the scattered settlement that retraced an arrangement refarable to the Roman era until the tenth century [5].
In essence, this phenomenon represents the transition from one dispersed habitat to a habitat concentrated in castles, grouped towns, fortified and situated at the top, a step that occurs through the convergence of three elements: the centralization of the population, fortification of the town and the formation of *territorium castri* around the site [6].
In Lazio, as well as in Campania, the concentrated and fortified town replaces the scattered rural settlement and agrarian structure space, revealing a kind of planned foundation, an intervention of rural planning[7] .
Actually in the process of fortification three separate historical processes converge[8]:
1. *incastellamento* itself, the fortification of existing settlements, or the construction of fortifications more or less close to them;
2 . the creation of territories and legal location associated to the castles [9];
3 .concentration, the concentration of the settlement, through the creation of new settlements or the convergence of the old ones: normally inside the castles (i.e. fortifications) as in the classical analysis of Toubert.
The *incastellamento* was in central and southern Italy conducted very frequently by the monasteries, mainly by the Benedictines of Montecassino and San Vincenzo al Volturno, but also by Farfa and San Clemente a Casauria, whose monastic and territorial organization is documented and recorded in the diplomatic sources, cartularies codes and *chronica*: The Religious acted in harmony with the owners of neighboring curtes and rural communities. In this regard *castrum* and *ecclesia*, incastellamento and enchurchment, cannot be opposed, as if they were models in competition. Anyway, the ecclesiastical institution seems to have taken a structuring role in the long term [10].

1.2. The Cassino territory

The territorial domain of the Abbey of Montecassino sees its real beginning with the donation of substantial portions of properties located in the area next to the monastery by the Lombard Duke of Benevento Gisulfo II, in 744. Prior to that date the Cassino territory consisted in assets dating back to the late Roman Empire and the funds of wealthy local families, descendants of the gentes Paccia , Ummidia, Tutia, Luccia who lived in *Casinum* during the imperial era[11].
The land donated to the monastery in the eighth century included a flat area between the rivers Rapido and Liri - Garigliano, and part of the mountain composed of hills to the north (Abruzzi Apennines) and on the southern side (Aurunci mountain)[12] .
The abbot Bertario, in 857, was the first to carry out a proper fortification of the territory, act to defend the abbey from the impending Saracen threat: an impressive complex of towers and walls of protection around the Monastery of the Savior, first called Eulogimenopolis , and subsequently San Germano [13].
Despite this intervention, the Saracen raids around 883 caused the abandonment of the monastery while the monks found refuge first in Theano, then in Capua, the territory was plundered and destroyed by the invaders. The tenth century was therefore marked by a severe social loss, a deeper crisis than the rest of the peninsula, from which derived in consequence the retreat of arable land and a significant alteration of the urban fabric [14].
The return of the monks and the abbot Aligerno to Montecassino in 949, was the *ubi consistam* for a total renovation and unprecedented and caused the reconfiguration of the abbey heritage. When the period of the building industry of the cellae was over it began the period of the fortifications of towns sprang up around the monastery: the entire earth of St. Benedict, as well as works for cultivation, land reclamation, and fortifications, was affected by a new judicial organization and by the onset of a new administrative system: the incastellamento phenomenon began [15].
In 967 the abbot Aligerno , through the contribution of the Ius Munitionis granted by Pandolfo Capodiferro and his son Landulf III , [16] obtained the right to freely fortify the entire inhabited territory by facilitating the reconstruction of the destroyed churches and the creation of new ones[17] . Around these farmers would settle, to whom the abbot gave soils with balanced contracts.
Dealers of land were bound to soils with long-term agreements that guaranteed the exploitation of land, while remaining the property of the monastery. In exchange for the freedom to settle in the land received and the opportunity to build homes both for themselves and for the employees , they were bounded to build the castle (castellum tan veins juxta et ratione) , with staff provided by Monte Cassino, the so-called magistri fabricatores. By placing their houses around the churches, they formed thereby those that can be defined the first rural villages, which were built on high ground before uninhabited.
The new settlement units was represented now by the castrum, a term that in most of the peninsula indicates a cluster of houses enclosed by fortifications, and often protected by a fortress built inside the perimeter wall, with agricultural areas positioned concentrically in the surrounding space. But the

castrates were also supporters of local economies, aimed to the reconstruction and repopulation of the territorial organization.
With the implementation of balanced contracts, lasting twenty-nine years and renewable, the vast territory of Monte Cassino , an area of nearly four square miles, was divided into small possessions that could not be moved unless within the same monastic community, which represented properties , although restricted to the payment of contracts.

1.3. The area of upper Valley of Volturno.

The territory which occupies the upper valley of the Volturno River, straddling the modern regions of Abruzzo and Molise, has always been inextricably linked to the role that the Abbey of St. Vincent played on it, from its definition that identifies itself with the foundation of the Vulturn monastery .
The Abbey of St. Vincent was founded in an area protected by Mainarde of course , which marks the border with Lazio and Abruzzo , not far from the headwaters of the river Volturno, by Lombard will and in conjunction with the Benedictine expansion throughout the country.
The tradition, linked to the events narrated in the Chronicon Vulturnense [18], says that it was founded in 703 by three nobles Benevento Paldo Taso and Tato, who came from the Abbey of Farfel, and chose to stay in that site where there was already a chapel in ruins dedicated to St. Vincent.
At the time of its foundation, the three were sponsored by Gisulfo The first Duke of Benevento , who gave them a vast expanse of land , about 300 square kilometers of land, the nucleus of what would later be the land of Sancti Vincentii [19] .
It should be emphasized that the foundation of the first monastery of St. Vincent foreruns about fifteen years before the restoration of the abbey of Montecassino by the Petronace of Brescia, which occurs precisely with the help of the community of Volturno ,distant only twelve miles of walking alpine [20].
Since the foundation the development of the abbey had to proceed at times, now facilitated by the growth of the monks, now damaged by the Saracen invasions and earthquakes, but at the end of the eighth century the monastery, with a small cloister located in the south of it, occupied an area of half a hectare and housed little more than 100 monks [21].
Over the years through numerous donations , particularly that one of Arechi II during the years 758-60, the monastery had become the owner of a large area of over 400 square kilometers bordering the territory of Monte Cassino , who trained at the same time thanks to similar ducal donations but with a much higher extension.
The Chronicon Vulturnense of monk John, dating from the twelfth century , and the first source for the reconstruction of the monastic history of the monastery of San Vincenzo al Volturno , contains a series of documents that attest to the formation of the assets of the abbey.
The formation of the Vulturn estates contributed , to varying degrees but equally significant, the private and public munificence . The flow of donations from the first half of the eighth century formed the basis of monastic power, was accompanied by the granting of such immunity rights that acted as a distinctive element of that power [22].
Internal organizational structures of the area are not documented nearly up to about 914-916 , a period when the monks returned after the looting and destruction of the monastery by the Saracens .
The situation changed completely in the early ninth century when ,under the initiative of the abbot Joshua , it was decided to launch a broader project of urban planning .
The abbots conciliated between Lombard and Carolingian power , placing the abbey as a watershed between two spheres of influence. According to Marazzi, only in the tenth century, the influence of the Carolingian was consolidated and the abbey became a sort of outpost in central and southern Italy.
Throughout the Molise between the ninth and twelfth centuries an extensive process of fortification is documented. The castles are born in the Volturno area in the ninth century, and again in the tenth century their fortification around the abbey is attested. In the following century the arrival of the Normans increases the widespread implementation of fortified and walled towns.
The Normans impose themselves by repressing the push for autonomy of the local lords . The occupation is accompanied by a work of fortification so punctual that they introduce the castles in the city as a characteristic of their original process of territorialization .
The hilly terrain makes it difficult to adopt appropriate solutions to the countryside, to the geomorphological characteristics , exploiting any previous settlements [23].
Until about the middle of the eleventh century the settlement forms had little consistency , being scattered within the entire area of the valley, but in these areas are developed the settlements which are the origins of those countries that still exist in the Valley of the Volturno.

1.4. Conformation of the centers: some significant cases.

For proper evaluation of any historic urban core it’s essential to look specifically at the territory which is the basis originator , along with all those physical, hydrological , cultural, settlement factors which variously affect its education , as the streams , vegetation and climate , thus acquiring a greater

awareness of the environment that characterizes the place where you place the single architectural object.
The centers who depend from the abbeys of San Vincenzo al Volturno and Monte cassino extend between Cassino and the plain of the western slope of Molise , neighboring territories which show very similar orographic and environmental features.
The same Cassino and Vulturn settlements, being of course the result of the encounter between a geographical site and a settlement pattern, present in the majority of cases, a common urban planning.
Types of settlement of this territory are divided into two categories : the spindle of the acropolis one and the winding one (partial or total): however, the plants of Vulturno centers have a greater readability , as they were unchanged in their shape after the loss of power of the abbey of St. Vincent determined an arrest in the development, both for their isolation ; Cassinensi centers throughout the centuries have changed their shape better because of the increased religious impulse and consequently to frequent and severe earthquakes that have always interested the area and often have totally and irreversibly destroyed structures .
A case that's particularly interesting in its conformation is the Vulturn fief of Castel San Vincenzo , in the province of Isernia.
The village is situated on a spur in the south of the Rio Omero, 749 meters above sea level . Because of its dominant position and the proximity to the Abbey of St. Vincent the village has assumed a supervisory role over the lands of the monastery, following the historical fortunes until the middle of the fifteenth century.
Actually, what is the present-day town was formed by the union of two centers , one -time independent named Castellone and St. Vincent, the first with total winding type, the second type with a spindle of acropolis , joined in the south Eastern Europe.
The core of Castellone wraps around the St. Stephen's Church, built in the twelfth century, which can be reached along the way of the Church that meets in the square now named Vittorio Emanuele III and on which the church faces .
The village of San Vincenzo develops itself following the linear Via Roma, with the monumental entrance to the west door of St. Philip (XII century), Which is also dedicated to the eighteenth-century church of the same name , located in the square that welcomes those who arrive in the country . The road runs through the village , opening in the center in a rectangular square with the church of St. Martin already existing in the inhabited area in 819.
The village appeared walled around the perimeter but did not have other defensive elements. In fact it isn’t indicated the presence of either a castle or tower to protect the population.
Unlike the case of the town of Fornelli: situated on a rocky ridge in the central part of the high valley of the Volturno , encloses an area of approximately 60 x 75 meters a set of small inhabited units into a wall which was once surrounded by a moat [24]. In Angevin era the walls were expanded with six cylindrical towers that disrupt the continuity of the walling .
The church of St. Michael the Archangel is still in the center of the fortified nucleus, with the residential center which is distributed radially around [25].
In the Cassino area in the same setting is recognizable for example in Castelnuovo Parano, in which the village is spread concentrically around the Church of Sant'Antonio Abate, contemporary with the construction of the fortified plant (XI century).
Although several seismic events, since the earthquake of 1349 , we have definitely changed the look , a trace of the original plant of the settlement is recognizable in a small circular tower with a shoe.
Until the seventeenth century there were still three doors , a square tower with three rows of rooms, and a round tower. What still can be seen now, on a rocky outcrop , is a square tower of which remains standing one side, surrounded by a wall of elongated shape inside in which was placed a residential building.

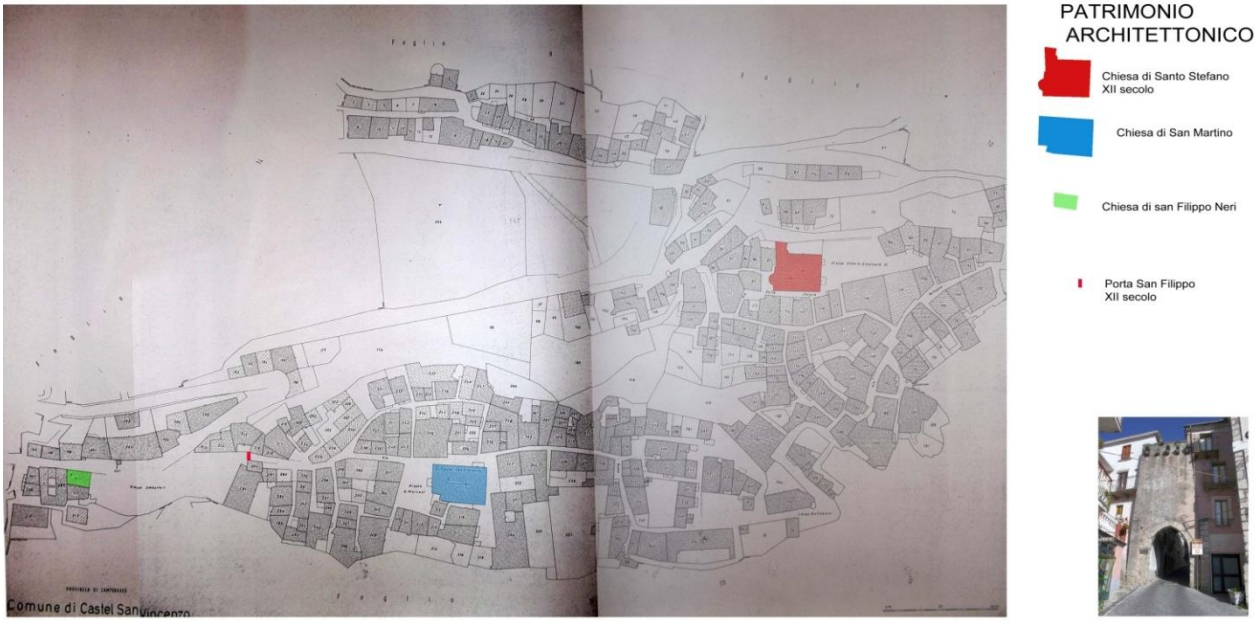

Fig.1: Castel San Vincenzo (IS). Elaboration on the cadastral plan.



Fig. 2- 3: Castel San Vincenzo (IS). The village and the church of Santo Stefano Martyr



Fig. 4- 5: Fornelli (IS): Some pictures of the walled perimeter.



Fig. 6: Fornelli (IS). The access portal.

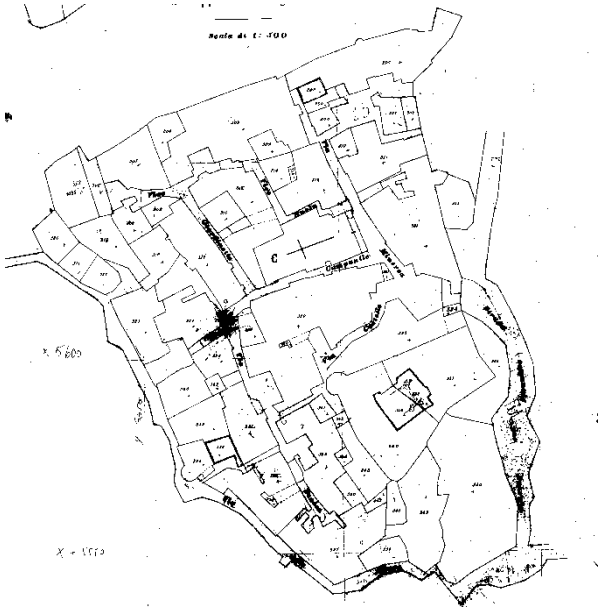



Fig. 7- 8: Castelnuovo Parano (FR). Floor plan and photos of the center (Archivio di Stato di Frosinone, UTE, *Castelnuovo Parano*, allegato A).

Bibliographical References

[1] GALASSO Giuseppe. Castello, incastellamento. In ZECCHINO Francesco. *Il Castello di Ariano*. Ariano Irpino: CESN, 2012, p.23. ISBN 9788898028047.

[2] TOUBERT Pierre. *Les structures du Latium médiéval: le Latium méridional et la Sabine du 9. â la fin du 12. siècle*. Roma, Ecole francaise de Rome,1973.

[3] DEL TREPPO Mario. *"Terra Sancti Vincencii": l'abbazia di S. Vincenzo al Volturno nell'Alto Medioevo.* Napoli: Libreria Scientifica Editrice, 1968.

[4] PIRENNE Henri. *Les Villes du Moyen Age: essai d'histoire économique et sociale*. Bruxelles: 1927.

[5] FRANCOVICH Riccardo. L'incastellamento e prima dell'incastellamento nell'Italia centrale. In BOLDRINI Enrica , FRANCOVICH Riccardo. *Acculturazione e mutamenti. Prospettive nell'archeologia medievale del Mediterraneo*. Firenze: Edizioni All'Insegna del Giglio,1995.

[6] LAUWERS Michel. *La storia medievale secondo Pierre Toubert*. Studi Classici e Orientali LVIII. Anno 2012, p. 215 e ss.

[7] MUSI Aurelio. *I luoghi della vita. castelli, monasteri, villaggi, città in Europa*,. Guida Editori, 2007, p. 28.

[8] WICKHAM Chris. Castelli e incastellamento nell'Italia centrale: la problematica storica. In FRANCOVICH Riccardo. *Archeologia e storia del medioevo italiano*. La Nuova Scientifica, 1987, p.57.

[9] VACCARI Pietro. *Le territorialità come base dell'ordinamento giuridico del contado nell'Italia medioevale*, 2° ed. Milano,1963.

[10] LAUWERS Michel. *La storia medievale secondo Pierre Toubert*. Studi Classici e Orientali LVIII. Anno 2012, p. 229.

[11] CARETTONI Gianfilippo. *Casinum*, Italia Romana, Regio I. Serie I.Roma:1940, vol.II, pp.33-35.

SAMMARTINO Guglielma. *L'organizzazione territoriale benedettina e le fasi dell'incastellamento nella Terra Sancti Benedicti*. Studi cassinati. Anno V. n.2, 2005, p. 66.

[12] cfr. PISTILLI Emilio. *I confini della Terra di San benedetto dalla donazione di Gisulfo al sec. XI*. Cassino 2006.

[13] FABIANI Luigi. *La Terra di S. Benedetto. Studio storico-giuridico sull'Abbazia di Montecassino dall'VIII al XIII sec*. Montecassino, 1968, voll. I-II, p. 32.

[14] SANTORO Lucio. L'incastellamento nell'alta Terra di Lavoro. In *Territorio, fortificazioni, città: difese del Regno di Napoli e della sua capitale in età borbonica*, a cura di Giosi Amirante e Maria Raffaela Pessolano. Napoli, ESI, 2008, p.261.

[15] CIGOLA, MATTEI, PELLICCIO, VOLANTE. *La Terra di S.Benedetto: dalla curtis al castrum*. In *Aspetti dell'incastellamento europeo e mediterraneo*. a cura di Carmela Crescenzi.Atti del Convegno. Arezzo 2006.

[16] TOUBERT Pierre. *Pour une histoire de l'environnement économique et social du Mont-Cassin (IXe-XIIe siècles)*. In Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres, 120e année. N. 4, 1976, pp. 689-702.

[17] FABIANI Luigi. *La Terra di S. Benedetto. Studio storico-giuridico sull'Abbazia di Montecassino dall'VIII al XIII sec*. Montecassino, 1968, voll. I-II, p. 56.

[18] *Chronicon Vulturnense del monaco Giovanni*. A cura di V. FEDERICI. Fonti per la storia d'Italia pubblicate dall'Istituto Storico Italiano. Scrittori secoli XII-XIII. Roma, 1938. vol. III.

[19] WICKHAM Chris*. Il problema dell'incastellamento nell'Italia centrale: l'esempio di San Vincenzo al Volturno*. In *San Vincenzo al Volturno: cultura, istituzioni, economia*. A cura di Federico Marazzi. Monteroduni: Edizioni Cep,1996, p. 106.

[20] TOESCA Pietro. *Il Medioevo*. Torino: UTET, 1927.

[21] SARNO Emilia. *Campobasso da castrum a città murattiana : un percorso nella geografia storica*. Roma: Aracne, 2012.

[22] SENNIS Antonio. *I caratteri della signoria vulturnense: una discussione da riaprire*, in *San Vincenzo ... op.cit*, p. 93.

[23] SARNO Emilia. *op. cit.*

[24] GIUSTINIANI Lorenzo. *Dizionario Geografico ragionato del Regno di Napoli*. Napoli, 1804. Tomo IV, p. 348.

[25] COLETTA Mario, *Il comprensorio storico- urbanistico. Metodologia ed esemplificazione di lettura.(La Valle del Volturn*o). Padova, 1981, p. 242.

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ANCIENT POMPEII SIGHTSEEING: INTANGIBLE IMMERSIVE TECHNOLOGY AND EMOTIONAL MAPS

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Abstract
Pompeii has always been the destination of a continuous flow of tourists from all over the world, who come to see first-hand the archaeological patrimony inherited from the past that has elevated Italy to the rank of the *"Bel Paese"* as the guardian of the beauty and charm of the past. Unfortunately, this basic condition also includes the negative elements of the political, social and cultural degradation that have not encouraged the sustainable development of the entire territorial system that now includes the archaeological excavations, the religious complex as well as the attached museums.
In line with central government initiatives (see DL "Cultural Value") undertaken in 2013 and aimed at the preservation, development and enhancement of the cultural heritage and activities of Pompeii, the current research test a *cultural* tourism project today *alternative* to the *mass*, which is processed through a **model of reciprocal systemic and relational exchange** between the tourist-traveller, the local community and the wealth of beauty inherited from the past.
Addressing an immersive almost pervasive path, through interactive technologies and environmental devices carried out with augmented reality, means fostering a retrospective reading of the space, as an occasion for inner enrichment for the 21st century tourist-traveller, who from simple day-tripper, penetrates into an innovative experience in the perceptual optical field in the same way as experienced by the romantic model of *Flâuner*. Through the use of **emotional maps** translated into new models of control and understanding of the space with a series of inspections of the emotions, it allows an individual to expand the knowledge of a place and explore the sphere of intimate man

Keywords:
Heritage: Collective Identity, Memory, Communication for Cultural Heritage.
Architecture: Modification Project
Landscape : Government of the territory, Sustainable development, Social Sustainability

1. Introduction

This research can placed within the current historical context that is characterized by a period of economic decay, a slowing of production on the verge of a ***recession,*** not only economic but also political and social, which tends in contrast to founding a fertile ground for a new cultural revival.

In general, this situation can be extended to the entire ***planet*** since man has abused the natural resources for too long and has particularly focused his activities on mere economic profit excluding any extended benefits to the community in the social and cultural spheres.
Specifically, the current American crisis is dragging Europe behind it, changing the direction of the global economy, while at the same time shifting the economic and productive barycentre from the US-European axis to the archipelago of new emerging countries such as **Brazil, Russia, India, China and South Africa**, identified with the acronym **BRIC(S).**
Unfortunately, ***Europe*** will have to wait a little longer so that the unification process of the ***European Community*** can comply with an overall programmatic intervention including the different systems and economic models, articulated and complex, of development and growth, finally considering all the countries currently participating as a true community.
Unfortunately, ***Europe*** has always been considered the old Continent since it is too conservative and anchored to old models of development, a process of unification of the nations that is too slow and merely based on the introduction of a single currency and therefore too limited.
In fact, this approach has not favoured a broader process of unification and development involving more heterogeneous areas ranging from sociology to politics, starting as a basis for a development model focused on culture understood by **Richard Florida and Maurizio Carta** as a **"cultural reset"**. [1]
Starting from the assumption that development through *culture* and *creativity* should be primarily focused as a tool to re-start from a state of serious decline, it means focusing on young people, their creative force and the opportunities offered by social exchanges as well as cultural and ideological premises that can favourably interact in the global village. [2]
In fact, the solution to the crisis intended as a reversal of the route will only be viable if it is based on the application of certain factors that promote innovation and progress expressed in the theories of **Richard Florida and Maurizio Carta** capable of promoting cultural development through a model based on the **3T and 3C** (Technology, Talent and Tolerance + Culture, Communication and Cooperation). [3]



Fig. 1: Saverio Della Gatta, Bottega di antiquario napoletano, gouache (1798)
First form of for example the distribution of the product archaeological inside the store

The theory tries to highlight some aspects of these factors of cultural progress by applying them to the territory of Campania, a region rich in archaeological and artistic artefacts that for decades represent a source and resource of cultural tourism , aimed at demonstrating that in the XXI century, there has been a reversal of values so as to assert that "... culture has exceeded technology as an engine of innovation, particularly in consumer goods ..." based on studies developed by *Judith Mühlenhoff*. [4]
In fact, *Italy* cradle of culture for the stratification of signs, thoughts and products, which are also identified in its archaeological and artistic environment, has always had the possibility to invest in an economic system for **tourism** in an attempt to combine the relationship between **tradition** and **innovation** into a relationship that is not to be considered confrontational but symbiotic and antithetical. [5]
Starting from L. De Biase, with tradition defined as *"... a source of knowledge for a society geared to make things right ..."*, development based on traditional roots intended not as an archaic model but as a base to which to refer to for the production and creation of a growth process that bases its pivotal point on creativity, in fact, tradition must express the meaning of things, the truth and it must establish itself as a source of knowledge from which to actualize technologies, service devices and automation systems useful in obtaining "smart" performances and innovations.
Many Smart City projects on the lines of **cultural and archaeological tourism**, especially in the cities of art, that hold a wealth of testimonies and secular values, revolve around the concept of *"heritage driven"* [6] while drawing from digital technologies as well as the intangible assets of Web 2.0.
If the orientation of economic policy management is changed by passing from "emergency" interventions to structural and strategic initiatives, there will be a radical change based on investments that tend to an opening of a creative nature without neglecting the creative and innovative contribution of young people who are more open to the contamination of knowledge.
Unfortunately, on the contrary, in recent decades, we are witnessing, disheartened and demoralized, the decay and abandonment by the institutions of cultural tourism destinations such as the archaeological excavations of **Pompeii and Herculaneum in Campania** as well as for the Imperial Forum and the Colosseum in Rome. Despite the growing tourist flow being mainly foreigners who visit the places of memory and tradition of classical civilization, policy initiatives tend to avoid the question of innovation thus marginalizing the contribution of **Cultural Creative Enterprise ICC** [7] with a short-sighted attitude.
Apply digital interaction systems through increased reality and the immersive reality directly connected to cloud computing, i.e. in close contact with records that can be stored and archived through the Open Source tool typical of the Web 2.0 era, means starting from a concept of creativity closely related to that of culture that by using advanced technologies can promote the material culture and social quality.
In the ***tertiary production*** sector, a formula for **cultural tourism** that is attached to the mass tourism, historically a driver of our economy, has grown in the last few years.
Establishing systems of economic development on a model intended as a magnifying glass based on actions and reactions, means promoting tangible and intangible products and services on the territory capable of promoting a **scenario of sense,** of aesthetic value in addition to a complement to the mere function of products and services in line with recent directives of the "White Paper on Creativity" by Walter Santagata. [8]

2. Vision and Scenario

The current line of scientific research addresses some design themes developed during the course of *"Company Museum"* in the second year of the **Master's Degree in Design and Innovation** at the Department of Architecture and Industrial Design "Luigi Vanvitelli" SUN , oriented at furthering the experience of a user interacting with digital technologies when visiting an **Interactive Museum and/or the Company Museum** the value of which is to transmit digital content. Everything starts with an analysis of the value chain of the cultural and creative industry, based on the definition of the **creative economy** that is understood as an economy based on knowledge and talent, traditionally associated with areas such as architecture, art, music and painting.
Today, however, this new dimension of the **knowledge economy** is also contaminated by scientific and technological activities capable of building a relationship that is a useful both for the interfacing of transmissible scientific research as well as the development of new forms of entrepreneurial projects. Progress and development depending on the production of culture means to leverage this wealth of knowledge stratified in our civilization and in every expression of the historical and artistic heritage and at the same time means that the scenario and context for creativity understood as a value that holds each individual to solve any problem by optimizing resources and time.
This position promotes economic development through digital technologies contaminated with culture as historical and artistic heritage, and thus the creative atmosphere or territory represents the pivot and at the same time the foundation of ongoing research reported in the international conference "XII

Forum International Le Vie dei Mercanti 2014" about the theme Heritage-Conservation-Management best pratice from the world to Pompei.
Starting from some scientific positions reported in the "White Paper on Creativity" produced by the Commission of creativity and production of Culture Ministry of Culture in Italy MiBAC (2009) under the chairmanship of Walter Santagata [9] and the European Digital Agenda for Culture (reported in the Green Paper "The cultural and creative industries unlocking the potential").
Specifically from the **Green Paper on Creative Industries**, there is an essential reference to the principle that *"... the culture becomes a creative input to the process of production of goods and services ..."* sometimes not necessarily only cultural. They are accompanied by activities attributable to forms of cultural expression a method of contamination with a creative and expressive dimension of the handmade design product expression of traditional manufacturing. While in the **White Paper on Creativity,** the model assumes a principle according to which: *"...the basic skills of creativity..."* the factor that offers guarantees of development in terms of innovation lies in governing the processes of communication, financial management and fundraising as well as market access strategies .
In Italy, the nation of art and beauty, the opportunity we have today to promote an economic recovery is offered by the opportunity to promote the creative and cultural industries contaminating immersive technologies as well as those of augmented reality derived from a *"technology –driven"* position with the values, cultural and artistic, described by the existing pattern of development such as *"heritage-driven"* , all to promote a process of continuous transformation where innovation and culture are the right mix to follow a line of frontier economic development and highly symbolic and intangible cultural tourism.
Specifically, the Italian tertiary tourist production sector with all the cities of art, archaeological sites and excavations of Pompeii and Herculaneum, testimony to a strong interest in classical civilization of communicative and cultural, bases its appeal on a model that promotes and disseminates values that are focused on culture.
If an aspect of creativity that focuses on communication technologies, innovations and industries of content is added to this precondition, a model of creative development that promotes the production of cultural content is obtained, capable of providing a complete service to cultural districts and tourist museums. Today, **Smart Phone** are diffusing interactive digital applications, new ways of sharing content and images that applied to the creative and cultural sector of the company, promote an active participation of a museum, customizing paths, impressions and emotions to be transferred in real time via cloud computing to friends, relatives, colleagues in remote locations based on the concept of a united global location GLOCAL. [10]





Fig.2 Luigi Salvatore Gentile, Quadriportico dietro il Teatro Grande di Pompei, gouache (1805) su carta
Fig.3 An unknown author, Veduta della tomba degli Istacidii a Pompei, gouache su carta
(In both immages Gouaches you can see the tourists who visit the excavation cultured)

3. Technological Tourism and Emotional Maps

In Campania, tourism has always played a leading role in the tertiary production sector due to the presence of an archaeological and environmental heritage that attracts many foreigners from Europe as well as other continents. Unfortunately, this opportunity is no longer sufficient and not enough o support the history and environment, it is therefore necessary to implement a strategy that involves planning and business institutions, local associations, the research universities and business realities according to a model of continuous innovation as a factor of competitiveness for economic development (*Triple Helix Model* [11] which allows Political Companies and Universities to interact).

However, local institutions, given the economic crisis and very few structural funds, have never concretely adopted in the configuration of an innovative **Cultural District** because the central government has always coped with relief interventions and commissioning safety, and because they have never considered cooperating, systematically involving different actors and people capable of exploiting the wealth of local creative businesses.
The definition of **Cultural District Museums** and the consequential distinction of several other forms of museum network or Museum System refer to research and scientific texts of scholars in economics and management, who recently addressed through careful critical reading the development of industrial districts in Italy. [12]
Specifically, the cooperative work in progress with some business networks and associations involved in tourism in the city of Pompeii based on the European Framework Programme for Research and Innovation **Horizon 2014/2020** so that an integrated funding for competitiveness can be implements and the application of digital technologies, the author is considering some design strategies to revive the tourism trade based on creative and cultural companies applied to the *"Open air Museum"* within a broader archaeological cultural district of **Company Museum in Pompeii**. The objective is to imagine the extent to which within a district cultural archaeological "open-air museum" is it possible synergistic intersect systems in the form of service and immersive technologies aimed at improving the quality and quantity of experience of archaeological space, improve services relating to the supply and consequently increase the number of visitors and improve the relationship between the public user/visitor and offer new products and services prepared on the basis of a system of interaction or immersive and interactive journey.
What form of twenty-first century tourism is preparing to materialize?
If industrial production has historically favoured the spread of a commodity and specialized monothematic product, today in the twenty-first century technological and digital developments tend to the *dematerialization* [13] of the product, which applies to the cultural district museum of Pompeii and Herculaneum and should incorporate a principle diffusion of externalities, i.e. intangible values and elements expressed in complex systems and multi-services for the integration and completion of the pre-existing cultural museum product. Investigating tourism through creativity and technology at the service of culture is to imagine systems of interactive technologies capable of constructing a scenario of meaning, where the space and time of the visit in the archaeological excavations becomes the relational platform for a new dimension of perception based on the experiential testimony to a feeling and immersive emotion as the result of a dialogue between the virtual and real, between the imaginary and imaginative obtained by overlapping and/or juxtaposition of a hologram that fully integrates with the existing historical and archaeological environment. Furthermore, the technologies of augmented and immersive reality allow the individual user of the service to interact with the information apparatus overwritten by customizing experiences translated into a path as the suggestion in the form of programmed self-management of continuous information.
Today, among the "digital natives", there is a pervasive use of interactive digital content aimed at offering a sensory journey that responds to the needs, dreams and expectations translated into a narrative in the form of "storytelling". The individual memory of that particular physical location can be so easily stimulated through the active participation of the user in addition to finding valid information cataloged, prepared and properly organized. It can personally expand the cultural matrix with creative contributions and interpretation.
Everything is entrusted to the contribution of the individual viewer, protagonist in relation to his experiential travel path defined in the era of post modernity by **Giampaolo Fabris** [14] as consum-Actor, but with the dimension being critical to be referred to, namely that human , in reference to the issue of involvement and behaviour will need to determine a measure through which to create reference guides capable of collecting data, stimuli and responses by organizational structures and museums together with the entire community in the form of cloud computing.
The system of archaeological excavations, contaminated with immersive technology, distorts the behaviour of tourists in the exploration of the space and search for information phases, which, obtained by a technological approach applied to the existing architecture of the past, increasingly blurs the boundary between physical and digital, between real and unreal loading the cultural experience of intangible and emotional values, stimulating the participation and interaction of tourists through its emotional component.
The tourist traveling through a *promenade*, in the manner of Baudelaire's *flâneur*, activates the emotional sphere in a playful and exploratory path, favouring a mental process in which the emotional involvement increases the more the tourist bases his journey through an appropriation of space in an haptic manner rather than optical, where the investigative path is not based on a faraway look, a stranger to his own person, in the manner of **Giuliana Bruno's** *voyeur* [15], but on a look that is more like a tactile vision, in which the body is involved through all its senses in the total complexity of the experience of using the space, with the whole system of perception through the sensory sphere. So that the simple consumption of images becomes living complete and complex in archaeological

spaces and museums, where the simple visual delight of an incomplete and ruined architecture becomes the desire to fruition through the perception of those places as real emotional journeys; the rigid optical vision is replaced by an inner journey that begins with a haptic approach to the outside world through the eye, passing through all the sensory fields of the body and turning into a real emotional journey, where the external journey enters into a relationship with the inner journey, and the physical journey with the virtual, in which places become defined as **Giuliana Bruno** [16] *mnemonic palimpsest*, i.e. rewriting the memories and the journey instead of a discovery in a territory as real as the interior, giving visitors the opportunity to write their own **emotional geography**, linked to this new way of looking and coming into *contact* with the space, which becomes a place of representation through mind maps.
Draw maps results in writing sentimental places, a psycho-geography, where maps become an intermediary between the physical reality and the inner life, and where emotions are influenced by the space within which it moves the memory formed through haptic and emotional experiences, which allow to model the architectural *promenade* of the tourist according to different emotional situations, giving rise to a continuous re-mapping of the space of the museum.
In this vision, the *yoyageur* of the museums of Pompeii moves away from the figure of the common tourist *voyeur*, simultaneously addressing a travel route connecting an emotional feeling inside and outside, public and private, where the *promenade* is transformed into an emotional and experiential narrative, in continuous evolution, recountable and transmitted through a new form of narrative or storytelling media within an architectural space.
Seeing and travelling, to explore the museum and archaeological reality, from life and body to an inner landscape that interbreeding with the new digital technologies of augmented and immersive virtual reality allow to roam as if the *flâneur* in time but in most other places and spaces through a journey of discovery and wonder characterized by the movement that generates emotion, promotes a kind of participatory emotional, sensory and cognitive experience. Recent technological contributions of interactive devices connected to clouds, and the continuous exploration and application configurations can also interact through microchips in clothes (wearable-technology) between the physical reality of the archaeological excavation site and a virtual hologramatic world within which the tourist is "immerged", allowing for the construction of a *figurative syllogism*, an active emotional link between past and future, between reflection and action between mnemonic perception and design perception of the future. The tools of augmented reality allow to connect the state of places and ruins (archaeological) to a facsimile diachronic historical reconstruction in which the possible use inside through immersive technologies facilitates the multisensory and pluri-perceptive haptic journey.

4. Best practices

A look into the future to improve the past, to foster a better understanding of civilization and the testimony of the society that once was, a "technological" reconstruction of an immaterial part of the archaeological site is not retrieved, giving an added emotional value to the historical value.
A reference model is the case history of the **CHESS Experience** as a model for future testing of a project funded by the European Commission under the Horizon 2020 program whose aim is to offer two new alternatives in the enjoyment of a museum space that merges adventure and interaction with the technology of augmented reality and the world of digital applications.

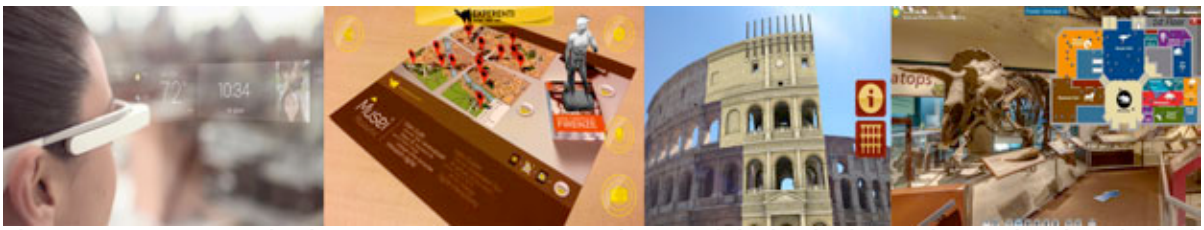

Fig.4 Some rapresentative images of regeneration projects and design in the tourism and archaeological sector BEST PRACTICE

CHESS (Cultural Heritage Experiences Socio-personal Interactions and Storytelling) adds to the world of the museum the following functions such as adventure, emotion, interactive participation, magic, exploration by combining the two dimensions of culture and technology that apparently seem antithetical. In connection with the current digital devices applied in this international project CHESS which involves various businesses, institutions and universities systematically collaborating to can capture the innovative and original aspects that promote the use of a user visitor to an open air museum in order to include in the range of services to the tourist an opportunity to promote a more complete experience and gratification as well as intellectual and cultural growth.

The tertiary cultural productive museum sector has more benefits in terms of opportunities and economic benefits thus increasing the value of the identity of the place that is home to such performance since the tourist would remain indelibly imprinted to the charm of the “Pompeii that was” cradle of civilization and classical culture, in addition to the conviction of a territory and a community to move with the times capable of investigating and using the various technologies in innovative ways that today characterize the processes of sustainable economic development by focusing on innovation as a competitive factor. Promoting the current models of local development, such as that of Pompeii and its catchment area in the field of mass tourism and cultural heritage, momentum towards development that is based on technological means to merge culture, history and technology in a creative atmosphere in a creative enterprise in line with current economic trends that in a situation of stable and continuous economic crisis could lead to a turning point and a revival similar to the emerging countries **BRICS** that base their innovative strength and growth, based mainly on the knowledge factory .



Fig.5 Some example about interaction design environmental devices to offer the traveler new opportunities for sharing. Application and new startup for the creative project

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Bibliographical References

[1], Tafter Journal Cultura e sviluppo di Nicola Migliore, 3T + 3C = sviluppo culturale. Ecco l’equazione dei “profeti” R. Florida e M. Carta
Referring the Web Page http://www.tafter.it/2012/09/27/3t-3c-sviluppo-culturale-ecco-lequazione-dei-profeti-florida-e-carta/

[2] BAUMAN Zygmunt, *Globalizzazione e glocalizzazione*, Editore Armando, 2005

[3] ibidem nota 1 cfr. Richard Florida in the Rise of Creative Class e Prof. Arch. Maurizio Carta in Creative City. Dynamics, Innovations, Actions Barcellona, ListLab

[4] cfr. new definition of innovation “Culture driven innovation” martedi 10 settembre 2013 The role of intermediaries in Culture-Driven Innovation. di Judith Mühlenhoff,
Referring the Web Page
http://translate.google.it/translate?hl=it&sl=en&u=http://culturedriveninnovation.blogspot.com/&prev=/search%3Fq%3DInnovation%2Bcultural%2Bdriven%26client%3Dsafari%26rls%3Den

[5] about innovation and traditional value cfr. Cultura è innovazione di Luca De Biase “Nòva24” in blog.debiase.com
Referring the Web Page http://blog.debiase.com/2014/04/cultura-e-innovazione

[6] Innovation Heritage Driven is a method born by definition of ICC Impresa Culturale Creativa or Creative Enterprise Culture
Referring the Web Page http://www.emiliaromagnastartup.it/creative/impresa-culturale-e-creativa-icc

[7] ibidem

[8] SANTAGATA Walter Università Bocconi, *Libro bianco sulla creatività. Per un modello italiano di sviluppo* MIBAC Ministero dei Beni e delle Attività Culturali e del Turismo giugno 2009

[9] ibidem

[10] ibidem nota 2

[11] The Triple Helix Model, di Henry Etzkowitz e Leydesdorff NewYork 2009

[12] ALBERTI Ferdinando G. “I musei fanno sistema” Ed. Guerini Associati, Le reti di Musei, BAGDADLI Silvia Ed. EGEA, ALBERTI Ferdinando Giuseppe e GIUSTI Jessica Daniela Liuc Papers n. 229, Serie Management ed economia della cultura 2, giugno 2009)
Risulta invece interessante ai fini della linea di

[13] about the concept of dematerializzazione cfr. PALMI Pamela *Le Fabbriche della creatività. Un’analisi organizzativa dei distretti evoluti* FrancoAngeli Milano 2013

[14] FABRIS Giampaolo, *La società post-crescita*. Milano Egea

[15] BRUNO Giuliana, *Atlante delle emozioni. In viaggio tra arte, architettura e cinema*, Bruno Mondadori Editori Milano 2006 e *Pubbliche intimità. Architettura e arti visive,* Bruno Mondadori Editori Milano 2009

Referring Web Pages Web: http://www.leviedeimercanti.it/2014eng

Other caption information
Fig 1: The gouache depicts, with attention to detail and freshness of tone, the interior of an antique store, characterized by ancient vases, paintings of views and a marble bust.

Fig.2: The Gouache represents one of the first buildings excavated at Pompeii, known as " Caserma dei gladiatori " or " Quartiere dei soldati," for the discovery on site of weapons, helmets and greaves.

Fig.3: The image takes up with a simplified spatial pattern, a design Desprez for the *Voyage Pittoresque* and entitled "Vue du Tombeau de la Petresse Mammia"

Fig.4-5: Technology Application, Environmental Devices = Best practies in Heritage Conservation Management from the world to Pompei

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Palenque: The Maya Pompeii.

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Abstract
Palenque is one of the most important places of the pre-classic period, World Heritage Site since 1987. Located in the Mexican state of Chiapas, about 130 km south of Ciudad del Carmen, it still contains architectures and sculptures dating back to the fourth-fifth century BC. The work presented reconstructs, through documentary sources for the most unpublished, the history of the city "rediscovered" at the end of the eighteenth century by Don Ramon de Ordoñez y Aguilar, historiographer of Charles III of Spain, highlighting the contribution of the architect Antonio Bernasconi, pupil of Luigi Vanvitelli, who realized maps and drawing of the site, applying modern tecniques experimented in Italy, during the Vesuvian excavation works. The king involved expert archaeologists in order to realize detailed explorations and excavations, because he was convinced that this place was, in large part, the key to the origin of the peoples of the New World: the Maya Pompeii.

Keywords: Palenque, Antonio Bernasconi, Chiapas, Carlo III.

1. The story of discovery of Palenque
The ruins of Palenque are located at the foot of the eastern highlands of Chiapas, bordering to the north with the coastal plain of the state of Tabasco. The importance of this Mayan city, which prospered during the Classic period, is represented mainly by its unique architectural beauty, which is evident both in the urban distribution of buildings, and in the particular aesthetic expression of its fine stuccos, carved tombstones, sculptures and its funerary and ritual complexes.
Thanks to these historical and cultural importance, this archaeological site has aroused the interest of many explorers and travelers, who have never ceased to visit it since its discovery in the eighteenth century, leaving several reports, studies and testimonies that make the city of Palenque one of the Mayan sites with the most complete archive of documentary information.[1]
The historical context in which it occurred the story of the Palenque archaeological discovery in the eighteenth century is part of the wider historical and cultural context of the Spanish possessions in America, during the reign of the Bourbons.
However, considering all this interest caused only by the proximity of the important archaeological site and the fortuity of the discoveries would be highly restrictive. In fact, the involvement of Charles III in organizing, soliciting and keeping under control the excavations prove the opposite. The Spanish king didn't restrict himself only to boost economic investigations in order to enhance the area of Palenque but also choosed personally the names of technicians who, in some way, would gave him professional guarantee for the success of the work. It is evident that the name of Bernasconi, bounded, as we shall see, to the one of his idol due to the magnificence of the largest of his projects in Italy (Royal Palace of Caserta) and other architectural and engineering works, can not be only a matter determined by fate but a precise choice of quality made by the sovereign.
When Charles III became King of Spain, the archaeological interest in the ancient indigenous city in ruins increased significantly, because, as King of Naples, he was an enthusiastic supporter of the excavations of Pompeii. Under his influence, there has been a significant development of the study of

the ancient indigenous Mesoamerican city and, consequently, an increase in travels and scientific exploration. [2] In the province of Chiapas, the first official program of investigations and explorations of the ancient city of Palenque begins, under the jurisdiction of the Governorate of Guatemala. During the government of General Gálvez, in 1783 the General D. Jose de Estacheria, Governor of Nicaragua, was elevated to the rank of President of the Assembly, Governor and Captain General of Guatemala. In April of the same year he took office and ruled with great integrity until 29 December 1789 , when he left for Spain where he obtained the government of the square of Pamplona and the degree of Field Marshal. [3]
Under his administration several works of public utility were realized in New Guatemala de la Asuncion, which became the new capital, after the destruction of Santa Marta due to the earthquake in 1773. The first news about the discovery of the ruins of Palenque date back to 1746, when Father Antonio de Solis, parish priest of Tumbala, was appointed priest of the People of Santo Domingo de Palenque, where he settled with his brothers and nephews. In relation to the missionary task assigned to him, De Solis arranged to boost the indigenous economy by encouraging the agricultural exploitation of the surrounding land. Sources report that during one of the visits undertaken with the intent of identifying areas suitable to plant new crops, the Father came upon some ruins in the territory, symbolically called by the natives *"casa de pietras"* . [4] This episode was reported after few years by a grandson of the Father to his classmate: the young Ramón Ordoñez y Aguiar later became the parish priest of the royal city of Chiapa. [5] In this role, in 1773, Ramon sent his brother José Ordoñez in exploration with two other companions, Jose Esteban Gutierrez de la Torre, Alcalde Mayor of Ciudad Real, and Nicolas de Velasco, retired knight, in order to visit the ruined buildings and gather all the useful information on what will prove to be the archaeological site of Palenque. So it was thanks to Don Ramón Ordóñez y Aguiar if the interest of the Spanish crown to the ruins of Palenque awoke. So, the 28th of November 1784, the governor of Guatemala José Estachería ordered Don Joseph Antonio Calderón, Lieutenant of the Alcalde Mayor of the city of Palenque, to represent the Spanish government in the city and realize immediately an expedition to the ruins. [6] The result of this first exploration, lasted only three days, was related in an illustrated report with four drawings in ink and sent to the Governor Estacheria, December 15, 1784. In the text Antonio Calderon said that after walking for a long time, he came to a place called *"casas de pietras"*, where he could examine eight structures and a palace, which appeared to be the building of major importance for the structure and the size. [7]

"... y despues de haver caminado las tres leguas llegamos a el parage tenido y nombrado aqui las Casas de piedra, y me fueron mostradas unicamte. por los referidos Yndios y Ladinos ocho Casas, y inclucive un palacio qe. por la constructura y magnitud no pudo ser menos; mas formando yo un concepto, bien fundamentado, qe. aquel gran Palacio precisamte. devio estar circunvalado de muchas Casas y que ahí devió de ser la corte"
(AGI, Audiencia de Guatemala, Exp. 674, Leg. 471, ff. 7r)

The Lieutenant, although impressed by the bulk of these ruins, which were called for the first time "the Great City of Palenque", stressed the difficulty of finding information about the establishment of the city.
"*... no ha havido quien me dé razón de lo q^{e}. esto fue, o q^{n}. haya sido el fundador, para desvanecer así muchos pensamienrtos q^{e}. formo al verlo todo y han formado otros mui entendidos, sin qe. puedan deslindar el monte de dificultades q^{e}. le ofrece a la vista con los vestigios de la gran Ciudad Palencana: Lo que puedo asegurar sor. Ylustre es q^{e}. la obra es suntuosisima aunque Si tosca en su fabrica y por lo tanto de gran firmeza*"
(AGI, Audiencia de Guatemala, Exp.674, Leg.471, ff.9v-r)

From his analysis a distinction is noticeable between the different types of structures that make up the core of the area. He began his path in the Palace and described the buildings he came across in relation to the two nearby rivers.
Similarly for the first time he assigned a specific name to all the ruins differentiating environments and architectural elements, categorizing them as towers, houses, patios, hallways, living rooms, niches, vaults, carved doors, stone beds, etc.. He described the stucco reliefs in the palace and in other buildings and defined them as: *"...figures carved very clearly on the wall of the palace* (ibid., ff.10v)." He realized drawings with ink. Calderon, however, did not refer to the location of the reliefs styled with all their characteristics. It is assumed that they could correspond to the relief of the pilaster B of the Temple of the Sun (Figure 1), to the plate of the Temple of the Sun (figure 3) and of course to the Tower of the Palace (fig. 4): it is important to note that in this first drawing of the Tower the upper body is covered by a vault, but two years later, during the expedition of Captain Antonio del Rio, appears collapsed along with a portion of the tower. [8]



Fig. 1



Fig. 2

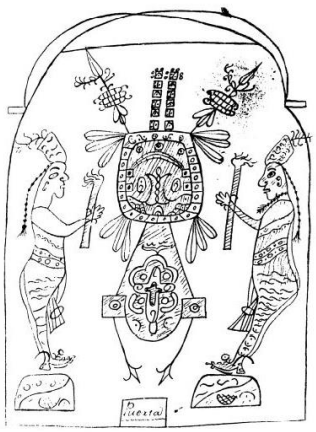

Fig. 3

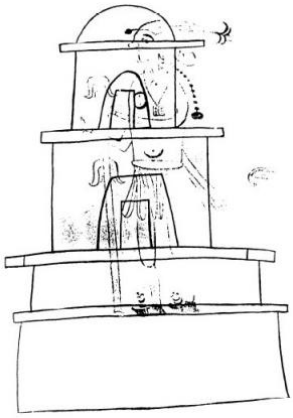

Fig. 4

To get an idea of the difficulties Calderon came across when he realized this expedition, just take a look at the report when he talks about the number of homes and buildings (structures) reported in the village. He enumerates 216 buildings, including 197 homes, 18 buildings and a large palace, making specific reference to the state in which they were found. This was the first valuation of the consistency of the architecture of the site and the archaeological material. [9]

"... pues lo demuestran con probantes a mi dictamen, muchos cimientos de Casas, ollas y ladrillos qe. cabando la tierra se ven quan en todo el distrito dicho; y no solo pero pudo tener dominio aquel Señor en todo Tabasco y los Rios de Usumacinta ..."
(AGI, Audiencia de Guatemala, Exp.674 , Leg. 471, ff. 8-9v-r)

Calderon sended its report to the President Estacheria in Nueva Guatemala in 19 papers, including four drawings in ink, on December 15, 1784. As a result of this report, 43 days later, January 27, 1785 Antonio Bernasconi, architect of the Royal Works of New Guatemala de la Asuncion, was appointed of a new investigation of the ruins of Palenque.

"…renuevese pr. el arquitecto de las Rls. Obras de esta Capital Dn. Antonio Bernasconi el reconocimiento. De los vestifiod de dha Ciudad en los terminos que el prevendré por la circustanciada Ynstruccion qe. el efecto se la pasará..."
(AGI, Audiencia de Guatemala, Exp.674 , Leg. 471, ff. 11-12v)

We do not know any news of the life and works of the Italian architect Antonio Bernasconi, before his arrival to the Captaincy of Guatemala, when he was nominated architect of the Royal Works in the Capital. However, the information contained in the General Archives of the Indies in Seville about his recruitment as Architect of the Royal Works of New Guatemala, permits to recreate a blurry image of his academic career. Among the other drawings made by architect Bernasconi, there are here reported the projects of the map of the Archbishopric Palace of Nueva Guatemala de la Asunción for Don Cayetano Francos y Montoy, in the perspective drawing that turns to the east of Piazza Maggiore, dated October 13, 1784 in New Guatemala (AGI, Audiencia de Guatemala, Exp.571, Leg. 2).
Also note the drawing of the fountain of the Main Square of New Guatemala with the equestrian statue of Charles III , submitted by the President of Guatemala in Seville with card Num.487 of 14 December 1786, a month and a half after the death of the architect Bernasconi, who did not receive the sacraments due to his sudden death on the 28 October of that year. The instructions for the second official shipment of the ruins of Palenque were given to Bernasconi, and were signed by José de Estacheria, President of Guatemala, in the Royal Palace of Guatemala on 29 January 1785. These directives were collected in 17 chapters and they teached Bernasconi on how to guide his expedition to this place, with the request to draw the most interesting elements, as well as inviting him to gather peculiar objects of the place in order to bring them to the capital of New Guatemala. [10]

"Ynstruccion de los puntos y particulares a que ha de dirigir el Arquitecto de las Obras Rls. de esta Capital Dn. Antonio Bernasconi y las observaciones, reconocimientos, examenes y medidas qe. por orden del dia le prevengo pase a executar en la arruinada Ciudad poco ha descubierta en el distrito de la Provincia de Ciudad Rl. de Chiapa y a distancia de tres leguas del Pueblo de Palenque.
Capitulo 10
Son obgetos de revision.

Primero: hacer merito de todo quanto pueda influir para formar idea de la antiguedad de aquella fundacion; y de lo qe. de luz para inquirir la Nacion, o gentes a quienes devió su origen.
Segundo: Qual fue la industria, Comercio, o medios con qe. subsistieron sus havitantes.
Tercero: que fatalidad, moción, o tragedia causaria la destruccion de aquella Ciudad y el exterminio de sus havitantes.
Quarto: Saber la entidad y magnificencia de ella.
Quinto y ultimo: Averiguar el orden, que a su Arquitectura señalan las noticias historicas de otra facultad; esto es, propias de que Nacion y tiempo fueron las reglas con que Se dirigio, por si fuere inferible, como acaso podrá ser esta cincunta. de la extensión de las piezas de los Palacios, su altura, torres, bovedas, subterraneos, escudos, estatuas, adornos y partes en qe. estan colocados"
(AGI, Audiencia de Guatemala, Exp.674, Leg.471, ff.13v y r).

In another communication, dated January 30, 1785, the President Estacheria invited Joseph Calderón to accompany the architect Antonio Bernasconi in his investigations.Bernasconi traveled from Guatemala to Santo Domingo of Palenque, arriving on the January 25, 1785, where he was accompanied by Fr Joseph Antonio Calderon to the ruins.

"Haviendo en consecuencia de la Orden de V S de 29 de Enero de este año, llegado el 25 de Febrero inmediato al Pueblo nombrado del Palenque en el distrito de Ciudad Real de Chiapa, pase luego en compañia de Josef Antonio Calderon theniente de aquel Partido al reconocimto. que en dicha Orden se me mando hacer de las Ruinas y fragmentos que existen a la distancia de tres leguas del referido Pueblo del Palenque"
(AGI, Audiencia de Guatemala, Exp.673, leg.645, ff.90).

Bernasconi brought with him the document in which the President Estacheria urged Josep Antonio Calderón. [11] It's clear that Calderon was precisely the one who organized both the expedition and the path in the archaeological zone, thanks to the experience acquired during his first trip to Palenque and mainly for having taken an official position by the Spanish Crown lasted 30-year, which allowed him to establish a direct coexistence with its inhabitants (Latinos and indigenous Lacandones Choles), the same people who helped him in both missions. [12]The result of this second expedition is the report the architect Antonio Bernasconi handed to the President Estacheria in the City of Guatemale (June 13 , 1785), which consisted only of four handwritten pages along with four projects, the same ones that were sent to Spain by the President Estacheria on the 25 August.The description of the site by Bernasconi, as well as the one of its main buildings and the architectural elements, it's quite general. [13]



Fig. 5

We are only talking of an explanatory text complementary to the maps he draws. Through these we can have basic archaeological information, which combined with the amount of information gathered during the first expedition in the eighteenth century, allow us to enrich the knowledge we have of the site. [14] His report begins with a floor plan of the whole that is inscribed in a circle of "seis legas y mil

varas castellanas" 1 (fig. 5). Here are three panels representing the residential buildings (table 2- fig.6), the complex of the main building with the temples of Cruz and Sol (table 4- fig.7) and the various motifs decorating them. (table 3- fig.8) [15]
Bernasconi's report was brought to the attention of the historian Juan Bautista Muñoz, chronicler of the Indies, who instructed him to gather more information on the site, making sure that the relationship was quite explicit and detailed in order to be presented to the king of Spain, antiquarian and passionate about archeology. [16]

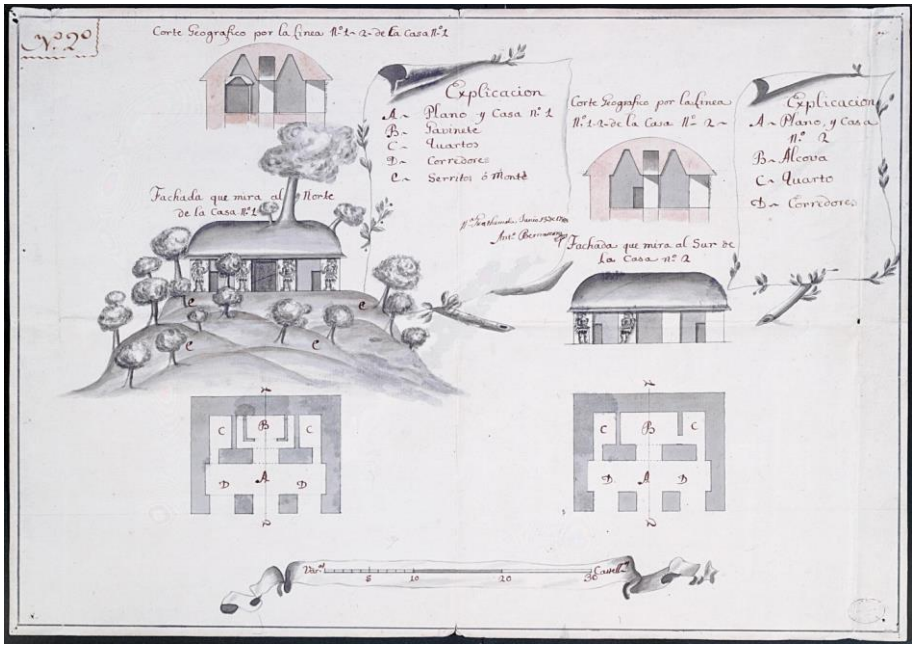

Fig. 6

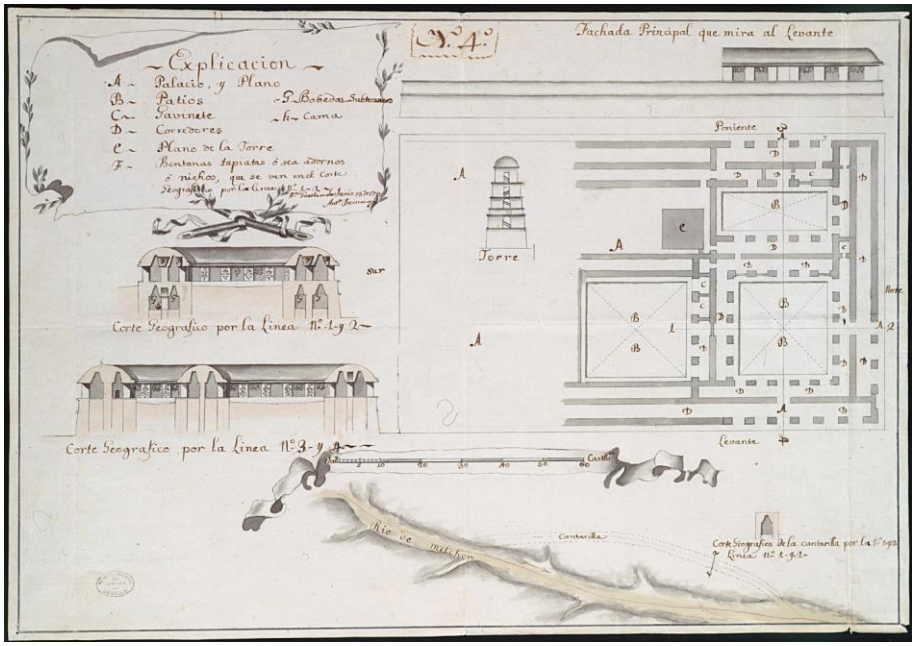

Fig. 7

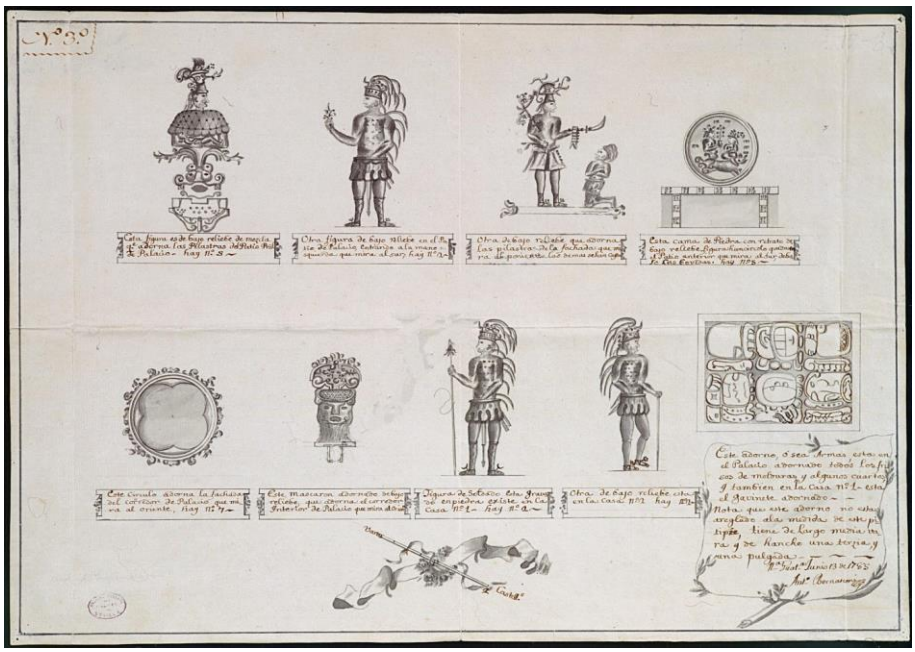

Fig. 8

Bibliographical References

[1] CASTAÑEDA PAGANINI, Ricardo. *Las ruinas de Palenque: su descubrimiento y primeros exploradores en el siglo XVIII*. Guatemala: Ministerio de Educación Publica , 1946, p. 19-20.

[2] BERNAL, Ignacio. *Cien Años de Arquelogía Mexicana: 1780-1880*. Cuadernos Americanos. Mexico,1952 vol.II, p. 137.

[3] ROYS, Ralph Loveland. SHOLES, France Vinton. *The Maya Chontal Indians of Alcalan- Tixchel: A Contribution to the History and Ethnography of the Yucatan Peninsula*. Washington: Carnegie Institution, 1948.

[4] DE BOURBOURG, Brasseur, *Recherches sur les ruines de Palenqué et sur les origines de la civilisation du Mexique. Ministre de L'Instruction Publique,* Paris: A.Bertrand, 1866.

[5] CABRERA, Paul Felix. *Teatro Critico Americano*. London: Henry Berthoud, 1822.

[6] CARRO, Pax Cabello. *Politica Investigadora de la época de Carlos III en la área maya*. Madrid: Ediciones de la Torre, 1992, p.75.

[7] PAILLÉS DE LA CRUZ, Maria. NIETO CALLEJA, Rosalba. *Palenque en el siglo XVIII, primeras expediciones de la Corona Española: Joseph Antonio Calderón y Antonio Bernasconi*. In Laporte J.P., Escobedo H., Villagrán de Brady S.,*VI Simposio de Investigaciones Arqueológicas en Guatemala*, Guatemala: Museo Nacional de Arqueología y Etnología, 1992, pp.474-504.

[8] ALCINA FRANCH, José. *Arqueólogos o anticuarios. Historia antigua de la arqueología en la América española*, Madrid: Ediciones del Serbal, 1996.

[9] GARCÍA SAÍZ, María Concepción. *Las ruinas de Palenque: su descubrimiento y primeros exploradores en el siglo XVIII*. Guatemala: Ministerio de Educación Publica, 1946, p. 19-20.

[10] BALLESTEROS GAIBROIS, Manuel. DE SAN JUAN, José Miguel. *Nuevas noticias sobre Palenque en un manuscrito del siglo XVIII.* Mexico: Universidad Nacional Autónoma de México, Instituto de Historia, 1960.

[11] DE LA GARZA, Mercedes. *Palenque ante los siglos XVIII y XIX*. In *Estudios de Cultura Maya, XIII*. México: UNAM, Instituto de Investigaciones Filológicas, 1981, pp. 45-66.

[12] DE RÍO, Antonio. *Description of the Ruins of an Ancient City, Discovered near Palenque, in the Kingdom of Guatemala in Spanish America, translated from the original manuscript report of captain don Antonio del Río: followed by Teatro crítico americano; or, a critical investigation and research into the history of the Americans, by Paul Feliz Cabrera.*London: H. Berthoud. 1822.

[13] WILKINS, Harold. *Mysteries of Ancient South America*. London: Adventures Unlimited Press, 2000. ISBN 0932813267, 9780932813268.

[14] BAUDEZ, Claude- Picasso, Sydney. *Le cités perdues des Mayas*. Paris: Gallimard. 1987.

[15] BRUNHOUSE, Robert. *In Search of the Maya.* USA: Ballantine Books, 1990. ISBN. 0345014200, 9780345014207.

[16] NÚÑEZ DE LA VEGA, Francisco. *Constituciones diocesanas del Obispado de Chiapa.* Mexico: UNAM, Instituto de Investigaciones Filológicas, Centro de Estudios Mayas, 1988.

[16] NAVARRETE, Carlos*. Palenque, 1784: el inicio de la aventura arqueológica maya.* México: UNAM, 2000. ISBN.9683677436, 9789683677433*.*

Archival References

Archivo General de Indias
1985 *La América Española de la época de Carlos III*. Sevilla: Ministerio de Cultura, Dirección General de Bellas Artes y Archivos de Sevilla.

Archivo General de Indias, Audiencia de Guatemala
1785 Expediente Formado Sobre el Descubrimiento de las Ruinas de una Gran Ciudad en las inmediaciones del Pueblo del Palenque, Provincia de Ciudad Real de Chiapa. Reconocimiento hecho por el Teniente Alcalde Mayor de Otro Pueblo Don Josef Antonio Calderon, mandado repetir al Arquitecto Don Antonio Bernasconi. Copia del Expediente de 30 Enero 1785. Expediente 674, Legajo 471. Sevilla.

1786-9 Expediente Sobre las Investigaciones del los Monumentos y Ruinas Descubiertas de la Provincia de Ciudad Real de Chiapa que Manifiestan una Grande Población. Expediente 673, Legajo 645 (95 folios). Sevilla.

1789 Don Manuel Josef Calderón, Curata de Tumbalá y Palenque, de 29 Abril 1789. Expediente 673, Legajo 645 (35 folios). Sevilla.

Archivo Histórico de la Biblioteca del Museo Nacional de Antropología
1785 *Papeles Varios*. Dibujos en Planos de las Ruinas de las Inmediaciones del Pueblo de Palenque, Provincia de Chiapa. Colección Antigua, No. 253.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Physical consistency and "immaterial life" of an architecture. The *Amphitheatre of Pompeii*: an exemplary case-study

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Abstract

In historiography the recognition of certain documentary materials - which are "spurious" with respect to the conventions of disciplinary tradition - and the extension of the "life" of an architecture beyond the cycle that proceeds from its concept to its completion and its transformation are closely linked problems. If it is accepted that the history of architecture should mean to reconstruct not only this cycle, but also its *use* as a social or cultural object and its changing of its consumption over time, then it requires the inclusion of new types of documents. Exemplary in this regard, it is the case of the Amphitheater of Pompeii, one of the most significant monuments of ancient roman architecture in Campania. Although there were no changes with respect to original conformation, it has condensed itself over the centuries a multiplicity of meanings that have taken placed or juxtaposed. Aim of this paper is to tell the stratification of these immaterial consistencies and their installing into the collective memory or imagination through "documents" extremely different from each other: an ancient painting; a photograph; a 19th century specification document for restoration; a newspaper chronicle of a assembly of Fascist National Party; and a document of the psychedelic counterculture of the early 70's: a musical movie.

Keywords: Archeology; History of Architecture; Pompeii; Theory and Methodology of Historiography

1. Introduction

The reconstruction of the "history" of a building requires the historian to go beyond the identification of the elements that make possible the "story" of his fulfillment just as material object.
The "life cycle" of an architecture of which the historian must take into account goes beyond that process which starts from the client's original intentions and arrives through the project at its execution, and then proceeds to the possible transformations of its distribution structure as well as its tectonic and formal arrangement. Duty of the historian is to reconstruct all the multiple uses, both tangible and intangible, of that architecture, never forgetting that *every* built architecture - and in particular those ones related to the scale of the monument or of the masterpiece - is always also a *social object*.
Architectural historians never speak only to themselves, nor only for architects, but also to those who are rather much (and especially) interested in the way in which changes over time the usage, the perception and the consumption of architectures.
In fact the various uses - manifestly declared or secretly instrumental ones- of a certain building in a particular context or in a certain cultural climate move away over time from the inherent nature and original of that architecture and the reasons for which it was built.
An analysis which stops to a mere fulfillment of those questions which legitimately arise and motivate the historian of architecture work- dating, attribution and reconstruction of the original conformation etc.. - runs the risk of turning what is perhaps only the starting point into the final purpose of the historiographical research. Ignoring or even neglecting the polysemy of contemporary or later meanings can preclude the possibility of grasping the complex relationship between the individual and collective act of men who used or just interacted with a particular architecture, relegating it to a generic "context" (almost pure "ornament" or "ritual" introduction to the historical narrative).

This conception of history seriously endangers the interpretive analysis - the reason being of the historical work - leaving too narrow margins to pass the level of a tautology, albeit professional and technically flawless. This explains, for example, the failure of all structuralisms that, never "explaining" just one architecture from a historical point of view, are therefore useless from the historiographical point of view. In the lens of the historian the focus of the past and present shape of things should not lose sight of its true object of study: the men who used them. In the history of things - and thus of complex organisms such as architectures too- the changing of relationships between objects and men is always a function of a partial reconsideration or of a radical revision of their "meaning." Each new use is a function of a new "meaning" of the object, which places it in a different way the location previously occupied by it in the social space or in the collective imagination.
The recognition of this dynamic is one of the tasks of the historian of architecture and implies (and indeed claims) an extension of the traditional corpus of documentary and iconographic sources from which he draws from the materials of their work, including both those specific to other disciplines both the products offered by new communication techniques: photographs, newspaper articles, movies. Archaeology, in this sense, is an extreme limit, since some architectures "lost" their own use, but have been "woken up" to be enjoyed in a different way from the original function, and often only in an immaterial dimension. The amphitheater of Pompeii is, in this respect, an exemplary case study.

2. A paradigm. Chronology, location and basic characters.

The Amphitheatre of Pompeii is the biggest building in Pompeii, occupying an area of about 15,600 square meters. It plays an important role in the history of ancient architecture because it is the oldest public masonry building that's known as specifically intended for gladiators games.
It should therefore be considered as the *paradigm* of a typology typically Roman, one of the most original and characteristic element of architecture and of urban space in the Roman world. This conclusion is reached thanks to the information we have available in relation to the client. An inscription informs us that who lended the transformation of the preexisting structure (realized in terrain and wood) into a permanent masonry construction, were Marcus Porcius and, above all, Caius Quinctius Valgus. They had just recently built the *theatrum tectum* in Pompeii too, which they also probably lended. In fact the Odeion shows many tectonic and structural elements similar to those used in the amphitheater.
The inscription states that the construction was carried out when the two magistrates were in their fifth and final year in their office as *duomviri quinquennali*, which fell in a "census year", and that could be in 70 BC. We can therefore say that the building dates back to the age of Sulla and is in any case much earlier than the first amphitheater built (partially) in stone in Rome in 29 BC by Statilius Taurus.
This record is not surprising. First, because the fighting gladiators shows, born in the margins of private funeral ceremonies, begin to establish themselves as public performances just in Campania, as demonstrated by some funerary paintings found in Paestum and Capua. If Neapolis, however, in the ancient Roman world played the role of undisputed capital of cultural *otia* and, in particular, theater, dance and performances for the entertainment, Capua was the most important center of the Roman gladiatorial. Secondly, Campania has been a sort of laboratory research of new types and construction techniques as demonstrated, for example, by the testing of large vaulted concrete spaces produced in Campania before becoming part of the great roman architecture in the Imperial age.
The term "amphitheater" helps to clarify the genesis of this type of building, designating it not as a "double theater" (as it is sometimes still considered), but as a "theater that runs around" the arena, and it was introduced in the official use as in the common one long after the construction of the first amphitheaters. In the same Pompeii, even in the Augustan age, they still used the original term of *spectacula*. By this term is meant the plant that surrounded the arena where the games took place, usually realized by means of embankments, natural or artificial, and equipped with temporary structures and wooden seats.
The amphitheater of Pompeii should be considered as the "petrification" of an embankment cruising around the esplanade of the arena and was located in the extreme eastern edge of the city for many reasons. In the first place, it was still an area free from buildings, suitable for large public building around which developing social and commercial activities; secondly, it was in direct connection with the escape routes from the city, in an ideal position because the large influx of foreigners would not procure traffic problems and obstacles to urban life.
The area of sedime chosen also allowed to shift to the fortified walls of the amphitheater to the south and east, with a great saving of economic resources in terms of materials and structures and execution times. Finally, there was also a very important politically motivation. Earlier, the gladiatorial games, in fact, were held in the *Foro*, an area that with the Romanization of the Samnite city was "monumentalized" and devoted to Roman official cults (and then specifically imperial) that could not be "contaminated" by recreational or "transgressive" activities such as those linked, in various ways, to the consumption of *spectacula*, inside and outside the amphitheater.

The amphitheater was built by digging up to 9 meters below street level an elliptical arena with the major axis oriented north-south. As the contiguous Palestra Grande, it is then inserted seamlessly into the *grid* with which most of Pompeii was rationally urbanized, already in Samnite age. Around the arena the auditorium was elevated, in the three distinct overlapping sectors of *ima, media* and *summa cavea* which, on the east and south slopes leans on the walls and on the north and south sides on an artificial embankment. The embankment is supported by a scarp wall and 62 buttresses realized in Monte Somma lava stone, almost an *opus reticulatum* with the edges in blocks of Sarno limestone. These buttresses were connected by round arches with projecting cornice, placed at regular intervals (except at the access to the north and west). These arches are almost all blind and, on the occasion of *spectacula*, were used by street vendors such as kiosks. A top frame indicated the presence of the parapet of an open ambulatory, about 8 meters wide and paved in concrete, which is accessed through four stairs, two flights of steps in double rampant and two in single ramp. On this elevated ambulatory there is a tambour with 40 small elliptical arches inside which there was the covered *vomitorium* which led into the *summa cavea*. Above it there were the *palchetti* (separated by walls) that constituted the crowning top of the implant, together with the famous linen *velarium* that protected the public from the sun, supported by wooden pillars and sliding strings. This top of the Amphitheatre is in bad state of preservation because it was not covered by the eruption of 79 AD, remained for centuries as the only outcropping part of the entire buried city of Pompeii.
The entrance to the *media* and *ima cavea* was through the *Crypta*, a vaulted concrete gallery which was accessed from the outside through four sloping vaulted corridors (one in the north and three to the west). The Crypta also presented at the time of the eruption some arches of reinforced brick made after the strongest earthquake in 62 AD, most likely made by Caius Pansa Cuspius who statues affixed to the inputs were dedicated to. Other artworks were present in the Amphitheatre, such as the paintings that decorated the parapet that separated the arena from the auditorium, high a little over 2 meters and bordered by a frame in the shape of a prism shelled (such as of the *Odeion*'s *analemma*). These paintings, now unfortunately lost, were placed in panels and were about various subjects: fights between animals; gladiators and hunting scenes; simple decorations and so on. The entrance to the arena took place directly outside the square through two long tunnels placed at north and south. They had a great architectural impact and were paved with large slabs of stone, realized for the obvious purpose of introducing wagons not necessarily with gladiators or wild beasts. The Amphitheatre, in fact, was not reserved for only gladiatorial shows, hosting feasts such as religious representations of Apollo, games and ludic choreographies, pantomimes with dancers, actors and buffoons and, even, military parades. These events were much loved by the masses and were taken, organized and financed by the political *élite* to build or strengthen popular support. These events were therefore exploited as means of identification or as real political struggle, such as that one which hardly opposed within the pompeiianian establishment the new rich Roman colonies to the ancient Samnite oligarchies. We should not forget, in this connection, that the politicians who possessed more economic means, invested substantial amounts not only in the shows and in the construction, renovation or modernization of amphitheatres, but also in the gladiators, many of whom were personal properties, as well as the most prestigious schools of gladiators will be imperial property. So it played an important role as a "stone showcase" where were on display political glories and personal fortunes, a formidable container in which they set up public identities and, most important, conveyed messages to the masses. For this reason, the amphitheater was perhaps the first and most powerful *mass medium* in the authentic sense of the term.
The amphitheater then played another interesting role, as "representation" of the social order. The seats for the spectators were in fact strictly differentiated (stages of honor reserved antlers, *ima*, *media* and *summa cavea*; upper *palchetti*) and assigned to the spectators according to rank. Beyond the economic and organizational reasons, this subdivision crystallized into the stone the social hierarchy, "photographing" the status quo, ie the momentary balance among the power relations that determined the positions occupied by the various components of the social body into the Pompeian society at the time when those games were held. So, going on stage not only was the show, but around it, the Pompeian society itself. It must however, at this point, account for the occurrence of a singular and paradoxical social "short circuit". The undisputed protagonist of the urban scene, and the most loved, invoked, and acclaimed public figure, even outside of the show, is the hero of the Amphitheatre: the gladiator who, like the arena itself where he was performing, was indeed: *totius orbis desiderium*. Subject to individual (and often unmentionable) desires, and at the same condenser collective impulses, the gladiator is at the top of a popularity that can give him redemption and life, and yet occupies the lowest rung at the base of the social pyramid, forced to live in slavery and in almost bestial conditions. The first one is the latest. He is really "the walking dead", the slave condemned to live and die in the general indifference or in the glory of cheer popular, as cruel as ephemeral. And the imperfect circular amphitheater ellipse ends up hiring the allegorical image of a social mobility that is only virtual, and is screwed onto itself in that circularity slavery-redemption-death, within a general folding only in the fiction of the staging arena. The amphitheater is a perfect machine for a "society of

the spectacle", still archaic and still imperfect, but in which, however, we recognize without difficulty behaviors and dynamics typical of our contemporary civilization.

3. Document I. A painting (1st century A.C.)

The painting in question is a fresco realized in the second half of the first century AD, now preserved at the National Archaeological Museum of Naples, and coming from a private home located in the *Regio I* (3.23) known as the “Casa della Rissa nell’Anfiteatro” because of the subject represented. The painting depicts, in fact, the famous brawl which broke out in 59 AD during the gladiatorial games that were held in the amphitheater, and involving young people of Pompeii and a large group of spectators from the nearby city of Nuceria Alfaterna.
The rivalry between Pompeii and Nocera originated by specific political reasons, attributable to the deduction of Nuceria a colony, which took place only two years earlier, as a result of which a portion of the cultivated soils pertaining to Pompeii was probably transferred to Nocerian landowners. The riot - which Tacitus also refers to (*Annales XIV, 17*) - made a great impression among the public, as evidenced by the fresco itself, but also by a graffiti in the *Casa dei Dioscuri* ("O Campani, you're dead together with Nocerini in that victory”). The fight had indeed dramatic results: sparked by mutual insults and accusations, it immediately degenerated into a stone-throwing and then in a real armed clash, after which counted some deaths and dozens of serious injuries, mostly among the ranks of the spectators from Nocera. The story had an immediate echo and also outside the city of Pompeii. The bloodshed was such as to induce Nero to ask the Senate harsh and exemplary punishment to the perpetrators, the largest of which was located in the organizer of the games, Livineio Regulus, who was exiled together with those who were identified as the leaders of both armed fronts. The gladiatorial games were banned in Pompeii and it was decided to close the arena to the public for ten years, though the sentence was reduced to two, according to some involvement of Poppea, that probably had a residence in nearby Oplonti, not far Pompeii. The amphitheater, however, did not have time to be reopened to the public because, as all the buildings of Pompeii, it also suffered from the severe damage inflicted by the strong earthquake of 62 AD.
The painting is as a valuable iconographic source not just to get the information required to reconstruct the original shape of the building, but because the way in which it is represented leads to some thoughts about both the consideration that it had the community who used it, both in relation to the relationships that it established with the context. It should be noted, first, that the work was made and then presented without any monumental architectural characterization.
Despite the large size and also the objective importance that covers not only to the local community but also offering hospitality to large groups of "foreigners" from outside of the city, the amphitheater did not pose architectural accents. Masonry structures are devoid of the element of most semantic connotation of classical architecture: the architectural orders, which, however, will become a central element in the formal qualification of the great ancient amphitheatres, and also in the *scenae frons* of roman theaters, as the central element in the apparatus of signification. The amphitheater is therefore not perceived or presented as a “monument” to exhibit, but as a pure service structure, part of the urban "armor" finalized to provision for social needs. It is significant, in fact, that in perspective deformation of the image of the amphitheater designed by the anonymous artist, the higher weight is given to the great double staircase through which access to the terrace above.



Fig. 1 *Rissa nell’Anfiteatro* (second half of the first century A.D.), Naples, Museo Archelogico Nazionale

This painting shows us that the task of "express" the building in an expressive and aesthetic dimension was assigned to a functional element of the apparatus of distribution. The amphitheater is seen more such as *social object* than an architectonical masterpiece. In fact, there is not the building in the abstract dimension of a "backdrop" to the representation of a bloody clash in the streets - as the architectural *scenae frons* of a show or one of the square of virtual architectures so frequent in the various "styles" of the wall painting of rich pompeian residences - but the amphitheater literally surrounded by the urban social life. The amphitheater – which is joined by another important building of great importance for the life of the community: the Palestra Grande - seems to be part of an integrated system of social spaces consisting of a real square that opens up before you with its permanent kiosks or the temporary stalls of street vendors, the rows of plane trees and the swarming of men and women that we can easily imagine animating the area, not only during the days of the *spectacula*.
Another extremely interesting aspect is given by the point of view - not only "technical" - chosen by the executor of the painting to represent the amphitheater. The amphitheater is in fact taken from above, from a virtual station to allow the viewer to see what goes in and what goes out at the same time. It is a point of view that helps us to understand the dual nature of the amphitheater. On one hand the great void, the mere container that is filled with animals and wrestlers, actors and audience, both part of the same great show. On the other hand, the spectacularization, the sublimation and the exorcism of the violence that is in the gladiatorial games, seem at some point to be no longer containable in the form of the show as in the shape of the reservoir that must contain it, and that bursts and overflows outside.
The amphitheater: a big "object" planed in the heart of urban space; a strong visual reference into the urban scene; an element that can transform an area on the edge of town, the peripheral extreme eastern limit of the city, into a powerful "attractor" the other pole of collective life. As a container and a condenser in a time of meetings and clashes, in its elliptical shape that dilates and contracts, the amphitheater seem to condense, overflow and then again collect the impulses and unresolved tensions of an entire community.

4. Document II. An accounting ledger for restoration works (1829)

The eruption of 79 A.D. that buried Pompeii was not able to cover the whole amphitheater and the part above the *summa cavea* remained for centuries, uncovered among the dense vegetation that grew on the layers of stone material that accumulated in that large bowl. It was the persistence of those structures to suggest the presence of a city in that place and that's why the entire area corresponding to Pompeii before being discovered in 1748 was named *Civita*.
The basin was not filled in full and the site once occupied by the amphitheater will take on the characteristic shape of a moat which explains the name assigned to that place for a long time: the *Scodella*. Its "discovery" occurred 26 October 1748 by Rocque Joachim de Alcubierre, an engineer and colonel of the Spanish Bourbon Genius, and marked the beginning of the slow return to the life of the whole city buried: mistakenly believed the theater of the city of Stabiae was finally identified as the amphitheater of Pompeii after 1763, the city which in turn finally ceased to be a faded as suggestive literary image for finally taking on the consistency of a real presence.
The Amphitheater - considered in its sole reality of architectural object, pure physical construction, observed and studied, measurable and convertible - refers to an iconographic document dating from the early XIX century and preserved at the Historical Archives of the Archaeological Superintendence of Naples. The manuscript is dated 1829 and signed by the architect Carlo Bonucci, a few months before designated "architect director" of Pompeii. The title is: *Misura ed apprezzo del lavoro eseguito dal partitario Giuseppe Dell'Aquila per porre in veduta gli archi fondati nella periferia esterna dell'Anfiteatro, situato nell'angolo della settentrionale della distrutta città di Pompei, rafforzare con fabbrica le lamie dei vomitori; e indi rifare una porzione dei sedili nella parte interna del medesimo sul lato sinistro dell'arena qual lavoro si valuta, ed apprezza per materiale, e magistero, nel tenor presente*.
It shows the "final accounting" of the work of the first "restoration" of the amphitheater, which began more than sixty years after its discovery in 1813 and after a year and a half stopped, to be finally resumed in 1826. Being an accounting document, it is extremely meticulous and shows in detail the interventions, even the smaller ones, made on some parts of the amphitheater. They consisteded essentially in the reconstruction of entire missing parts of the building, rebuilt in the "old style", such as nine external arches, the reinforcement arches at the intrados of the vaults of the *crypta*, and even the stone seats of an entire sector of the cavea.
The aim was twofold: to secure the building by eliminating the causes of potential structural instability and, above all, restore a plausible and possibly suggestive image, able to perfectly overlap in what was considered the *ideal-type* of the "Roman Amphitheater", ie a building that would have been a bellwether of the scene that was going to be rebuilt in the unearthing Pompeii, but considered in its autonomy of the subject with no reference to the social and cultural life which acted in. In the

restoration that the document describes, there was no concern to distinguish new parts from the original ones: on the contrary, the effort was to allow the new parts in *camouflage* with existing, offending the authenticity of the archaeological evidence. For this reason this accounting document is particularly valuable because it allows to distinguish between the original parts (including the restoration's works carried out in the aftermath of the earthquake of 62) from those built in *imitation* of the ancient and often performed with original materials found in site (not infrequently from other areas of the amphitheater itself), which pose today extremely serious problems of recognition.
Despite the cold objectivity of accounting work, the paper relates a lot more than those that explicitly tells. Through it, in fact, you can grasp what emerges as the prevailing attitude in the architectural culture of the time compared to the complex issues related to the conservation of the archaeological heritage. More: it is a document that exhibits a "mentality" that goes beyond the specific disciplinary restoration and on the contrary regards to the relationship that the culture of the time, in its broadest sense, has against the past and its "tracks". A past that must be able to materialize front of our eyes through testimonials forced somehow to be "living".
The illusion of being able to *reborn* the past, not figuratively but in the true sense of the term, passes through the certainty that a ruin is *useless* if it is not able to build a reliable and as much as possible "complete" image through the transition from conservation to alteration, even to legitimize the reconstruction "in style" and the *invention*. There is no doubt that in the late eighteenth-century mentality, which survives in the early decades of XIX century, an unburied object has a real value only if it can fully grasp its *integrity*, a *conditio sine qua non* for its appreciation: without it, all the neoclassical notions considered as central in the evaluation of an object of art or architecture - style, shape, materials and techniques - lose any "value" in archeological field.
Even before its importance or its aesthetic qualities, the decision to intervene and commit financial resources for this purpose - is the case of the Amphitheatre - is a function of the integrity of the evidence, or of the possibility of reconstructing the artefact. The persistence of this conception - which also boasted influential supporters such as Winckelmann - is at the origin of the arbitrary completions and the "reconstructions style" that characterized many archaeological restorations, not only in Pompeii.
That ancient arena where gladiators clashed became the battleground in which performing the violent battle between the proponents (usually scholars antiques) of an improper conception of the restoration and those (usually architects) who tried, with great effort but without success, to offer more correct and advanced positions in a still uncertain culture of architectural restoration, still looking for a statute disciplinary science. The document that meticulously describes and even quantifies this senseless restoration reveals a flagrant paradox: right there where the object is proposed as a physical and *real* construction, finally freed from the immaterial dimension of the Memory or the Imagination, it is subjected to an intervention that, in the end, deliberately denies the same physical reality and the status of archaeological evidence itself, trying to create, on the opposite, what is considered as *the* pure "ideal" image of the "amphitheater". In the rubble and dust of the yard, at the end, the object emerges as an *idea*.

5. Document III. A photograph (1848), compared with a vintage postcard

A town without men, with empty streets, lifeless architectures, silent stones: this is what evokes the first photographs taken in Pompeii. Among these pictures, an image of the amphitheater is of particular importance because it was perhaps on the first ever to be printed. It was created as a "calotype" by Reverend George Wilson Bridges (1788-1863), anglican clergyman, writer and photographer, archenemy of the abolition of slavery. The calotype - unlike the "daguerreotype" by Louis-Jacques-Mande Daguerre - allowed to print copies from a negative and is also known as "talbotype" by the name of William T. Fox Talbot, who began to experience this procedure around 1831, patenting in 1841, just two years after the daguerreotype.
The meeting with Talbot, around 1843, incited the rev. Bridges to approach this new kind of technical reproduction of images, which put to use in a long photographic campaign. From Paris, where he had bought the camera, he went to Malta and from there, between 1846 and 1852, he traveled throughout the Mediterranean, as far as Egypt and the Holy Land, taking about hundreds of negatives (for a total of about 1,700), which were then shipped to Talbot to be printed.
It is remarkable to note that the first building began to be excavated in Pompeii was also the first to be photographed, and the way in which the amphitheater is reproduced in this photograph calls considerations of some interest. First, the arena is not represented from the outside, giving up to bring to light the relationship with the urban context that the fresco of the brawl, on the contrary, put so strongly in evidence. Throughout the nineteenth century Pompeii is not perceived, moreover, as what remains of a city at one time full of life, but it is still considered as a summation of artistic or architectural isolated incidents and not as part of an integrated system of spaces, environments and architectures.

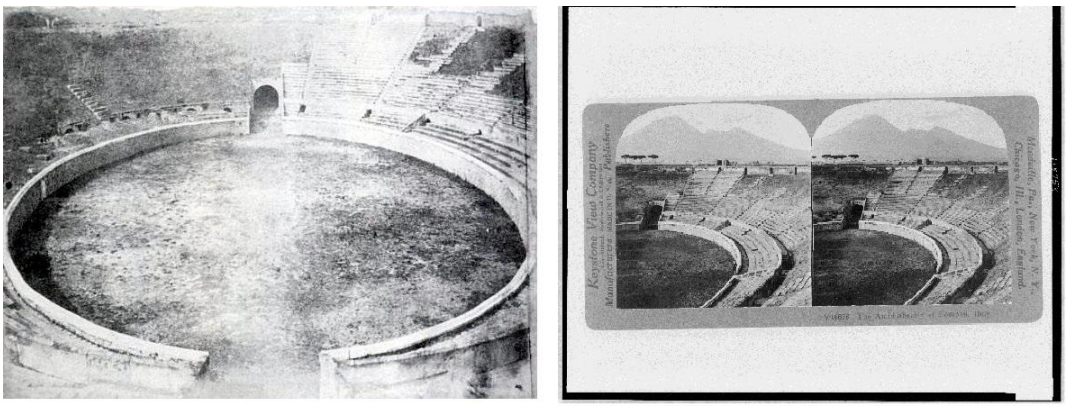

Fig. 2: left: Reverendo George Wilson BRIDGES, *The Amphitheater at Pompeii*, 1848;
right: The Amphiheater in 1926 ca. in a vintage photo

Bridges deliberately leaves out of view every other possible architectural presence, and the Amphitheatre applies to himself, returned by the recent renovations throughout its charm. The geometry of the elliptical amphitheater, however, is almost didactically emphasized, because Bridges places the lens on the end of the major axis of the ellipse. He offers a view of a classical monument in a front position, setting up a de facto staging that privileges the balance guaranteed by a frame perfectly symmetrical. The other photograph was taken instead around 1926, for a postcard. It conveys, on the opposite, a sense of dynamism, somehow even "anti-classical", which is explained by a kind of almost romantic sensibility by which the photographer had laid the eye lens on the disinterred city. Photography still imitates, despite all, painting. It seems to be still in the age of Romanticism, and the amphitheater is in fact put in relationship with the natural space. As in a XIX century gouache, in this second picture the amphitheater's glimpse is framed by a row of pine trees that border the upper crown and open the view of the landscape, referring to other more distant pines located in a countryside still not contaminated by the wild urbanization of the next century and, finally, to the absolute ruler: the peremptory profile of volcano.
This photo does not propose the Amphitheatre as a document of social history, politics and culture, and even as an exceptional testimony to insert into a repertoire of ancient Roman architectures. This specimen of the photographic document intends to perceive the perfection of the form of an object returned in its entirety from the depths of History, but again delivered in some way to that, beautiful and violent Nature, that once buried it.

6. Document IV. A newspaper article (1928)

The fourth document proposed is an article edited in one of the most important Italian newspaper: "La Stampa" of Turin. The item does not inform of an event of particular importance, and it is indeed an editorial relegated to p. 5. This is a correspondence from Naples who reported a political rally, which was held on Sunday 9 September 1928. It is, more precisely, an "adunata" of the National Fascist Party (PNF), which channeled several thousand workers from Naples and its province to Pompeii, with a consistent organizational effort, as special trains and buses set up for the occasion. The participants were all workers enrolled of the Party organized as "dopolavoristi" in some associations who managed their leisure under the complete control of the PNF. The reason of interest for this episode with no historical relevance - except as a gash on the social life in a nation totally controlled by a fascist party in a totalitarian regime - lies in the fact that this political event took place inside the 'Pompeii Amphitheatre.
This fascist celebration came to pass in the presence of guests at the highest political level as Augusto Turati, national secretary of the PNF for a little over a year, and Commissioner Michele Castelli, perhaps the most powerful man in Naples since 1925, accompanied by other civil, political and military representatives and by a marching musical band. To act as hosts were Amedeo Maiuri, famous archaeologist and the chief executive officer of the excavations of Pompeii, and Giuseppe Spano, a scholar of the amphitheater and subsequently more comprehensive author of the study dedicated the building. The article reports almost completely the short discourse given by Turati, also highlighting the points where it was interrupted by applause, cheers and chants. It was not, in fact, an assembly, as Turati himself explained in the speech held in the amphitheater: "we do not call you, and we do not call for you to "discuss" on politcs, as the politics of the Italian people cannot be that the one of a Chief who commands and knows where to go. (...) We want to meet, but not within the four walls of a hall for one stupid game of words; among the repeated hosannas of a complaisant claque. We

want to meet together right here, with your face to the sun, at the edge of this ancient city that rises inch by inch every day and replay the charm of the beauty and of the past life, for looking into our eyes each other and see if we are good and worthy, and to repeat to ourselves that we'll never go back again." They were years in which the mass rallies in the amphitheatres were frequent enough to consolidate into a very pleasing habit to the Duce. One of the most spectacular fascist rallies took place into another ancient implant, the Arena di Verona, with choreographies and scenography extolling the Cape.





LA STAMPA - 10 Settembre 1928

ULTIME NOTIZIE

Turati parla nell'anfiteatro di Pompei

a 10 mila dopolavoristi napoletani

Le armi e la pace

nel discorso del Ministro della Guerra francese

Fig. 2: "Adunata Fascista" in Pompei (09.09.1928, Istituto Luce).
On the right: the article *Turati parla nell'anfiteatro di Pompei*, "La Stampa",10.09.1928, p.5

Sunday 2 April 1933, many of these workers will find themselves together into seven thousand, conveyed to Rome by seven special trains, rallied in the Flavian Amphitheatre and then greeted by the Duce himself. When at the end of the '30s the fascist authorities of Naples devised the great complex for the Esposizione Trienniale delle Terre Italiane d'Oltremare, Mussolini asked to build a big "theater of the masses for the masses" for 20 thousand spectators, who will be significantly called "Arena Flegrea." The real "theater fascist" for littoria Italy was to be in fact - using the words of Mussolini himself - especially a "mass theater for the masses," and exacted those installations able to accommodate choral performances that were to represent, and indeed exalt "a collective consciousness that exceed the individual, overlapping the reality of the individual to that one of the crowd of which he is only a part. The mass must therefore be considered not as a sum of individual entities, but as a single indissoluble reality. "
The choice of ancient amphitheatres as places of these "adunate" - despite the excellent alternatives offered by so many old and new Italian squares or by the new public buildings built by the Regime - is perfectly understandable, and maybe even obliged. The amphitheater, one of the most beautiful and best preserved architectural evidence of the greatness of the ancient world, in fact, well satisfies two specific needs. On the one hand it fits perfectly into the cult of the Roman world on which Mussolini built a large part of a cultural policy functional to the yearned new *renovatio imperii*. On the other hand it condenses specific instances of political propaganda, in years in which the new collective rituals of mass society - for more in a totalitarian regime - inevitably intersected with the "spectacularization" of politics openly researched by Mussolini as a fundamental instrument of consent.
The meaning and the role of the amphitheater of Pompeii are in this sense completely unrelated to the logic of archaeological tourism of mass that the regime itself had also encouraged, in Rome as in Pompeii. On the contrary, they are rather situated in a pantomime in which the two protagonists are the Duce and "his" people. At the time of its greatest popular support, Fascism has by now reduced the space for any political action to the mere presentation of a plebiscitary consent to a scheme that transforms the amphitheater in the ideal scenario, sumptuous and authoritative, new and old, and for this reason certainly the most appropriate for its ceremonies and its liturgies.

7. Document V. A psychedelic musical film (1971)

A completely different way of perceiving and then "using" the Amphitheatre of Pompeii is documented by a film production of the early 70's of the last century: the musical movie "Pink Floyd at Pompeii", filmed between 4th and 7th October 1971 largely in Pompeii, and in particular in the Amphitheatre, with inserts footage shot at the Solfatara of Pozzuoli, and then in Paris. The Pink Floyd, one of the most famous and influential groups in rock music history, had recently absorbed the painful exit from the group of its founder, the great visionary poet Syd Barrett, and they were a band ripe for the great international success.

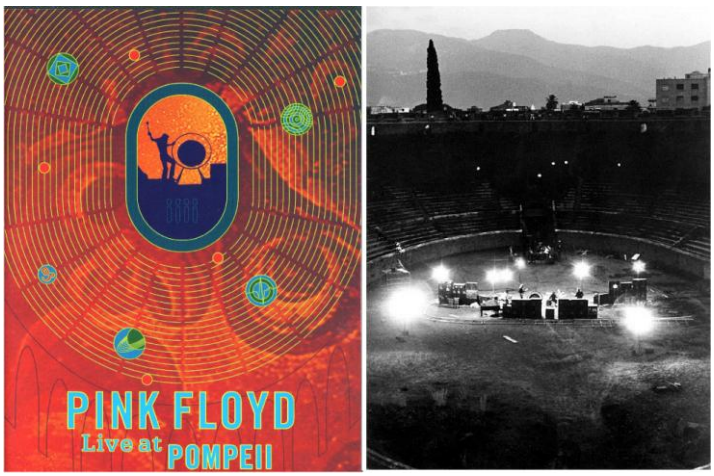

Fig. 4: The PINK FLOYD, *Live at Pompeii*, 1972 (left: poster of the remastered digital edition of *Pink Floyd: Live at Pompeii: Director's Cut*, DVD Universal Music & Video, 2003; right: The Pink Floyd in the arena, october 1971)

The film marked a crucial step in this direction for the band's career because they were able to engage the remnants of the London counterculture of the Sixties in a rock music easily inserted into the logic of the profit music industry. Two years after the band recorded "The Dark Side of the Moon", the album with which they climbed the international sales charts, consecrating them as the undisputed protagonists of the world rock scene.
The encounter between the London-based group and the Cinema there had already been with the proposals for the soundtracks for the films of Barbet Schroeder; at the highest level, with Michelangelo Antonioni, who included three songs of theirs in *Zabriskie Point* (1970) and then, a few weeks before, with Stanley Kubrick who requested, unsuccessfully, their intervention for the music of *A Clockwork Orange* (1971). Creator and director of the movie in Pompeii was the Scottish filmmaker Adrian Maben, later the author of several documentaries on art history.
In the first version of the movie Maben filmed Pink Floyd playing at the center of the arena of a completely empty amphitheater, closed to the public for the occasion, with a special permission by the Archaeological Superintendence, thanks to Ugo Carputi, professor of the Faculty of Architecture in Naples, and a Pink Floyd fan. After the great mass gatherings characterized by the utopia of Woodstock but also by the violence of Altamont, where the hippy dream definitively broke, The Pink Floyd waive to autocelebrate through the exhibition of crowds of fans convened in a sort of oceanic assembly-concert. The relationship which The Pink Floyd seem rather seek with the listener-viewer aspires to be individual and personal, as the lysergic experience itself seems to suggest: a practice that begins with the others, through the ritual of taking collective psychotropic substances, but then proceeds as a journey - a *trip* - in the individual's mind, through stages of altered consciousness.
So The Pink Floyd could have placed the camera "everywhere", relying on the visionary power of their lyrics and sounds, or unleashing a blaze of psychedelic abstract figurations. Instead, they choose to represent themselves in an ancient amphitheater, with no special effects and no spectators. The Arena is enough in itself. This choice cannot be explained only with the objective influences exerted by the beauty of the architecture, since it expresses rather a parallel, if not a "cosmic connection", between the monument and the music of The Pink Floyd. The Amphitheatre, by virtue of its completeness of archaeological evidence belonging to a past world and yet still perfectly "working", seems to present itself in the double condition of the subject of *another time*, and yet belonging to *each time*. It is at once real thing and a mental thing, an object of scholarly study and "machine" powerfully attractive inserted in the circuits of mass tourism. Suspended among exotic imaginary, seduction of ruins, evocation of life and death, crowds and absence, the amphitheater evokes the poetics of an "elsewhere" as never far from the reality of the metropolis, but paradoxically constructed through the codes of urban culture contemporary art.
So also is the music of Pink Floyd: a *medium* between the abstract dimension, alienating, cerebral of the psychedelic universe that refuses a real or permanent placement in space or time, and that of mass civilization to which it belongs. It’s not the sophisticated expression of a niche culture, but it’s now an industrial product, designed, manufactured, promoted and distributed as an object of popular consumer products. The Amphitheatre emerges here as a "text”, independent once again, both from its original nature of building mass spectacles, either from the current tourist attraction, a symbol of Pompeii in a few decades become one of the most attractive tourist destinations in the world. The buildind born to accommodate crowds for performances, thanks to the charm of its history and its shape shows itself with no crowd, becoming itself "the show."

The same ellipse of the arena, stylized in a series of concentric ovals, appears overlaid on one of the movie posters, as a logo which enters in dialectics with the colors and patterns like the psychedelic light show. At the center of the oval is a freezecam shot of Roger Waters ready to shoot a gong – archaic musical instrument par excellence and not by chance also used to promote in ancient civilizations the evolutionary processes of personality - which gives a symbolic start to the visual and musical in which the viewer is going to be swallowed. It is a journey into the depths of History and, at the same time, into the contemporaneity, as shown in the sequence plan that takes musicians between ancient stones carved by inscriptions or graffiti and gigantic amplifiers on which there is the inscription "Pink Floyd, London".
That trip had been opened with the beautiful slow sequence that framed the amphitheater from the arena to glide slowly and zoom on the musicians in action at the center of the arena, some of which, like ancient gladiators, are shirtless. It closes an hour later, with the same opening track (*Echoes*) and reverse sequence, with the last frame that returns the glam of an amphitheater offering the viewer (as well as the historian) a precious *Saucerful of Secrets*: a stoned enigma full of history and *stories*, enclosed into the geometric perfection of an arcane and modern Beauty.

Bibliographical References

ANONIMO. Anfiteatro di Pompei. *L'Omnibus pittoresco*, Napoli 1839, 2, p. 182-183
BRIDGES, Rev. George Wilson. *The Amphitheater at Pompeii*, 1848
GARRUCCI, Raffaele. Epoca in che fu costruito l'Anfiteatro pompeiano. *Bullettino Archeologico Napoletano. Nuova Serie,* 1853, 1, n. 19, p. 145-148.
BRUNENGO, Giuseppe. Sull'epoca dell'anfiteatro pompeiano. Lettera all'editore del Bullettino, *Bullettino Archeologico Italiano* 1 *(*1861-62), Napoli 1862, n. 6, 1861, p. 41-44.
DE PETRA, Giulio. L'anfiteatro pompeiano rappresentato in un antico dipinto, *Giornale degli Scavi di Pompei.* 1, 1868, n. 8; 1869, coll. 185-187, tav. VIII.
SCHONE, Richard. Wandinschriften vom Amphitheater zu Pompeji*, Hermes*, 1870, 4, p. 138-140.
DESSAU, Hermann. C. Quinctius Valgus, der Erbauer des Amphitheaters zu Pompeji, *Hermes*, 1883, 18, p. 620-622.
RED. Turati parla nell'anfiteatro di Pompei a 10 mila dopolavoristi napoletani, *La Stampa*, 11 settembre 1927, p.5
GIOVENALE, Giambattista. *«Erunt vela»*. In *Atti del II Congresso di Studi Romani*. Roma: 1931, 1, p.181-195.
COZZO*,* Giuseppe. Il velario negli antichi edifici anfiteatrali. In *Atti del II Congresso Nazionale di Studi Romani* 1, Roma. 1931, p.196-204.
GIROSI, Maria G. L'anfiteatro di Pompei. *Memorie della Reale Accademia di Archeologia Lettere e Belle Arti. Societa Reale di Napoli,* 1936, 5, Parte II, p. 27-57.
SPANO, Giuseppe. Alcune osservazioni nascenti da una descrizione dell'anfiteatro di Pompei. *Annali dell'Istituto Universitario di Magistero di Salerno*, 1952, 1 (1949-50), p. 355-419.
ÉTIENNE, Robert. La naissance de l'amphithéâtre: le mot et la chose. *Revue des Etudes Latines.* 1966, 43, p. 213-220
HARVEY, Paul Benjamin. *Socer Valgus, Valgii, and Q. Quinctuis Valgus*. In AAVV. *Classical and Classical Traditon. Essay presented to Robert E. Dengler on the occasion of its eightieth birthday*. Philadelphia: 1973, p. 79-94
GRAEFE, Rainer. *Vela erunt. Die Zeltdacher der romischen Theater und anlicher Anlagen.* Mainz am Rhein: P. von Zabern,1979
GOLVIN, Jean-Claude. *L'amphitéâtre romaine. Essai sur la théorisation de sa forme et de ses fonctions*. Paris: De Boccard 1988.
LASSAM Robert. *The Romantic Era. La Calotipia in Italia 1845-1860. Reverendo Calvert Richard Jones 1804-1877 Reverando George Wilson Bridges 1788-1863. William Robert Baker di Bayfordbury 1810-1896.* Firenze: Alinari, 1988
SAMMARCO*,* Bruno. *Teoria, metodo e prassi operativa del restauro in un cantiere dei primi decenni dell'Ottocento a Pompei*. In *Scienza e Beni Culturali. Il cantiere della conoscenza. Il cantiere del restauro Atti del convegno* (Bressanone 27-30 giugno 1989). Padova: Arcadia 1990, p. 541-558
JONES, Mark Wilson. Designing Amphitheatres*. Mitteilungen des Deutschen Archaeologischen Instituts. Roemische -Abteilung.*1993, 100, pp. 391-393
WELCH, Katherine. Early Amphitheaters and the Romanization of Campania*. American Journal of Archaeology.* 1993, 97, p. 305
WELCH, Katherine. The Roman arena in late-Republican Italy: a new interpretation. *Journal of Roman Archaeology.* 1994, 7, pp. 59-80.
http://www.brain-damage.co.uk/other-related-interviews/adrian-maben-live-at-pompeii-2003-with-brain-d.html
MASON Nick, *Inside Out: A Personal History of Pink Floyd*, New York: Widenfeld & Nicolson, 2004

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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ID 183
Ordinary and emergency: a possible new order through productive poles. The case of Piana del Sarno.

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Abstract
Which role can productive settlements' planning have in an exodus strategy?
And, inverting the terms of the discourse, can mobility system of escaping contribute to productive clusters renewal (and, through them, of the whole territory)?
In a reflection about an active sense of natural patterns, which capacity they have for structuring a new urban order?
We apply these questions to the complexity of Piana del Sarno, a huge area crossed by the Sarno river, composed by several middle size urban nucleos with different cultural potentialities (as Pompei archeological area), with a strong historical capacity to use agricultural quality and, above all, characterized by partially being in the "red zone" (the emergency area potentially invested by Vesuvium eruption effects).
So we want to describe a recent research project (PRIN 09) that defines shape and sense of productive condensations in the Piana del Sarno in a general thinking that intersects theme of exodus and the possibility of a urban order fixed by natural elements.
Today, old industrial areas (named PIP, ASI) are completely stopped in their evolution for many reasons (inadequate infrastructures, not organic structure, too expensive purchase and management costs). Our project goal is fixing few criteria that permit to develop new role of production and so defining new geographic poles. One of these criteria concerns the double quality of new infrastructure: productive framework in ordinary use, mobility escaping system in emergency phase.
These criteria could guarantee a renewal order's stability.

Keywords: urban order – production – emergency – infrastructures/framework

1. General Framework
This research has two distant issues as nucleus: production *clusters* and evacuation directions to use in case of seismic and volcano event. Both the issues are considered by the same point of view and it is about infrastructures in a possible re-thinking of urban and territorial structure of Sarno Valley study area.
Improvement of urban assets in productive existing areas – as occasion for polarization of existing industry, settled in fragmented way and grown in relatively recent history – and the on-going rethinking of Red Zone exodus directions general framework (in which a part of study area is located), are two questions this research wants to make in contact with the aim to show feasible solutions on the basis of shared infrastructural need.
Indeed, on one hand, the current stasis condition in which PIP areas lie, despite re-modulation made by STU - Areas seen as an unconvincing alternative to diffuse and unstructured realities, internal or adjacent to urban centres - highlights the need for rationalization and refurbishment following advanced criteria, but also the need for a strengthening of their polar role within the territorial

framework. This rethinking should allow PIP areas to be urban and geographical large-scale benchmarks solving the issues of infrastructure links, the variability over time of industrial spatial requirements, energy autonomy of productive sector, the need to revisit the issue of centralized-integrated services (equipment) related to logistics, first trading, processing and the review of public green's role provided by urban standards for D areas (L. 765/67).
On the other hand, if we think that actual evacuation plan (prepared by the Department of Civil Protection) must deal with infrastructural inadequacy with respect to the ordinary and emergency load, it is necessary to increase internal local connections along escape lines in connection with fast viability, as indeed pointed out by the Extraordinary Plan of Operations 2003 (PSO).

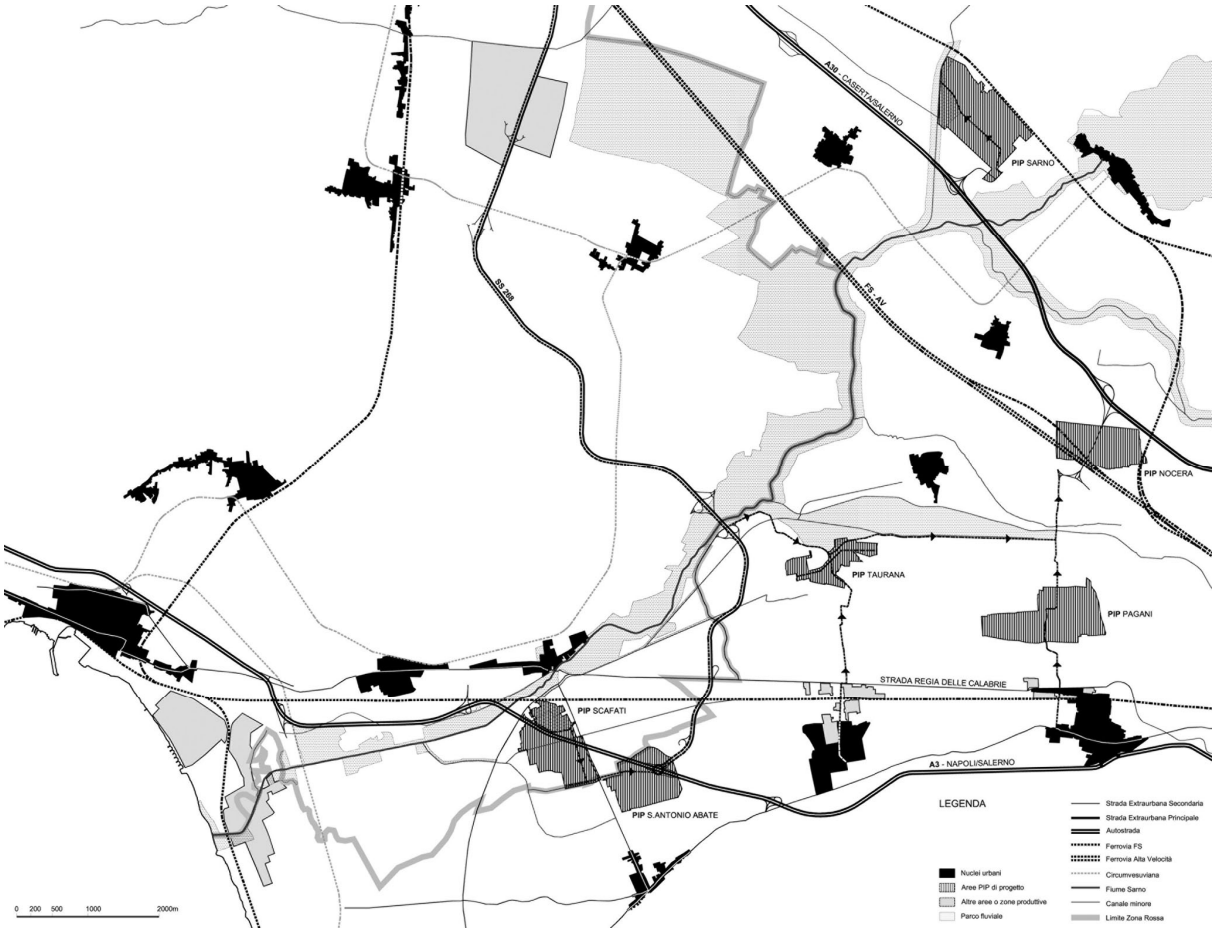

Fig. 1: Plan of Piana del Sarno – historical nucleos, productive areas, exodus directions.

1.1 Objectives - Purposes

The purpose of the research is to verify if rationalization of productive areas - through few feasible interventions - can be oriented to punctual redefinition of a structure that can be considered as an opportunity to build a new exodus frame. The locational criterion for PIP areas that regards proximity to the motorway junctions (which coincide with the "gates" of evacuation plan - manned places-filters regulating exiting evacuation flows) means that these areas are critical in the design of exodus.
In addition, it is evident that the rethinking about infrastructures in PIP areas, corresponding to a partial redefinition of urban structure of these areas, introduces the question of the revision of industrial buildings through a reflection concerning with urban morphology and aggregation of artefacts, but also the artefacts' architectural features. The natural features of Sarno Valley, in this reasoning, large scale elements as Sarno River have a central role, its system of canals, natural areas defined by flooding bands as well as the draft for River Park.
Finally, the indirect objective of this research is also to support the condensation of production in industrial areas - recognizing the value of intents proposed by Law 865 of 1971 which established implementation plans for production sites - to relocate industries actually present in urban centers, to promote the necessary separation of transport flows and the reduction of building density in the same centers.

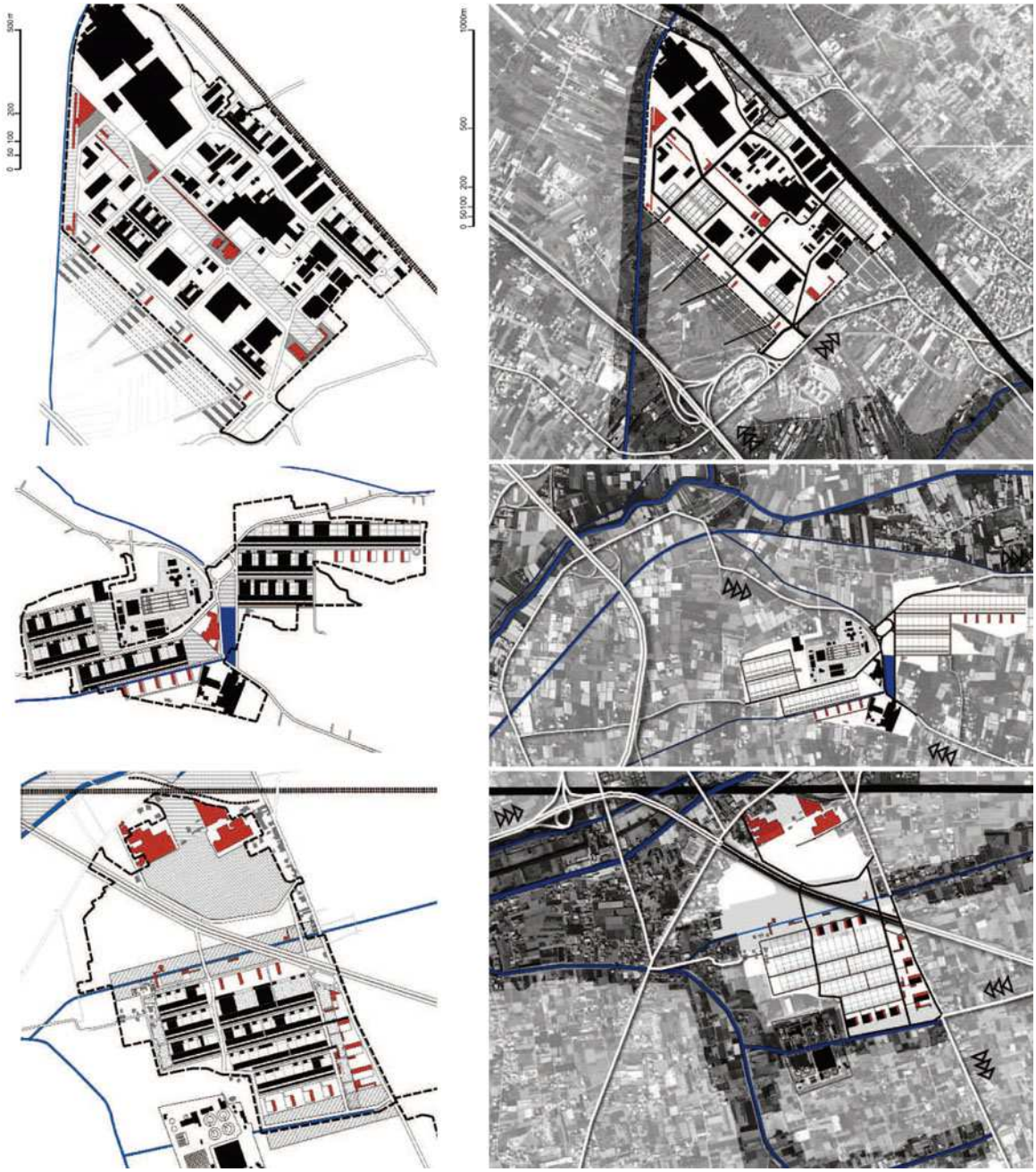

Fig. 2: PIP areas, projects: Sarno, Taurana, Scafati

1.2 The theme of exodus

The concept for exodus plan is exposed by the Strategic Plan that sets some interesting ideas for this research. In fact, the current P.S.O. highlights the need for a strengthening of infrastructural system to make the exodus more efficient in various stages of alert. The Strategic Framework (par. A1.a, Art. 3) describes some possible actions for the adaptation of escape routes net through the rationalization of infrastructural system.

In addition to intermodality criteria (relationship between several transport systems through interchanges) and multimodality (variety of transport systems), among the possible actions we highlight the actions promoting hierarchy and functional specialization of infrastructures and those actions that aim to organize the urban transport of goods "focused on regional interports and local logistics platforms focused for the collection and distribution of goods." In addition to these opportunities, some principles seem attractive – underlined in PSO Norme Quadro (Article 12) - such as the "redundancy in connections serving municipalities in the Red Zone" and the adaption of existing network "to different load conditions in ordinary and emergency situations (...) useful for both scenarios."

The general motive of the project is the need to redefine the urban structure of existing PIP areas starting from a new (or redefined) road in axial position with appropriate size to serve as a large

specialist infrastructure with secondary branches. In emergency regime this road becomes a fundamental element for the civil traffic in exodus direction. As shown in study cases described below, position and arrangement of this infrastructure is derived from traffic flows analysis and from the possibility of duplication of some existing axes with lower transport load capacity (as in the case of PIP Scafati).
In the hypothesis of restructuring productive areas as autonomous polarities (from the point of view of energy, logistics, services, through the establishment or strengthening of collective spaces and equipment), equipment-services system - already provided by the minimum standards allocate for this purpose - qualifies the entire production area as a polarity for the whole territory. We think this system can respond to the small farms' need to rely on consortia for products processing or logistics(see ISTAT data of these years related to agricultural enterprises, which shows a constant tendency to reduction of enterprise scale and the parallel proliferation of family farms).
The PIP areas rethinking is an opportunity to polarize the presence of productive artefacts, that actually are diffused and often inserted in urban fabric, to promote, in this way, their relocation reducing congestion in dense urban areas, lightening ordinary traffic and separating productive transport flows from ordinary ones. This orientation, which is one of the general and widespread positions in contemporary urban research, works in the direction of concentrating occupied lots to conserve soil and bring it to a "negative balance". We highlight the cases of Nocera and Angri where production areas are internal to urban fabric and there are congestion phenomena for the road Strada delle Calabrie.



Fig. 3: Project of productive architectures, plans

2. Applications

The applications concern three PIP areas interested by on-going new drafts for the modification of original projects (according to L. 865/71). These sites are located in geographical area near to Sarno River, to the River Park and considered in this PDR as potential benchmarks of an integrative infrastructural frame connected to the great main roads. These areas are: P.I.P Scafati, P.I.P. Taurana, P.I.P. Sarno.
In the considered areas, in the last ten years PIP plans have been revised by Urban Transformation Company Agroinvest prepared by (STU are established by Legislative Decree no. 267/2000 as mixed subjects with the aim of implementing urban transformations). These re-modulation projects are approved (eg, PIP Sarno) or in the approval process (PIP Scafati). The lots reshaping - both industrial and artisanal ones - stems from the need of reducing lots' surfaces responding to the general reduction of the corporate's size happened during the last two decades (see Istat data on firm size).
The average lot - compared with the original provisions which included an area of 2000 sqm - is contracted to a surface of 1000 sqm. These projects do not alter, if not exceptionally, the system of

roads (often already realized). For this self-limitation, that do not discuss the roads structure, we can say that reconfigurations have a mere division logic. It establishes that areas geometrically defined by road network are "mechanically" divided in surfaces responding to the market's needs. In conclusion, in revisions there are no principles of hierarchy, structure, localization strategy for equipment.

2.1 The project of productive clusters

The project's guidelines lie in the roads hierarchy, in the definition of a more relevant role for nature, in the contribution of service central architectures defining the identity of industrial areas, in the redefinition of a productive type-building more congruent to changing needs and in the relocation of existing residential volumes. The projects include a structuring role for water systems and green areas - intended as places for service collective infrastructures or as energy infrastructures -.

Project involves different degrees of implementation, according to a progression considering logistical difficulties associated with the relocation of existing industrial buildings and, where applicable, the definition of a new internal roads system for industrial area.

The progression involves:

a *first degree* in which we define open spaces and we configure some new roads, a *second degree* involving the moving of some small and medium existing industrial activities and roads consolidation, *third degree* in which existing activities contained in large industrial buildings to be demolished or converted according to different uses are transferred and the final definition of roads network, of green areas and of eventual new water canals.

In function of the characteristics of the different areas, the construction of equipment may be provided in each of the three degrees of development.

Each project builds the new structure for PIP from a spine road (longitudinal or transversel) ordering the urban system. Equipment architectures are generally located on this road. It assumes a dual role:

- organizational and hierarchizing when it is considered as specialist infrastructure, or during ordinary working;
- as an integrative way for exodus during emergency in cases of earthquakes or volcanic and idrogeological risk.

The derivation canals of Sarno River and flooding areas are natural elements assumed as regulatory traces for urban system. Canals and lamination basins to be constructed to prevent flooding phenomena are an opportunity for energy production.

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Identification of the Modal Properties of a Medieval Tower Next to a Landslide

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Abstract
In this paper dynamic identification techniques for a non-destructive evaluation of the dynamical characteristics of cultural value buildings are applied to the medieval Normand tower of Craco (Matera, Italy) that is built next to a landslide area. As a consequence the little medieval town was abandoned starting from 1968 when the effects of the landslide on the buildings were more pronounced. The tower is one of the few building still standing as it is built on a fixed stiff ground.
More in detail, the paper presents the in-situ tests results and the preliminary finite element model of the tower.
The tower was built in the XI century for defense against enemy attacks. It has a symmetric square plan, with dimensions 11 m x 11 m, and it is 20 m tall. Inside a cistern in reinforced concrete was placed in 1949. It has no interaction with the structure of the tower; nevertheless it makes more difficult to install the sensors of the testing set-up.
The results of the experimental tests have been analyzed to estimate the modal parameters through Operational Modal Analysis. The results will give indications about the health status of the tower in order to assess its effective risk of collapse and prevent the structure from the damage due to dynamic forces and the close landslide movements.

Keywords: Masonry Tower, Structural identification, Forced Vibrations, Operational Modal Analysis.

1. Introduction

The neglect status suffered by many minor historic centers in Italy and abroad, whether they are the result of a translation of the settlements as a result of a disaster, whether they have been evacuated to a different motivation, is an opportunity to reflect on the meaning and reasons of the restoration of the forgotten villages. Their slow and gradual disappearance requires urgent conservation and proposals to assign a new role and meaning, without excluding a-priori a possible conversion into places of contemplation and sedimentation of collective memory.
Studying ancient villages means increasing the interest and promote the operational skills related to the preservation of historic buildings, the typological, formal and constructive values, which are the signs of identity of an urban organism with its unique value, so as to safeguard its transmission to future generations.
The preservation of architectural heritage becomes of fundamental importance especially in presence of dynamic phenomena and forces acting on the buildings. In these cases it is important to assume a correct dynamic assessment and design of rehabilitation techniques and risk mitigation interventions [1,2]. The dynamic identification techniques allow a non-destructive evaluation, which is very important in the case of architectural heritage.
In this paper, the study is focused on the medieval Normand tower of Craco (Matera, Italy) that is built next to a landslide area. This is the reason why the little medieval town was abandoned starting from 1968 when the effects of the landslide on the buildings were more pronounced. The tower is one of the few building still standing as it is built on a stiffer and more stable ground.
The paper presents the in-situ tests results to compare with the preliminary finite element model of the tower.

More in detail the test campaign was conducted on the tower with the aim of a direct monitoring of the environmental vibrations. The results have been analyzed and compared with the data obtained from the visual inspection and the preliminary numerical model of the tower [3]. The acceleration data obtained during the tests will be, in fact, used for the Operational Modal Analysis (OMA), which allows knowing the modal parameters of a structure by mean of non-destructive tests, because, like in our case, the structure has a cultural-historical value. This technique is particularly suitable for slender structures such as towers [4,5] because, as explained in the Italian guidelines [6], if they are subjected to vibrations even of low intensity, generally produce very clear signals. Sometimes, on the contrary, difficulties arise due to the geometry of old masonry towers and buildings, which often are not accessible to the upper levels [7,8]. On the contrary the monitoring of these levels is preferable as the response vibrations are clearer and stronger [9,10]. The behavior of masonry buildings and towers is also highly influenced if they are connected to other buildings or are built in aggregates [11,12].
The actual boundary conditions of the tower and the mechanical properties of masonry could be defined through the dynamic identification based on the recordings of a experimental samplings in-situ, which include the use of only ambient vibrations. This represents, through input of an environmental nature, a solution to evaluate the characteristics of the materials and the constraint conditions of the structure, in order to define reliable numerical models, through updating procedures, and to validate the vibration modes, the natural frequencies and the damping ratio on real data. In this way it is possible to define suitable intervention solutions for structural repair and strengthening [13]. With this aim, in parallel to the dynamic identification, a 3D finite element model for a linear simplified analysis is implemented and developed.
In this work experimental data obtained from environmental vibration and recorded during the in-situ tests are shown and discussed: the test set-up is described in detail and the first results of the experimental campaign are reported together with the first considerations and comments relatively to the state of conservation of the structure. Also the results obtained in-situ are compared with the results obtained from the preliminary FE model of the tower.

2. Historical information on Craco

Craco is just one of many centers abandoned in Italy for danger of landslides, which are likely to be physically deleted because of the progressive deterioration, inevitable consequence of the absence of daily use and a constant action of maintenance. But it is the state of disrepair of Craco that, paradoxically, has attracted the attention of scholars and visitors; they have been attracted by the unquestionable charm exercised by the ruins of a village made of poor constructions, but firmly tied to the extraordinary natural landscape of the region (Figs. 1, 2).

a) **b)**



Fig. 1: a) South-West view of Craco; b) East-North top view of Craco.



Fig. 2: Top view of Craco.

The history of Craco is documented only from fragmentary and insufficient sources. The settlement is mentioned for the first time in a document dated 1060, where *Cracum* appears among the possessions of the Bishop Arnaldo Tricarico whose diocese counted, between the XI and XII century, thirty Universitas (municipalities). The first feudal lord, Eriberto of Craco, is mentioned in a document drawn up between 1154 and 1168, while Roberto Pietrapertosa is the name of a royal executioner who holds Craco between 1176 and 1179. Another document records that in the XII century Craco, along with Cagnano, was among the fiefdoms of the principality of Taranto.
A century later, in 1239, Godfrey, lord of Craco, appears in the list of the barons to which Federico II had given the job of guarding some Lombard prisoners. It is likely, therefore, that the first nucleus of what local historians call the "castle", presumably encompassing or coincident with the tower, perhaps with confinement cell, was the seat of the feudal lord.
From an architectural and engineering points of view re-tracing the historical events of the urban organism and the individual buildings (including the typological structure), recognizing the materials, analyzing the techniques of historic buildings, studying the characteristics of the built, assessing the state of preservation, is to understand the current state of ruin, which does not mean fatalistically accept the status quo, but to evaluate the possibility of developing a project for the preservation and enhancement of the entire built heritage, differentiating the degrees and impact of individual interventions.
The state of degradation of the medieval village can offer a starting point for an overall project, unitary and coherent, that readmitting the urban organism in the circuit of the use, in line with the municipal strategies oriented to the recovery of their ancient heritage building, it respects the character enhancing the functional vocations. The idea starts from the conviction that it is possible, for one side, to exploit the criticalities of Craco and turn them into strengths, and, on the other side, to exploit the other local resources.
The study of Craco is aimed at safeguarding and revitalization, which provides, in the first instance, a monitoring program of the buildings of the historic center to increase the knowledge of those that need restoration, enlarging the limits of direct observation that, on the other hand, remains an indispensable step of investigation.

3. The survey aimed at restoring

The planned survey, conducted with the utmost caution, has been preceded by a careful analysis that, starting from a scrupulous relief (this is understood as one of the tools of historical knowledge and then restoration), gave information on the geometry, materials, equipment, construction techniques, recording anomalies and irregularities useful to the overall understanding of the building.
But the study takes advantage of the survey intended also as a means equally effective for the analysis and evaluation of the cracking pattern, which can be extended over time in the form of monitoring, i.e. constant monitoring of the evolution of the phenomenon of degradation, such as to facilitate the reading and interpretation of landslides.
Knowledge, therefore, is a prerequisite both for the purpose of a reliable assessment of the current security, both for the choice of an effective and at the same time respectful restoration.

The knowledge of the materials and construction techniques is certainly useful to discern the weak points of the structure in order to properly consolidate both what has now become dilapidated and what has been heavily tampered. The purpose of consolidation is to return the building the static-structural requirements lost over time, taking into account the ethical limitations imposed by the historical and aesthetic implications which, in achieving a newfound technical efficiency of the building, are placed to guarantee the preservation of a symbol of the collective memory.

4. The Normand tower of Craco

The Normand tower is located in the highest and more stable part of the hill where the old town was built (Fig. 3). It is the tangible evidence of the first settlement developed at first along the ridge path, the current Via Alfieri, up to palace Carbone, and then progresses down the South-West slope favoring the level curves.
The tower is the first defensive building carried out in Craco for strategic control of the territory. The documents so far traced do not say anything about the exact date of foundation that, based on what previously mentioned, is attributable to the first half of the XII century. Nor do we know if the tower was originally isolated, or if it was equipped with secondary service constructions, not communicating with the tower, placed in adherence to the portion of the first level, and was built, at least initially, for purely military needs. It is also unknown if it pursued the dual function of residence and administrative center of the feudal lord as well as city fortress of the lord from which to impose the payment necessary to guarantee the safety of the small cultivated lands.
The tower has a symmetric square plan, with dimensions 11 m x 11 m x 20 m (height). Actually, the part that stands free from small buildings at contact on two parallel sides is about 17 m tall.
Inside a cistern in reinforced concrete was placed in 1949 (Fig 3b). It has no interaction with the structure of the tower; nevertheless it is an obstacle for installing the sensors of the testing set-up. Moreover it should be evidenced that to install the cistern a barrel vault inside the tower was removed, probably producing the failure in the upper part of the wall, only visible from inside (Fig. 4).

5. Experimental study

The experimental study consisted in ambient vibration tests and recordings of acceleration time-histories in specific points of the tower. For the tests 16 piezoelectric accelerometers with a sensitivity of about 1000 mV/g have been utilized. The results of the experimental tests will be analyzed to estimate the modal parameters through Operational Modal Analysis [14,15,16,17]. The results will give indications about the health status of the tower in order to assess its effective risk of collapse and prevent the structure from the damage as effect of dynamic forces mostly due to the close landslide.

a) **b)**



Fig. 3: a) East-West view of the Normand tower; b) inside view of the tower and the r.c. cistern.

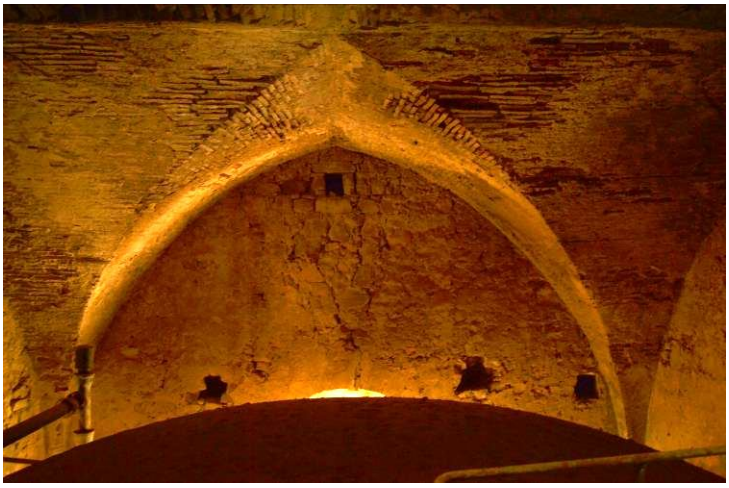

Fig. 4: Inside view of the Normand tower with the cracks on the wall down the vault.

5.1 Test set-up and data acquisition system

The geometrical survey and the visual inspection have been followed by the monitoring phase. The monitoring system consists of several elements properly connected:
1) acquisitions units, or piezoelectric accelerometers of PCB National Instruments, each one with a sensitivity of about 1000 mV/g. Appropriate rectangular blocks were designed and realized in order to ensure the perfect orthogonality of the accelerometers in each point of application, directly applied to the masonry: the accelerometers were inserted with screws on the threads realized on the perpendicular faces of the blocks (Fig. 5a),
2) data acquisition system or DAQs positioned at the levels to be monitored. The control units consist in acquisitions modules of the National Instrument, each one is divided into 3 channels; for each DAQ two modules were used, so overall there are 6 channels (Fig. 5b),
3) co-axial cables with low impedance and with a length variable from 4.0 m to 15.0 m;
4) a laptop where an Acquisition software of NI is installed.
The management of the data acquisition and archiving is done through a software developed in a Lab view ambient [18]. The program automatically converts electric units to engineering units, and stores the signals acquired on the Hard Disk.
The signals post-processing system, an FFT Properties-Signal Analyzer [19], has been chosen in order to obtain characteristics of precision during the signals acquisition.
The piezoelectric accelerometers have been installed on two levels, the only ones accessible from a narrow staircase (Fig. 6a). The difficulty to install more accelerometers at other levels was principally due to the presence of the r.c. cistern inside the tower, as previously described. Fig. 6b shows the plan view at a quote of 10.5 m and the position of the accelerometers; it is possible to notice the presence of the cistern inside the tower, very close to the structural walls. Fig. 6c shows the position of the accelerometers on the terrace at the second level of the tower to be monitored.

a) **b)**

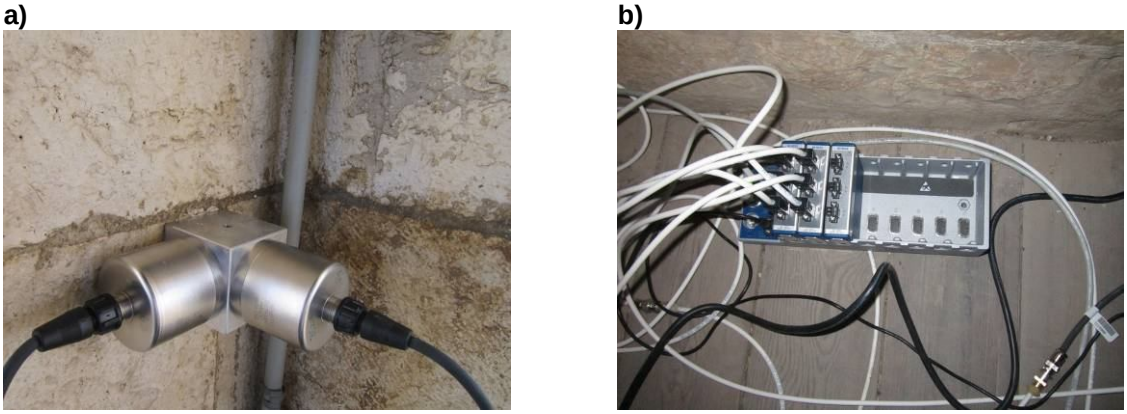

Fig. 5: a) example of piezoelectric accelerometers, PCB National Instruments; b) acquisition modules (DAQ).

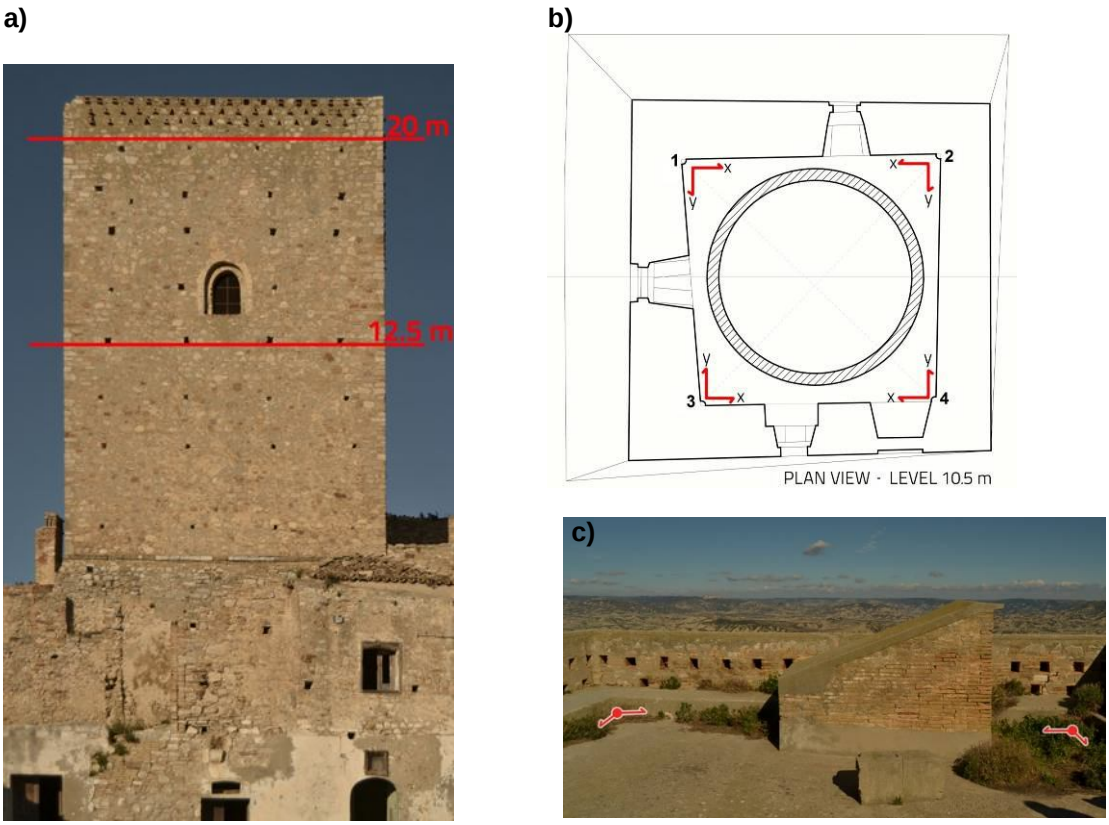

Fig. 6: a) positioning of the accelerometers (in red); b) plan positioning of the accelerometers (in red); c) positioning of two accelerometers at the second level (quote 20.0 m).

5.2 Tests Results

The accelerations have been recorded in 8 different points at two levels, at quote 12.5 m and at quote 20.0 m from the base. In Fig. 7 the time-history of the acceleration at the first level, in correspondence of accelerometer n. 3 is plotted.

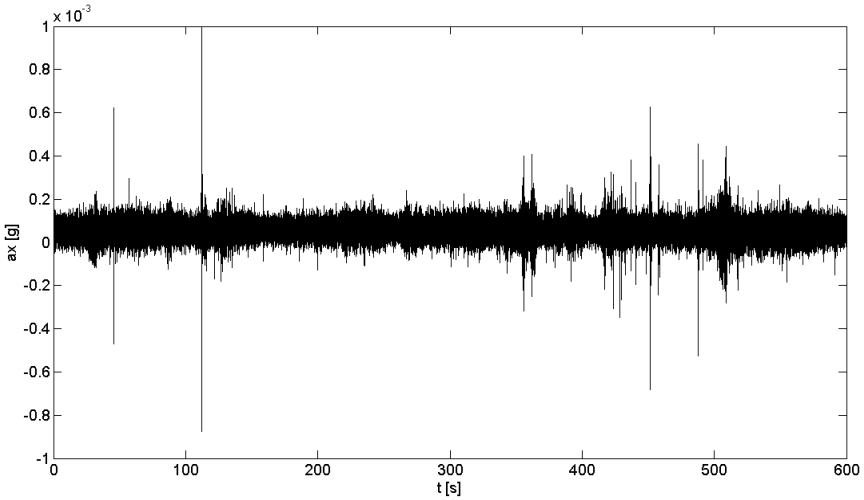

Fig. 7: Accelerometer 3 in x direction at quote 12.5 m.

The acquired time-histories of the accelerations at the eight sensors will be utilized to identify the real frequencies, mode shapes and damping factors of the tower. They will be compared with the numerical results obtained on the preliminary model (see par. ..) in order to update it.
The updated model will be utilized to study a reliable retrofitting of the structure, also considering the effects of a close landslide.

6. Preliminary numerical 3D finite element model

The data obtained from the archival study, the geometrical survey and the visual inspection have been utilized to develop a preliminary three-dimensional finite element (FE) model. In this way it has been possible to obtain the dynamic characteristics of the tower to be compared with those obtained from the test campaign.

6.1 Description

The numerical finite element model of the tower has been made with Straus7 software for finite element model analysis [20]. The tower has been modeled with 3-node plate elements with a uniform mass distribution along the height of the structure. The cistern has been considered in the model because it stands in contact with the tower's walls, even if there are some simplifications. Fig.8a shows the final model of the tower and the cistern inside, consisting of 50 vertices, 3170 nodes and 5909 plate elements. The base has been considered totally fixed.
The different constraint conditions that characterize the structure on the NW and SE sides in contact with other small structures, have been considered as local elastic springs.
The mechanical properties of the masonry utilized for the preliminary FEM analysis are the elastic modulus (E) equal to 800 MPa, the Poisson's modulus (v) equal to 0.2 and the material density equal to 1800 Kg/m^3. It was assumed a linear elastic mechanical behavior during the calibration. The value of the stiffness of the springs (K) has been assumed equal to 900 N/mm. These values have to be updated following an iterative approach until a satisfactory level of agreement is obtained between the numerical and experimental frequencies. In this particular case the iterative process will be carried out varying the Young's modulus (E) of the masonry and the value K of the springs.
These values will be updated in a future analysis. As a consequence, the finite element model of the tower shown here is only preliminary and cannot be completely defined as the aforementioned uncertain parameters may not be chosen.

6.2 Results of the numerical analysis

The preliminary results obtained from the analysis with Straus7 software are shown in Tab. 2, which collects the first five frequencies obtained from the preliminary FE model. The correlated mode shapes of vibration are shown in Fig. 8.
The first mode corresponds to a bending mode in E-W direction, the second to a bending mode in N-S direction and the third mode is a torsional one; the fourth and fifth modes are bending modes of a level higher than the first two.
It is expected that the first two frequencies, the bending modes, should be very close having the structure an almost square plan. But even if the tower has a first natural frequency in the same range of any other similar case presented in the scientific literature [4-5], the presence of the small one-floor one-room structures in contact with the lower part of the tower on two parallel walls made the 2nd frequency quite different from the 1st one. This is explained by a higher stiffness in one direction due to the presence of the constraints.
Tab. 2 shows the first five frequencies obtained during the experimental acquisition tests.
After the acceleration recordings the characteristics utilized in the preliminary numerical model will be updated following an iterative approach until a satisfactory level of agreement will be obtained between the numerical and experimental frequencies. It will be then possible to perform a stress analysis and determine the most stressed part in the tower where it will be necessary to design a structural reinforcement.

Tab. 2: The preliminary frequency values of the F.E.M

Mode	Frequency (Hz)	Frequency (rad/s)
1	3.35696	21.09
2	4.41093	27.71
3	7.03589	44.21
4	7.75742	48.74
5	10.71	67.26

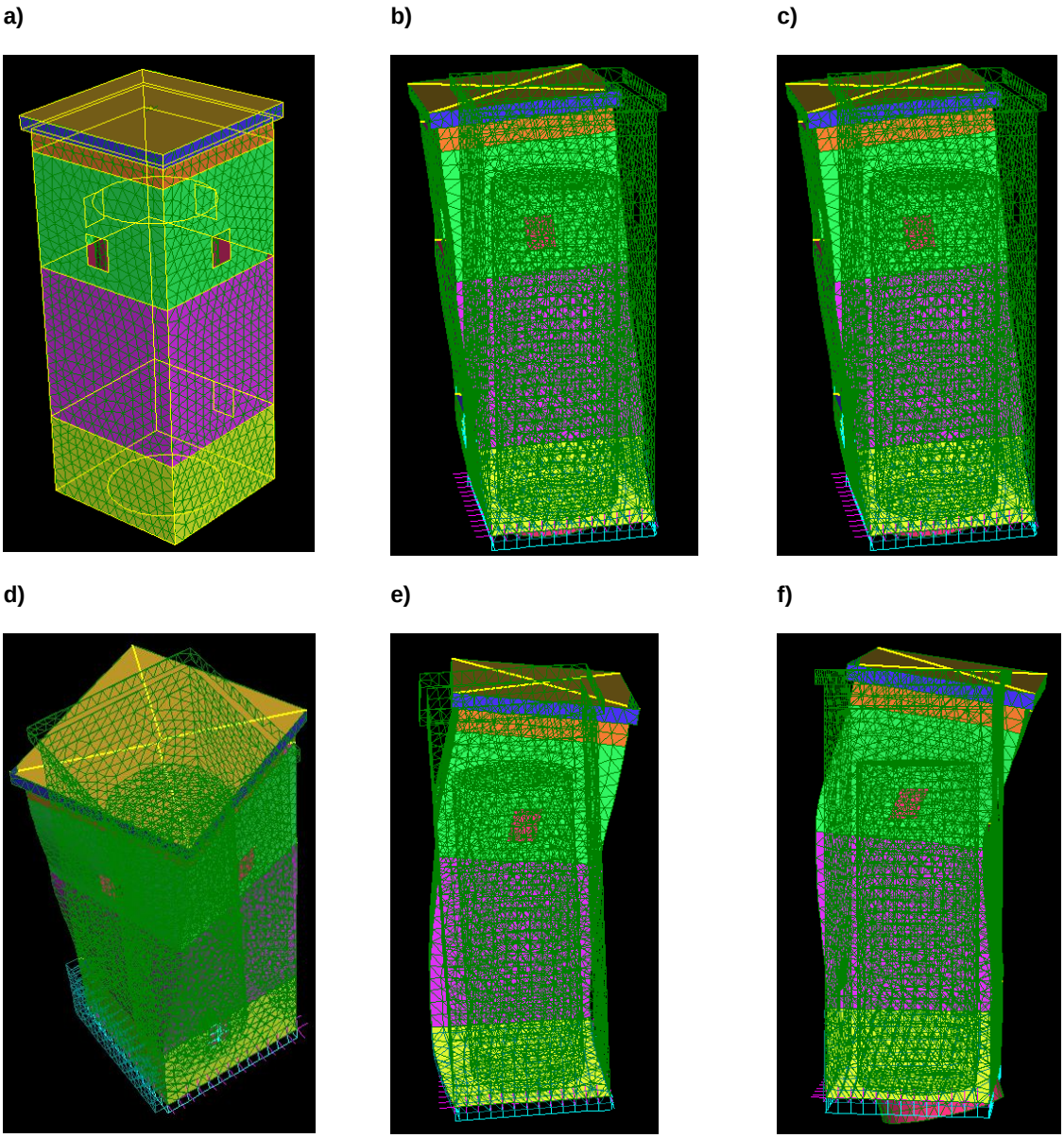

Fig. 8: a) Finite Element model; b) c) d) e) f) Modal shapes of vibrations of the Finite element model.

7. Conclusions

The present paper shows the first results obtained during in-situ investigation on the Normand tower of Craco, which, indirectly, is subjected to the movements of the close landslide. Geometrical survey, visual inspections and environmental accelerations recordings are the techniques utilized to determine the characteristics of the structural masonry walls and the modal parameters of the tower (frequencies). In parallel a numerical analysis has been conducted on a preliminary model of the tower with the aim of updating the in-situ recordings by mean of OMA techniques and define a reliable model for next study of the stress distribution in the structure.

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Bibliographical References

[1] Meskouris, Konstantin. *Structural dynamics, models, methods, examples*. Berlin: Ernst & Sohn, 2000.

[2] Foti Dora, Debernardis Margherita, Paparella Vito. Structural Safety Control of Masonry Buildings: Non-Linear Static Seismic Analysis with a Non-Linear Shear Strength Criterion. In: B.H.V. Topping, (Editor). *Proceedings of the Eleventh International Conference on Computational Structures Technology*. Dubrovnik, 4-7 sept. 2012, STIRLINGSHIRE:Civil-Comp Press, ISBN: 978-1-905088-54-6, doi: 10.4203/ccp.99.

[3] Foti Dora. Non-Destructive Techniques and Monitoring for the Evolutive Damage Detection of an Ancient Masonry Structure. *Key Engineering Materials*, 2014.

[4] Ivorra Salvador, Pallarés Francisco. Dynamic investigations on a masonry bell tower. *Engineering Structures*, 28(5) (2006) 660–667.

[5] Foti Dora, Diaferio Mariella, Giannoccaro Nicola Ivan, Mongelli Michele. Ambient Vibration Testing, Dynamic Identification and Model Updating of a Historic Tower. *NDT&E International,* 47 (2012) 88-95, doi:10.1016/ j.ndteint.2011.11.009.

[6] DPCM 02.09.2011. *Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme tecniche per le costruzioni di cui al DM 14/01/2008,* (in Italian).

[7] Lepidi Marco, Gattulli Vincenzo, Foti Dora. Swinging-bell resonances and their cancellation identified by dynamical testing in a modern bell tower. *Engineering Structures*, 31(7) (2009) 1486–1500.

[8] Foti Dora, Ivorra Salvador, Sabbà Maria Francesca. Dynamic Investigation of an Ancient Bell Tower with Operational Modal Analysis. *The Open Construction and Building Technology Journal*, 6 (2012) 384-391, doi: 10.2174/1874836801206010384.

[9] Diaferio Mariella, Foti Dora, Mongelli Michele, Giannoccaro Nicola Ivan, Andersen Paul. Operational Modal Analysis of a Historical Tower in Bari. in: Conference *Proceedings of the Society for Experimental Mechanics Series, "IMAC XXIX"*. 7 (2011) 335-342, doi: 10.1007/978-1-4419-9316-8_31, 31 Jan.-3 Feb. 2011, Jacksonville, Florida, USA.

[10] Foti Dora, Diaferio Mariella, Giannoccaro Nicola Ivan. Non-Destructive Monitoring of an Old Masonry Clock Tower with Forced and Environmental Actions. in press in: *Proceedings International Forum "Le Vie dei Mercanti"*, Editor La Scuola di Pitagora, in "Fabbrica della Conoscenza", 12-14 June 2014, ID 111.

[11] Formisano Antonio, Mazzolani Federico Massimo, Florio Giovanni, Landolfo Raffaele. A quick methodology for seismic vulnerability assessment of historical masonry aggregates. in: *Proceedings of the COST Action C26 Final Conference "Urban Habitat Constructions under Catastrophic Events"*, Federico M. Mazzolani, Chair, Naples, 16-18 September 2010, CRC Press, Taylor & Francis Group, London, 577- 582.

[12] Formisano Antonio, Florio Giovanni, Landolfo Raffaele, Mazzolani Federico Massimo. Numerical calibration of a simplified procedure for the seismic behaviour assessment of masonry building aggregates. in: *Proceedings of the 13th International Conference on Civil, Structural and Environmental Engineering Computing, CC 2011*; Chania, Crete; 6 - 9 September 2011.

[13] Modena Claudio, Valluzzi Maria Rosaria, Tongini Folli Roberta, Binda Luigia. Design choices and intervention techniques for repairing and strengthening of the Monza cathedral bell-tower. *Construction and Building Materials*, 16(7) (2002) 385–395.

[14] Foti Dora, Gattulli Vincenzo, Potenza Francesco. Output-only modal identification in unfavourable testing conditions and finite element model updating of a seismically damaged building. *Computer-Aided Civil And Infrastructure Engineering*, 2014, Online ISSN: 1467-8667, doi: 10.1111/mice.12071.

[15] Foti Dora, Ivorra Salvador, Bru David, Dimaggio Giuseppe. Dynamic Identification of a Pedestrian Bridge using OMA: Previous and Post-Reinforcing. In: B.H.V. Topping, (Editor). *Proceedings of the Eleventh International Conference on Computational Structures Technology*. Dubrovnik, 4-7 sept. 2012, STIRLINGSHIRE:Civil-Comp Press, ISBN: 978-1-905088-54-6, doi: 10.4203/ccp.9.9

[16] Diaferio Mariella, Foti Dora, Sepe Vincenzo. Dynamic Identification of the Tower of the Provincial Administration Building, Bari, Italy. in: *Proceedings of the Eleventh International Conference on Civil, Structural and Environmental Engineering Computing*, Malta, 18-21 Sept. 2007, paper n. 2.

[17] Diaferio Mariella, Foti Dora, Giannoccaro Nicola Ivan. Identification of the modal properties of a building of the Greek heritage. *Key Engineering Materials*, in press, 2014.

[18] LAB VIEW, National Instrument: Austin, TX (USA).

[19] FFT PROPERTIES-SIGNAL ANALYZER, ver5, DewReserch: SlovenskeKonjice (SLO).

[20] STRAUS 7, v 2.3.3, Strand7 Pty Ltd (AUS).

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Heritage discretize: the Regional Park of Matese.

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Abstract
The protection of the heritage of the Park of Matese, associated with innovative technologies through which you can observe, document and preserve the relationship between nature and architecture are the values that have made a path of knowledge in the lush nature of the extreme site of Province of Terra of Lavoro on the border between Campania and Molise. This territory quoted by Polibio are a homogeneous composition between built and natural environment between then complemented by geological and karst with iridescent colors which overlooks the green forests and propose actions for the protection of economically productive rural villages not devoid of architectural such as castles and convents on the remains of the classical age. The research is based on the belief that the action of the protection and enhancement of the places can not be separated from an activity based on the discretization of multidimensional knowledge and measurement of assets. The various formal and aesthetic aspects of nature and the built facing historical reasons, the relations between factories and housing facilities for agricultural used in the geographical context give life and character to the landscape, the roots based on the multidimensional representation, in which each component, material and immaterial returns the territory as a dynamic entity constantly evolving.

Keywords: Matese Regional Park, multicriteria analysis, representation

1. The rural heritage of the Matese
The reading of some archive images and contemporary have in common the structure, shape perception, the compositional geometry useful to make the reading of the signs of historical systems and networks, where the perceptual nature of the compositions is drawn. To the operations of research in Documentary, are added references to the naturalistic theme that, in relation to architecture, expose the beauty of structural and compositional territory. The latter characteristic is essential for the implementation of measures to protect the causes of degradation are many and varied in relation to the natural and made environment in which they present their functional characteristics and perception. The development of the itinerary is contained in the following stages: the first concerns the perception of places and architectural structures in the landscape and the urban environment. Take advantage of these images means acquiring the historical value and the current reality. The visions of the architectural reality in dealing with shapes and colors of the social structure are acquisitions that belong to the detector and the designer through graphical documentation.
The second segment of the research develops a comparative study of documents of different age and origin, whose expressive language shows pictures compared of the territory and the current reality, both played with the detection of the places. The review outlines the common images of Ailano, Castello del Matese, Cusano Mutri, Faicchio, Gallo Matese, Letino, Piedimonte Matese, Pietraroja, Prata Sannita, Raviscanina, San Gregorio Matese, San Lorenzello, San Potito and Valle Agricola documented by representations analyzed to compared in order to achieve the interpolation knowledge and aimed at the conservation and protection of places from which resource landscape.
This territory is mentioned by Polibio that after describing the plain around Capua adds that it is strong and difficult to access, "and it limited on one side by the sea mostly by high mountains and

uninterrupted, through which the hinterland leads to the plain only three steps narrow and bitter, respectively Lazio, the Irpinia and Sannio". The present vision of the places manifested a homogeneous composition between built and natural environment among their integrated with geological and karst with iridescent colors which overlooks the green forests and propose measures for the protection of economically productive rural villages not devoid of architectural like castles and convents of sediments of the classical age. The different formal and aesthetic aspects of nature and the built facing historical reasons of the relationship between housing and facilities designed for agricultural use in the context geographic characteristics and give life to the landscape; designs based on the roots of the natural environment in the cultural life of the region studded with children living in the suburbs architectures prevalent in rural vocation, pursuing an analytical knowledge through discovery. To graphically document the human environment and natural images are compared aspects of nature such as trees, rocky elements, water sources and structures related to the production of the soil.



Fig. 1: The Matese Regional Park: view from the east.

2. Discretize the heritage: research methodology

The beautiful natural landscape of the Park of Matese offers unpredictable a scene, in which between rich forests of beech and maple trees, between different species of animals and plants of the Apennines, also rare, you can see the springs, caves and lush valleys, together with traces of prehistoric civilization , Italic and Roman. Of particular charm are the testimonies of monastic hermitages and caves that demonstrate the presence of zones of medieval worship, along with the discovery of small rock sanctuaries. The research is based on the belief that any action for the protection and enhancement of places can not be separated from an activity based on the discretization of multidimensional knowledge and measurement of assets. The measure, therefore, is the basis of knowledge and representation of the values of all physical and intangible assets of reality and documentary traces of man in his biological evolution as a function of the environmental context in which they live. Measure and capitalize the infinite reasons of nature, as we recommended Leonardo, is to recognize the genetic heritage, the identity of places, the founding of the ongoing process of restoration and regeneration as a modification against any notion of transformation: transform involves action dictated only from a technological need for conduct going beyond the limit imposed by knowledge. The instruments of knowledge allow us a multidimensional representation, in which each component, material and immaterial, returns the territory as a dynamic entity constantly evolving. The methodological system it is not given by the sum of the individual single-issue knowledge, but from a integral of knowledge that any information is qualitatively and quantitatively itself.



Fig. 2: The Matese Regional Park: view of the Matese lake.

Each point is described by a range of information that analyze the characteristics of material and immaterial triggering an ecogeometric approach that allows you to "measure the complexity", ie to recognize characters founding by reading the signs. It is the most effective means not only to analyze a territory, but also to program the management calling a hierarchy of actions. In applying this method to the territory of the Regional Park of Matese, analyzing a large and heterogeneous place, where knowledge is consisted of the reading given to the understanding of all the complex aspects that contribute to determining the form, not only as appearance exterior, but also as a carrier of immaterial values related to the history, culture and traditions over the centuries have stamped their marks to the environment by initiating a knowledge of the territory so to speak genomics.

3. The Matese Regional Park: surveys

The protection and enhancement of the heritage of the Park of Matese, represent a path of knowledge in the luxuriant nature, the far site of the province of Terra di Lavoro, on the border between Campania and Molise. The Matese Regional Park is a protected natural area of Campania, established by the Campania Regional Law n. 33 of 1 September 1993 and came into operation in the year 2002. the territory mainly includes the mountain massif of Matese and is made up a chain of calcareous mountains mainly located between Molise and Campania, where towering the Mutria Mount, the Gallinola Mount and the Miletto Mount. The park occupies an area of 33.326,53 hectares along a North – East, South - West, by the valleys of the rivers Sava and Lete, runs for about 50 km up the valley of the Tammaro River, in the province of Benevento.

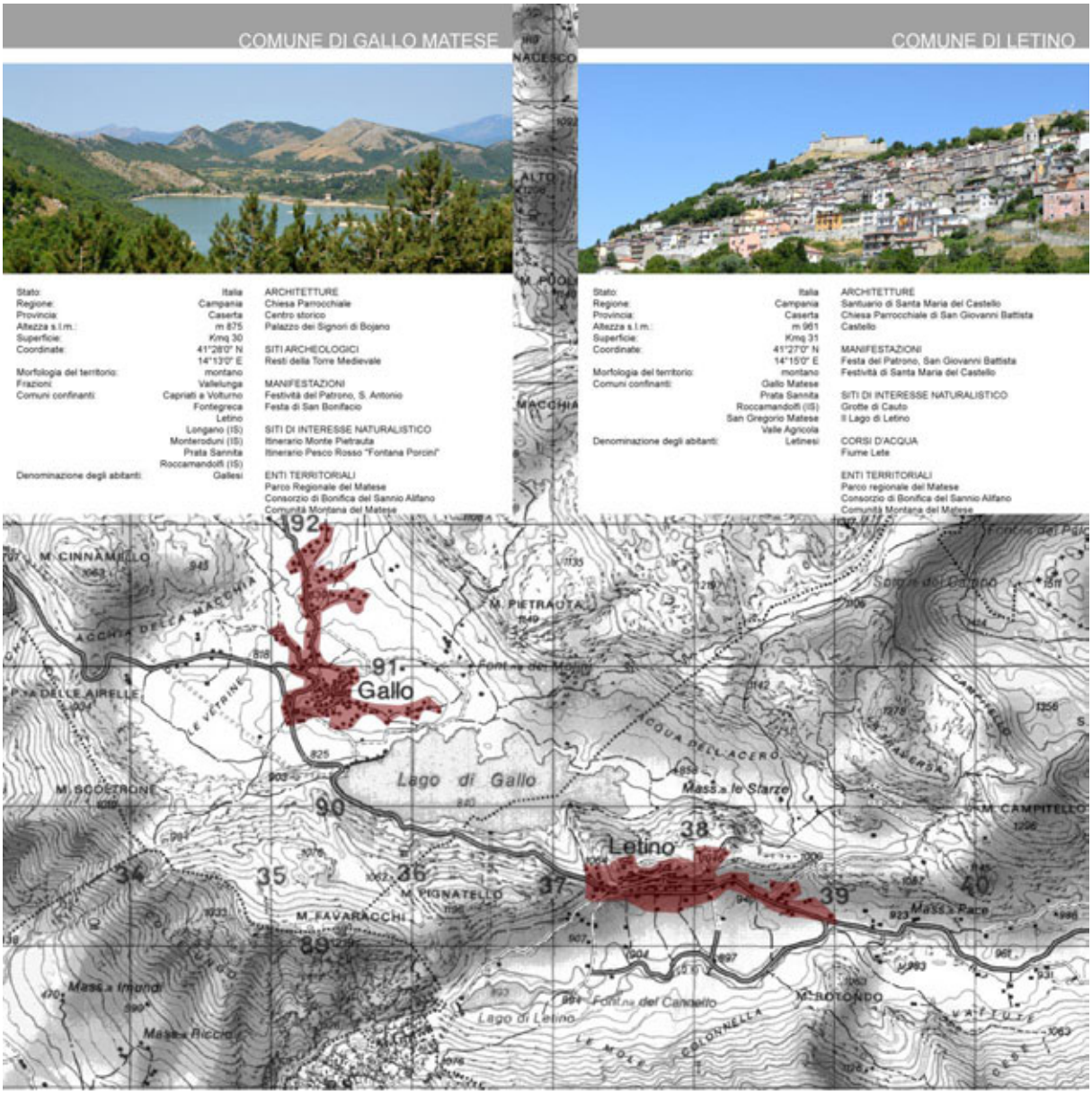

Fig. 3: The Matese Regional Park: thematic map on the towns of Gallo Matese and Letino.

The lakes and springs represent another important key to the protected area. The presence of three basins on the plateau, the lake of Matese, the lake of Gallo and the lake of Letino resulted in a wonderful natural habitat for wolves and eagles. The lake of Matese is the highest karst lake in Italy and collects the waters of Miletto Mount and Gallinola Mount and it is important for the abundant flora lake of rushes and reeds of the marshes that make it possible to rest and nest in a wide variety of birds water. Its relevance is given both by the water, such as power supply aquifers and underground rivers, and to the use of hydroelectric power. The lakes of Letino and Gallo were created by crossing the rivers Sava and Lete and are still used for hydroelectric purposes.
The presence of castles, city walls, towers, fortified villages is characteristic of the landscape of the Matese and offers a fascinating place full of history. Gentle landscapes with lakes from the blue waters which reflect the summits of the mountains, well-preserved historical centers, relations between the Romans and Samnites, led to the designation as a Special Protection Area, in accordance with Directive 79/409/CEE. Most of the villages still perfectly the ancient medieval structure: access doors, the walls, the mansion, the churches. One of the most significant examples is the castle of Prata Sannita, built in the twelfth century, perfectly preserved, is part of a small town is still surrounded by its walls and stands on a rocky ridge that slopes toward the river Lete.

4. The Matese Regional Park: historical notes

In the Iron Age, while the Tyrrhenian coast is affected by Greek settlements, inland areas are of Etruscan dominion of Capua and make their main center.

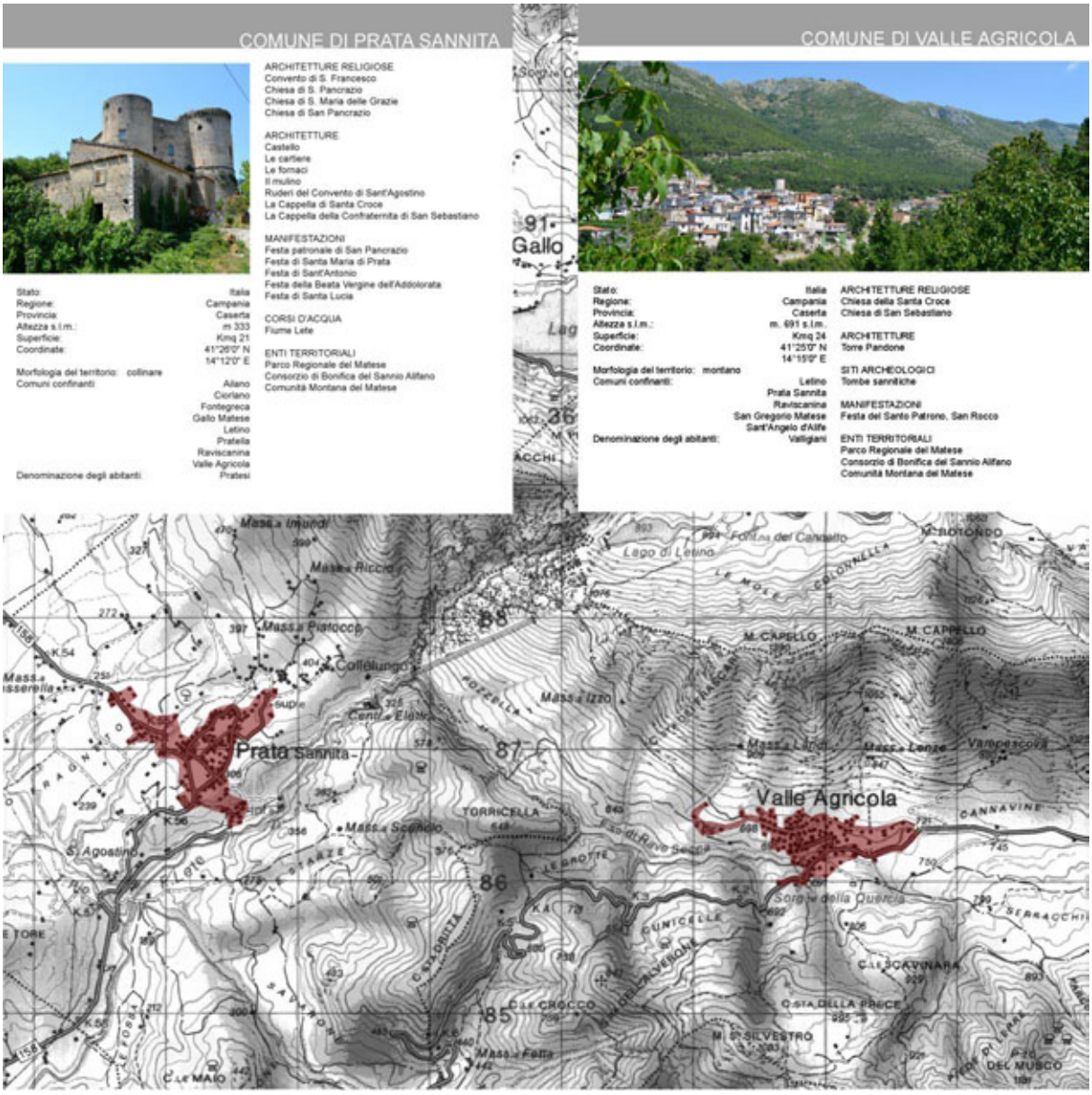

Fig. 4: The Matese Regional Park: thematic map on the towns of Prata Sannita and Valle Agricola.

The Matese is a stronghold of the Sanniti who resist the disruptive power of Rome. In the late - ancient of these lands pass the Goths, the Vandals and the Lombards, who settled in the inland areas. Even today, with monuments and sacred caves dedicated to the cult of San Michele Arcangelo and the Matese bears the mark of the presence Lombard. The centers entrenched and fortified monasteries tell of the arrival of the Saracens. The period of Normanno Svevo and Angioino buildings still, villages, rock caves as signs of splendor and of ups and downs, of wealth and splendor. During the fifth century BC, the population descends from the mountains of Abruzzo directed to the most fertile plains of Irpinia and Puglia: the Sanniti, which occupies the hinterland, pushing in some cases up to Neapolis, Herculaneum and Pompeii. According to the author Tito Livio, referring to the invasion of the Sannita people in the Campania region, defines the Sanniti were a fierce people, military and predator, not at all interested in the activities of production and exchange. This description suggests a people perched on the mountains and dedicated exclusively to the practice of farming. However, the archaeological finds attest to a high degree of civilization. The Sannitic wars, which last 343-290 BC and they see quite a few defeats by the Roman, as in the case of the Forche Caudine in 321 BC. The traces left by the Romans on the territory are remarkable. Alife with its walls in random length it is a wonderful example. The town still retains its urban layout, with four doors typical of the castrum, at the intersection of the roads that connected to Caiatia Bovianum through the Matese, and Venafrum to Telesia. The crisis of the Roman world and several outbreaks of plague and malaria, which are decimating the population, facilitate the invasion of the Goths and Vandals in the fifth century AD.

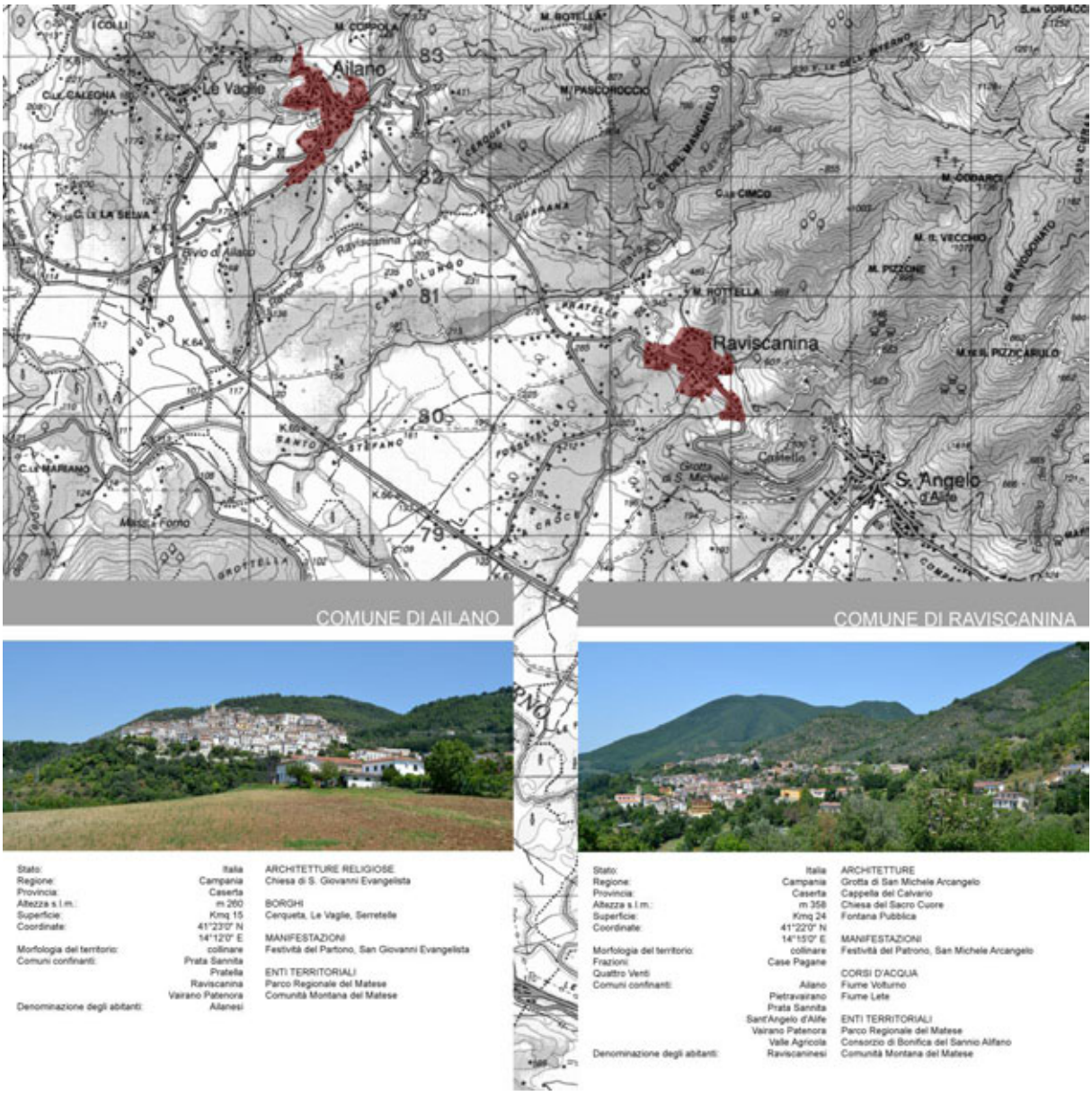

Fig. 5: The Matese Regional Park: thematic map on the towns of Ailano and Raviscanina.

A century later, are the Lombards, who settled in the inland areas of Campania, to reorder politically throughout the area. The caves, the great protagonists of these mountains, are treasures of history and art. The imprint of this period is especially evident in caves such as Curti located in Gioia Sannitica, or those of Raviscanina and Faicchio, adorned with altars and important frescoes. With the coming of the Saraceni, the whole area undergoes a profound transformation: the centers are perched on the hills, in the more sheltered positions, and even the monasteries are fortified. The refugees in the city of Alife founded numerous centers built against the hills or along the sidessuch as Castello del Matese and San Gregorio Matese, Prata Sannita, Pratella, Ciorlano and Piedimonte Matese. All the Volturno Valley, moreover, is rich in castles, the legacy of the next The period also Norman, Swabian and Angevin. The whole area bears the signs, buildings and works of art, style prevalent at the time of the Spanish domination. Cerreto Sannita, for example, is located in a place other than that of the previous city, mentioned by Livio and Polibio as Cominium Ceritum. Razed to the ground in 1688 by a terrible earthquake, it was rebuilt with a new facility, free of walls, typical of urban conception of the eighteenth century. On orthogonal streets are lined blocks to plug in court and block, and beautiful buildings are adorned with limestone fillers in soft colors. A typical example of a noble residence is the Filangieri Palace de Candida Gonzaga in San Potito Sannitico. Built in the eighteenth century by the family of Sanillo on the remains of a Roman villa, of which it retains an aqueduct, was expanded during the nineteenth century by the Count Gaetani.

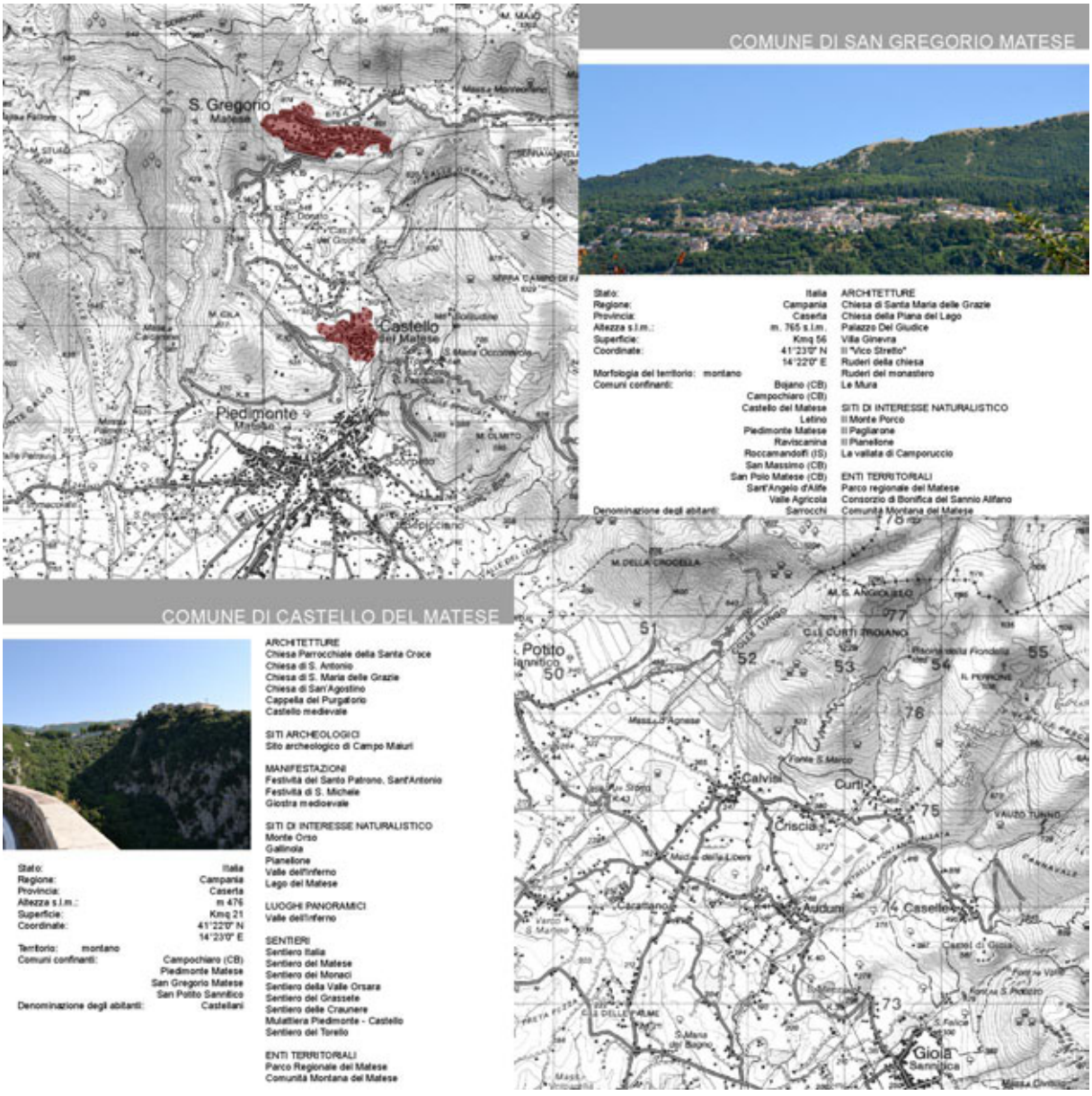

Fig. 6: The Matese Regional Park: thematic map on the towns of Castello del Matese and San Gregorio Matese.

5. The Matese Regional Park: some municipalities under investigation

The town of Piedimonte Matese is the gateway to the natural mountain massif. The area, located on the slopes of Mount Matese and Mount Cila, at the end of three valleys, one of the Paterno, one of the Rivo and that of Torano, looks like a green and uncorrupted nature, bathed by the Torano river, a tributary of the Volturno river. A pre-Roman historical testimony are the remains of the megalithic walls of Mount Cila consisting of three city walls, with a thickness of two meters. Part of the sannitiche fortifications became were destroyed by the Saracen invasions.

The town of Castello del Matese is surrounded by nature and framed in the charming mountain range, enriched with caverns, caves, streams and springs. The Norman period, the Castle is an imposing building with five towers, two of which are still visible. In the oldest part of the settlement, the presence of remains of megalithic walls of ancient Samnite period attest to how much the settlement was chosen in pre-Roman times as a defensive place thanks to the existence of natural ravines.

The town of San Gregorio Matese is located at 750 m. above sea level, on a majestic limestone wall of the Matese Mount, between the lake of the same name, and the step of Miralago is set in a typical rural landscape, including extensive farming and herding traditional woods of beech and maple. The trails lead through historical era Samnite tombs of warriors Italic until you see a particular Christian settlement of the Sixth Century.

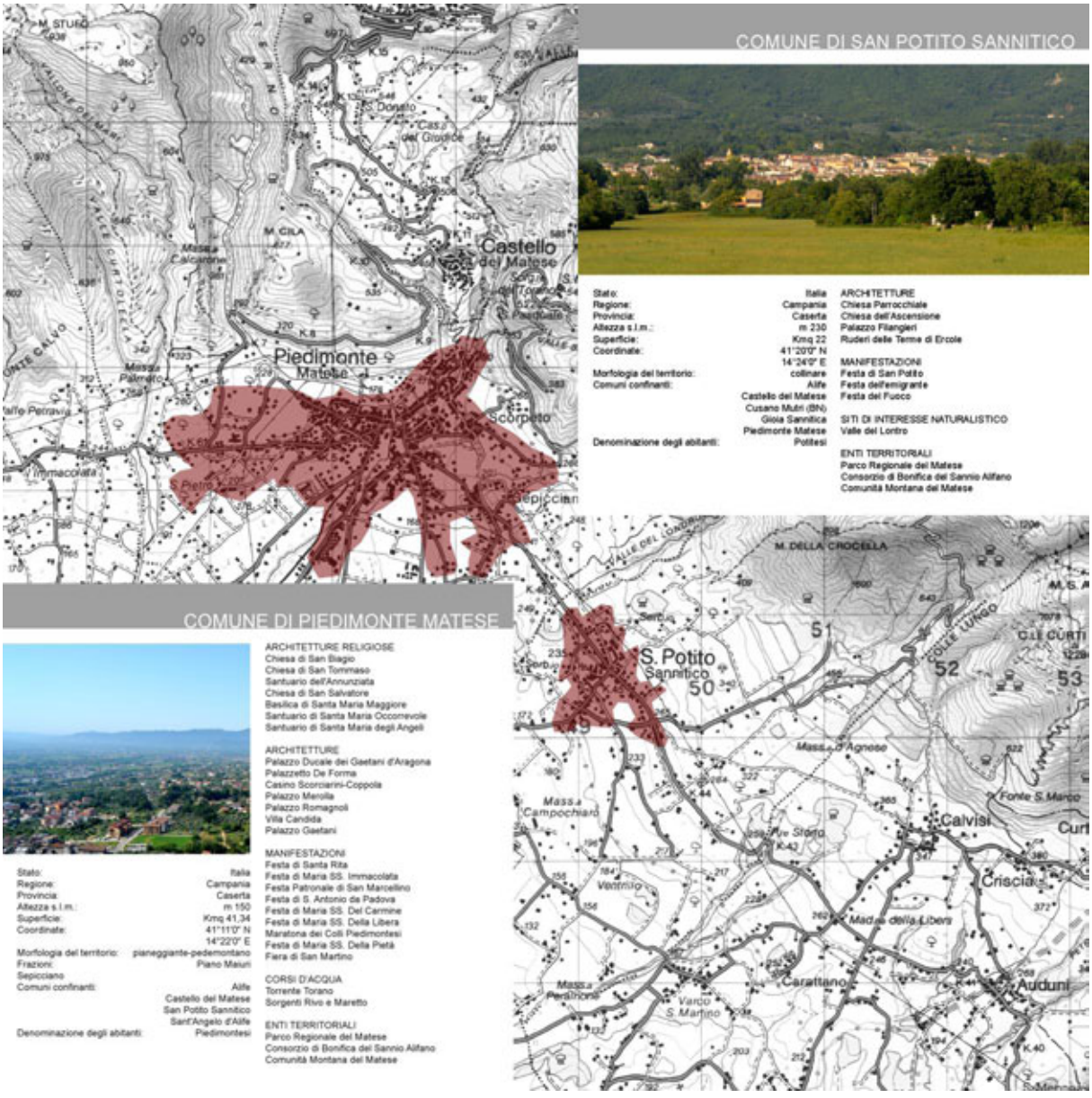

Fig. 7: The Matese Regional Park: thematic map on the towns of Piedimonte Matese and San Potito Sannitico.

The town of Valle Agricola is a charming village with copses and beeches, which lies near the ditch Rave Secco, a tributary of the River Lete. The place is dominated by pine forest of Monte Cappello, dominated by an ancient tower the Samnite, and the Scavenara hill, overlooking the valley of the river Ravone. After the Saracen invasions Valle Agricola has been in possession of the Barony of Prata, and then become, in the Norman period, a feud of many noble families. One of the four towers that were part of a fortification of medieval origin, of a square, had risen to defend themselves from the attacks of rival lords. The tower, whose origin is the Lombard period, is visible in the town that has incorporated over the centuries.
The town of Gallo Matese is a settlement of ancient memory. The extraordinary discovery in 1979 of the remains of Homo Aeserniensis in the Pineta area, on the border with Isernia, certifies that the place was already inhabited around a million years ago. Gallo became, in Roman times, an important line of communication to the plain of the Volturno, on the side of Venafro, up the slopes of Mount Pesco Rosso, passing the ditch of Marangoni. The site is home to the Lake of Gallo, a reservoir created a few decades ago that feeds the hydroelectric plant of Capriati a Volturno.
The town of Letino is a picturesque mountain village that is located on the Matese and is on a hill over a thousand meters above sea level, between green fields and rich woods. The town sprang up following the permanence of shepherds in winter. The Church of Santa Maria dell'Arco and that of San Pietro picked up their first settlements. The Norman castle is the most obvious evidence of the medieval period. The artificial lake was built by to support the central SME of Prata Sannita in 1911.

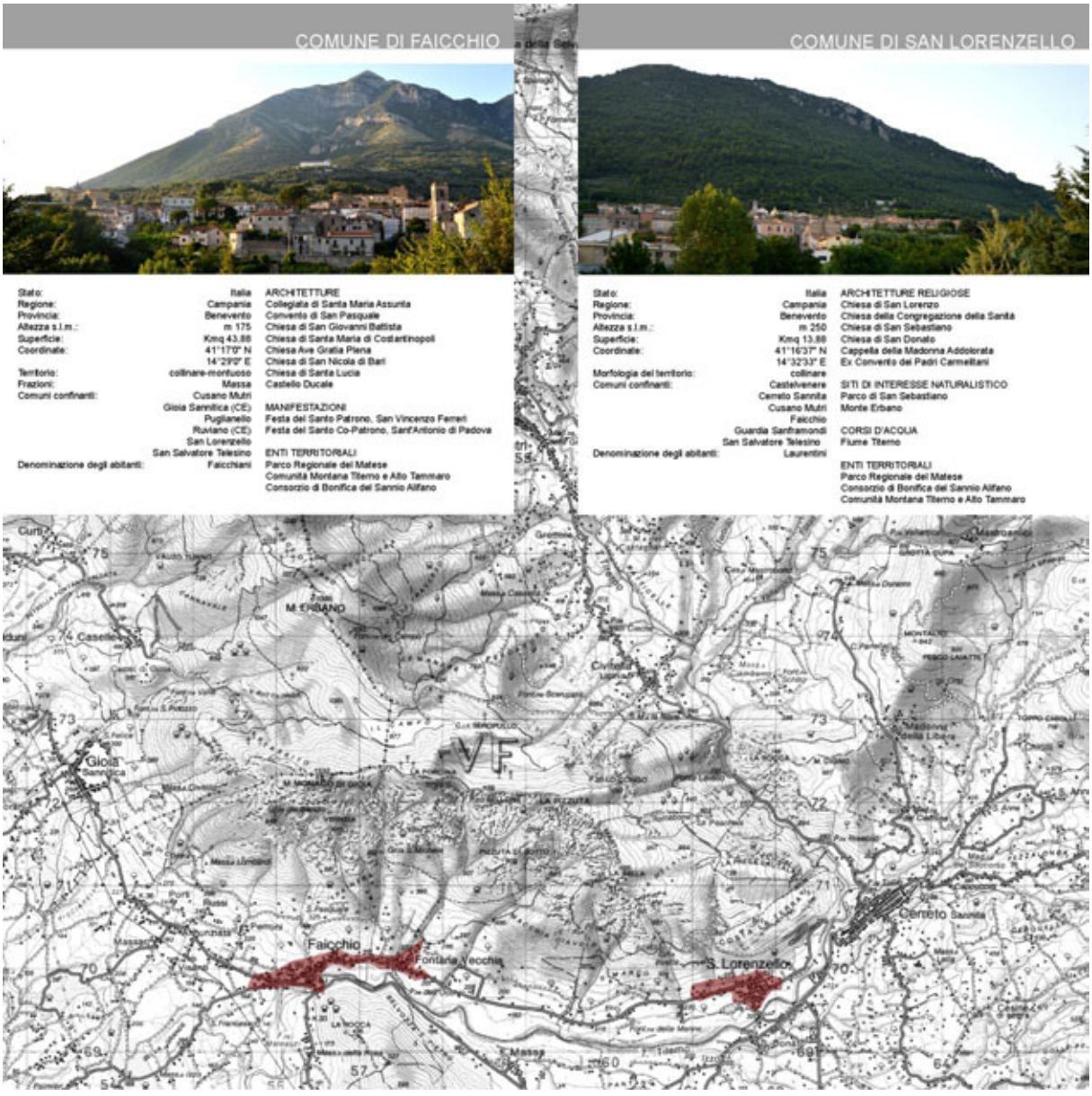

Fig. 8: The Matese Regional Park: thematic map on the towns of Faicchio and San Lorenzello.

The town of Raviscanina is located in the unspoilt rocky ledge at the foot of the Matese Mountains, and has always taken advantage of a strategic defense and control over the area. The forests of beech trees, widespread and rich Mediterranean maquis undergrowth, the large presence of various species of wild animals and the presence of small settlements has facilitated numerous caves of prehistoric man, witness the discovery of pottery from the middle and late age of Bronze. The territory was the subject of several settlements, first of all the Samnite and subsequently that of the Latins. Then became part of the possessions under the feudal duchy of Benevento.
The town of Ailano is perched on a rocky hill feature. Retains the medieval street pattern, flanked by the river Lete and pristine pastures and woods. Of Samnite origin, is an important archaeological site
The town of Prata Sannita is placed at a height of 400 m. the rocky slopes of the north-western side of the Matese, comprises two settlements: Prata Superiore and the characteristic medieval village of Prata Inferiore. The megalithic walls testify that the first settlement was founded by the Samnites. The Roman era saw the heights of these tragic clashes between the Romans and Samnites. After the dominion of the Lombards that made Prata feudal possession of the duchy of Benevento, the city fell under the control of the monastery Montecassino. The fortress was built in the ninth century. and has a rectangular plan that is built around a courtyard whose floor covers a large tank designed to collect rainwater. The entrance to the village is made up of a majestic arch through which you reach the access ramps of the Castle. The nineteenth-century portal is valuable. The three is storey while the north tower contains a fresco of the Annunciation.

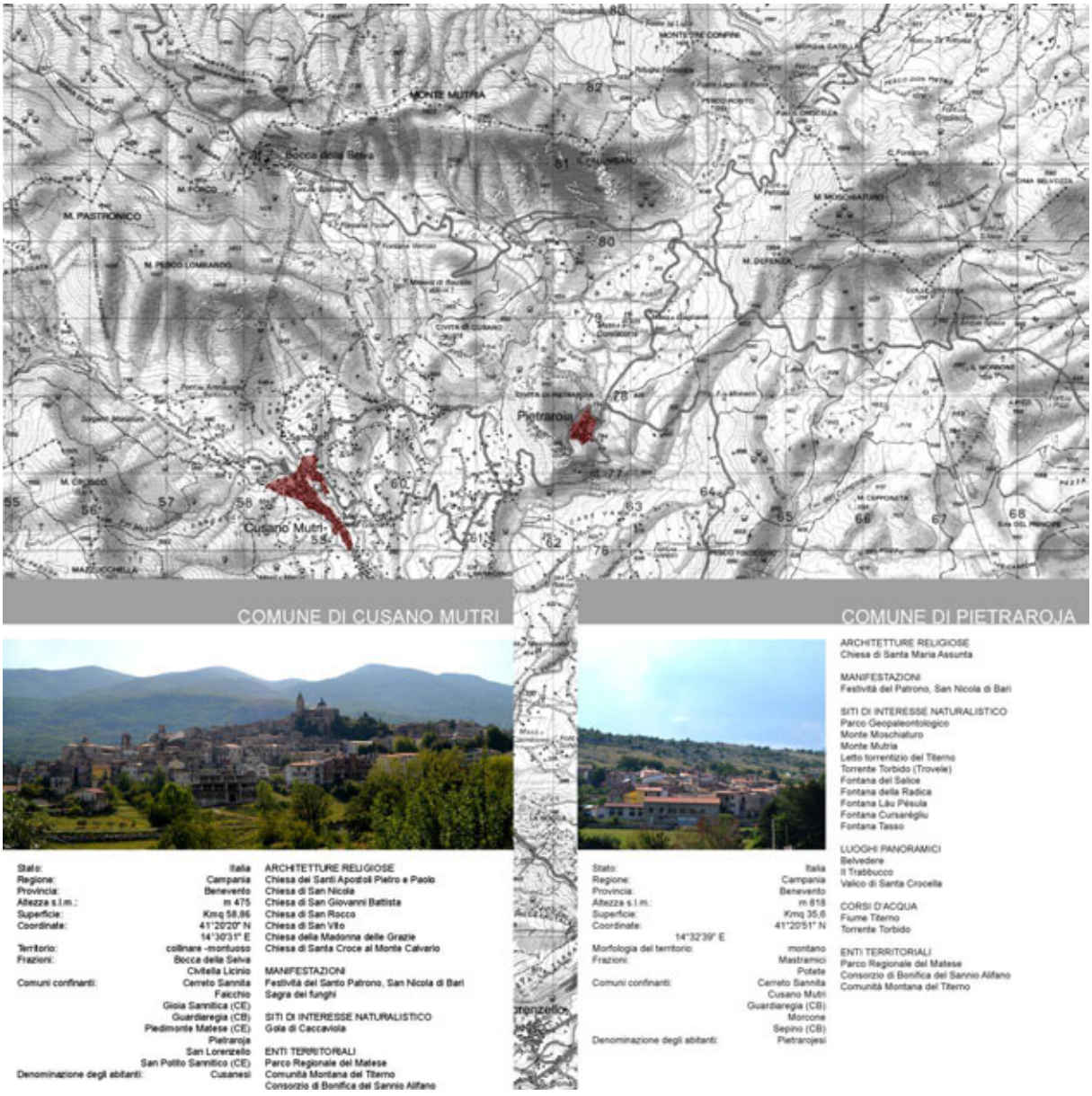

Fig. 9: The Matese Regional Park: thematic map on the towns of Cusano Mutri and Pietraroja.

6. The Matese Regional Park: tradition

The Matese is also a wealth of history, traditions and legends, many of whom still live as an expression of local folklore, closely connected to the daily life of farmers and shepherds. In the villages, perfectly preserved, where you live in a state of tranquility and serenity, but at the same time, you experience the hardships, difficulties and loneliness of mountain life, it is possible to walk through narrow cobbled streets that history: the history of transhumance pastoralism, the story of the robbers after the Italian unity, the history made by the cycles of nature.

The towns are Matese cradle of art and crafts. The land and trees, simple elements, provide the raw material for local handicrafts, based primarily on ceramic, stone and wood. Within the protected area, the centers of Cerreto Sannita and San Lorenzello constitute a single artisan in Italy, dating from the seventeenth century. Walking through the streets you will come across laboratories master potters. Here transform the clay into precious works; matter takes shape as if by magic by turning on the lathe manual, and is then baked in the oven according to ancient techniques.

Other materials worked by craftsmen Matese is wood. This art is flourishing in San Potito Sannitico, Letino, Ailano, Pratella, Gioia Sannitica, and Cusano Mutri. The main products are benches and stools, or kitchen tools such as shovels and multibucket oven. From stone, carved by hand, you get construction elements and authentic pieces of art. With the woven wicker baskets are of various shapes and sizes. Gallo and Letino possess valuable traditional costumes, made by the women of the country and enriched with embroidery bobbin, which with a patient and painstaking work allows you to get very elaborate lace.



Fig. 10: The Matese Regional Park: view of the landscape near to Pieraroja.



Fig. 11: The Matese Regional Park: views of the Matese lake from the west.

Bibliographical References

[1] CORNIELLO L., 2012, Overlays in Amalfi Coast: Less and More of the elements in the landscape, in C. Gambardella, “Le Vie dei Mercanti” LESS MORE, Architecture, Landscape, Design, La scuola di Pitagora Editrice;

[2] GAMBARDELLA C., 2000, I layer della forma urbis, Napoli: ESI

[3] GAMBARDELLA C., 2001, La leggerezza della geometria, Napoli: ESI

[4] GAMBARDELLA C., 2003, Le Vie dei Mulini. Territorio e impresa, Napoli;

[5] GAMBARDELLA C., 2012, Atlante di Pompei, Napoli: La scuola di Pitagora Editrice;

[6] GIORDANO P., CORNIELLO L., 2012, Atlante Grafico e Teorico Amalfitano. La conoscenza e la modificazione del paesaggio costiero, La scuola di Pitagora editrice;

[7] GIORDANO P., 2012, Il disegno dell’architettura costiera, La scuola di Pitagora editrice;

[8] VITTA M., Il paesaggio, Einaudi, Torino, 2005.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The diffusion of the triconch churches in the Mediterranean world*

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Abstract
In recent years, the archaeological documentation has furnished new interesting elements about the diffusion of the triconch typology in the whole Mediterranean area.
The birth of the Christian art in the period immediately subsequent to the Edict of Milan of the 313 A.D. coincides, in fact, with the formation in the Mediterranean world, particularly in Roman Africa, of a new society and of a new culture that imposes the adoption of renewed architectural models diffused in the dawning monastic centers.
Even if with suitable differentiations, the new oriental paleochristianes churches adopt typologies in which Hellenistic and imperial survivals, Byzantine and Syriane influences coexist with technical and formal elements derived by the local tradition.
The existence of cultural and religious common circuits could explain the great diffusion of unitary formal models that is recorded, beginning from the IV century, in centers at times very geographically far.

Keywords: History of Architecture; Christian archeology; Triconch churches; Mediterranean world

1.

Territorial dynamics and cultural plans about the diffusion of the triconch typology in the paleo-christian's basilicas refer to the relationships established among the first christian communities between the IV and the V century in the Mediterranean area, which united the values about the ascetic isolation with the principles about the cenobitic life.
Generally, the rising monastic aggregation took advantage of articulated structures where, in addition to the sacred spaces – basilicas, sanctuaries and burial-places – there were monk's cells, locations addressed to host the pilgrims, sometimes libraries and *scriptorium*, mills, kins, oil-mills, wine-cellars, storehouses, apart from cisterns and shafts.
In the Mediterranean area, new spaces devoted to new functions took new architectural configurations in which survived hellenic and imperial elements and byzantine and syrian influences, coexisting with technical and formal elements resulting from the local tradition.
To better understand the birth of the basilical model with *trycore*, it's necessary to briefly trace out the origin, the process and the symbolic value about the triconch, since its earlier architectural utilizations, starting from Krautheimer's assumption that is so say that the paleo-christian art is not the prelude to the medieval art, but essentially the last phase of the late antiquity art, about the architectural conceptions that dominated western world centers, eastern areas and the Mediterranean costal areas [1].
Although deriving from greek τρίχωρος, the term has been used in his latin version *tricorium* or *trichorum* to identify an architectural element.
Starting from the II century, the sources report the term referring to urban and sunurban mansions, with a peculiar monumental and representative character.

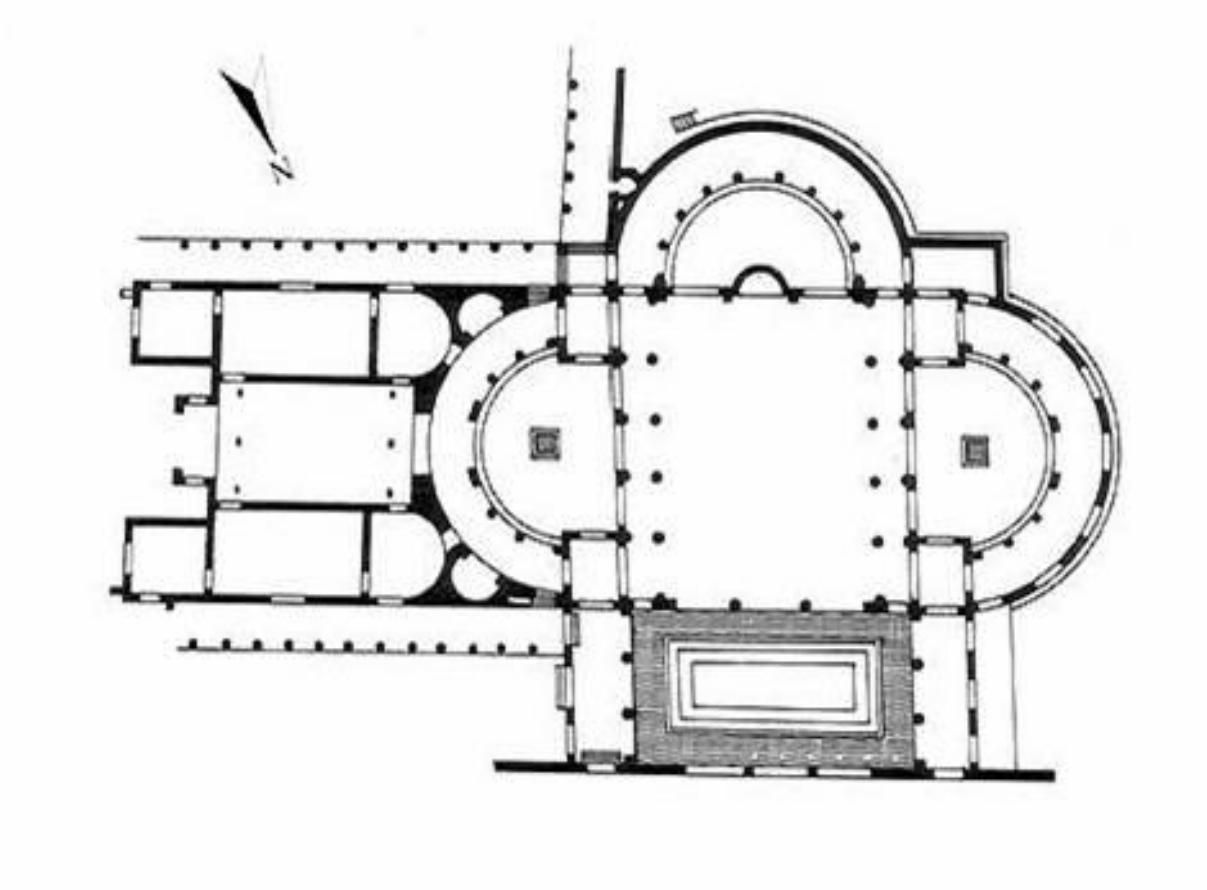

Fig. 1: The *Trycora* of Villa Adriana inTivoli (II century).

The triconch's utilization in the architecture concerning the late-empire mansions and its diffusion all over the western areas, is confirmed by Irving Lavin in his many statements in Gaul, Spain and Africa (Tunisia), where it is very popular in structures datables between the end of the III century and the beginning of the V century [2].
Initially, the triconch appears as a *triclinium*, that is like a dining room for special events, but soon it become one of the most representative location of imperial roman apode, addressed to official ceremonies. A similar utilization is documented by Villa Adriana in Tivoli (II century), and by one of the most emblema tic building of the late antiquity age: the mansion of Piazza Armerina in Sicily (beginning of IV century) that, starting from the models of the private building by that time, (peristyle mansion with an apsidal courtroom and a triconch room), clearly reveal influences deriving from the North of Africa [3].
The triconch is very popular even during the age of the paleo-christian architecture, where it is choosen thanks to its symbolic value: the *triclinium* become, according to the triconch typology, the emblematic location addressed to the Eucharistic meal.
The ritual that took place in the imperial buildings was, in fact, considered as a religious rite *sancti palatii ritus*, and the building itself was considered as the emperor's temple of worship.
After the christianity's foundation as the cult of State, many of its ceremonial aspects were perceived on the basis of imperial terms, with a symbolic meaning, seeing Christ as the Emperor of Heaven and the paleo-christian church as the house of the Lord.
Consequently, the Liturgy and the architectural definition of its spaces, started to obtain an increasing number of elements about the official ritual, roman and imperial. After all, the most frequently used term concerning the paleo-christian church, *basilica*, shows a clear regal derivation. Similarly, Paolino di Nola describing the church founded by himself for the Cimitile's Christian community, uses the term "palatium": *omnia circa nos lucere ut aperta videntes, cuncta putaremus flammis correpta cremari ipsaque sanctorum simul igne palatia tanto fervere* [4].
Even the sources show, starting from the IV century, developed a metaphorical equivalence between the royal or imperial *palatium* and the Christian basilica. These observations could justify the introduction of the church's model with the triconch typology in the paleo-christian architecture, but the most recent archeological discoveries and the new interpretations about some known buildings, permit to obtain new elements about the apparently well-established historiographical contest.

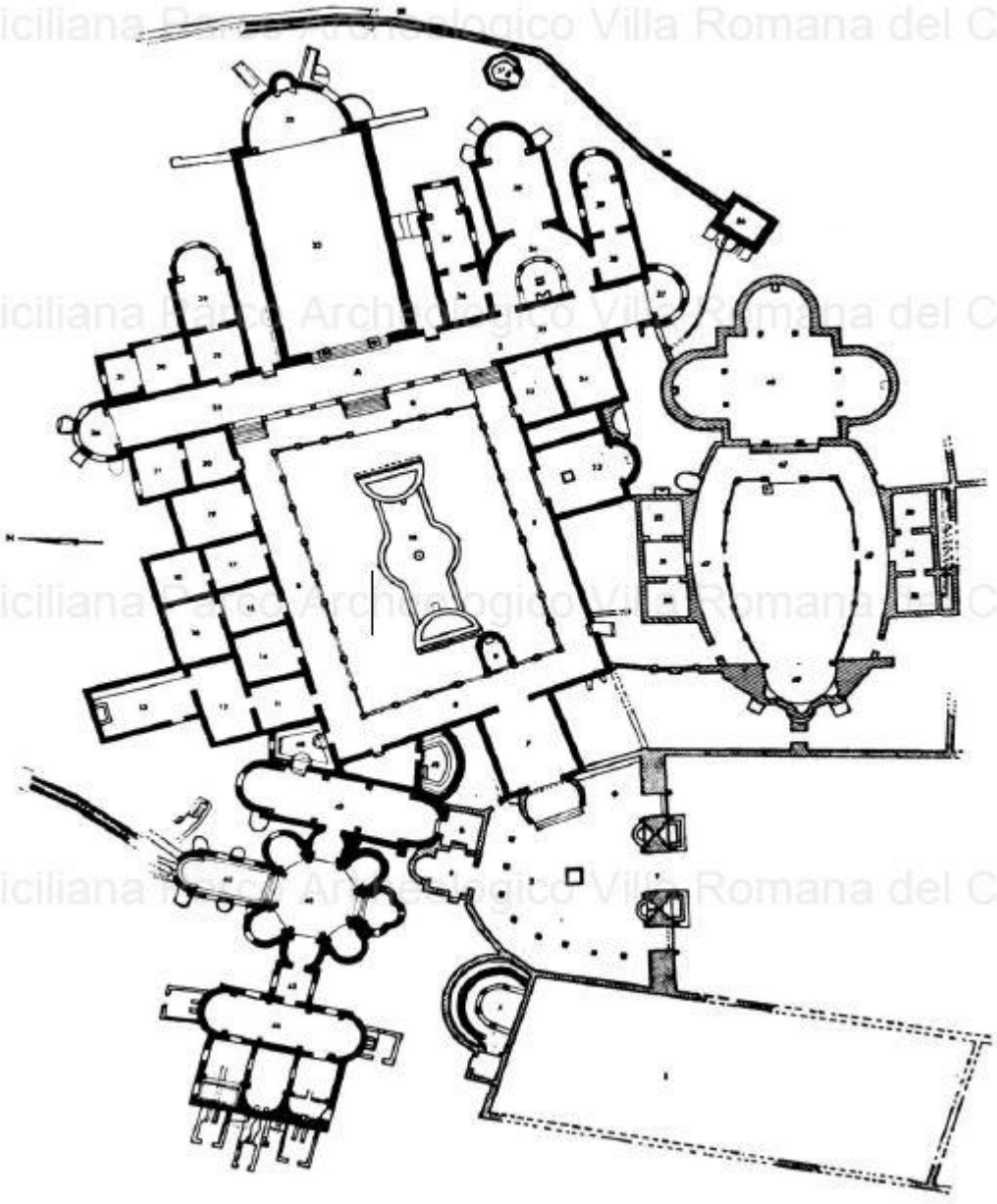

Fig. 2: Piazza Armerina (Sicily - early IV century) from Heinz Kähler, *Die Villa des Maxentius*, 1973.

The Edict of Milan in 313 A.D. deeply turned the official approach of the roman state towards the church, most of all in relation to the religious practices and to the free veneration of martyrs and, then, to the realization of specific places of worship, ratifying the integration of the Christianity in the culture of the classic world [5].

In this context arose Costantine's architecture, in which, architectural elements connoted with ideological values shaped with imperial mold. Recent critique considerations help to specify the role played by late roman villas for the definition of the new monastic locations, through the examination of the Christian communities founded between the IV and the V century, respectively from Sulpicio in Primuliacum, from Martino in Marmountier and Paolino in Cimitile [6].

Many biographical analogies band the three in common experiences: they have never traveled to oriental landscapes and they have never lived in a monastery. Moreover, they belonged to the army or to the provincial aristocracy that performed official charges at the imperial court.

In regard to Sulpicio and Paolino deal with rich landowners who choose to lead a monastic life in structures that inherit spatial models and organizational manners from the villa's example.

The conversion to the ascetic practices and to the cenobitic life redifined, in effect, the role of the *dominus*, definitively ratifying the passage from the *otium ruris* to the *contemptus mundi*.

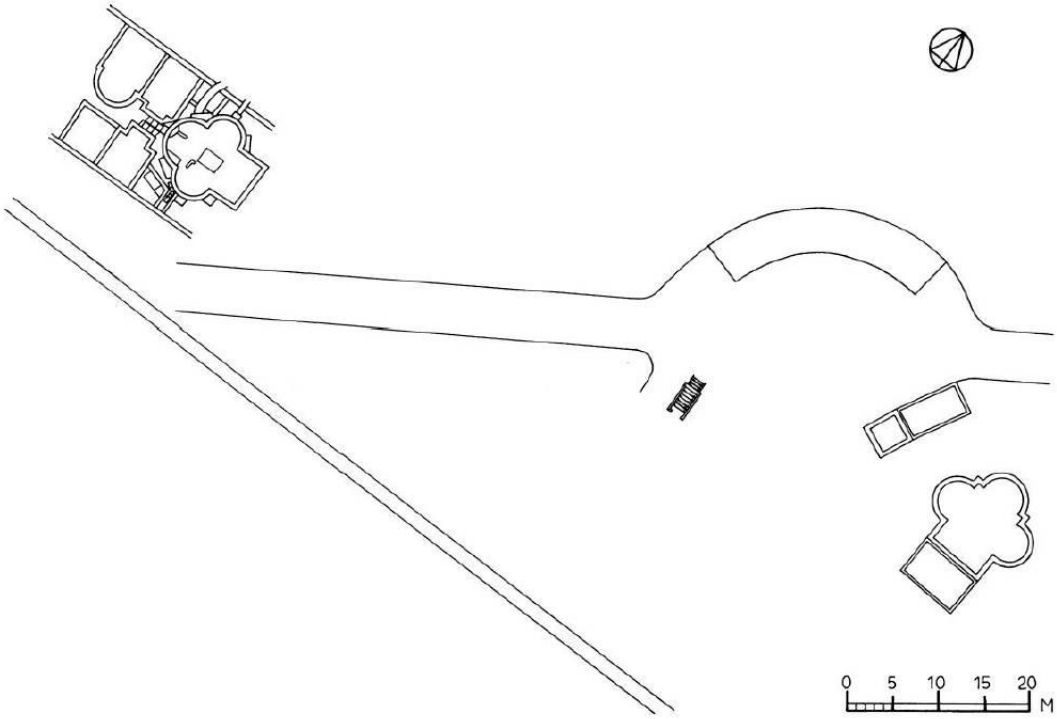

Fig. 3: *Cellae trichorae* of San Callisto's Catacombs (Rome - IV century).

The sharing about the theological and constructive choises recordered in the conformities between Sulpicio Severo and Paolino could be symptomatic of a common attitude to the founders of the christian communities with epistolary rlationships among them.
At the beginning of the V century all the empire's territories developed, in effect, monasteries and convents were used by the first cenobitic communities in place of the villas.
Indeed, as is known how "a warp of continuities and analogies associates the Mediterranean world between the IV and the V century" [7].
Between the IV and the V century the first christian communities become vital centers for the spread about the monastic principles and the community life in the west. Is remarkable a substantial homogeneity about the implementation of specific planimetric systems also recurring in different territorial areas, which lead to the circulation od reference models – also by artists – through the Mediterranean areas, Egypt, Syria and balkan, dalmatian and istrian regions up to Italy and Gaul.
Of course, every single case has to be analyzed in their peculiarity, but the literary sources seem to confirm the role of the late roman residential buildings about the definition of paleo-christian monastic spaces.
First of all, the *Epistolae* and the *Carmina* written by Paolino permit to recreate the origin of a sacred place at the beginning of the IV century and furnish prooves about the intense theological and epistolary relationships that the *monasterium* founded by himself in Cimitile, had with the more important christian exponents and with the greater bishops, members of the greater seat of Italy, Acquitaine, Gaul and the christian Africa.
Ambrogio (bishop of Milan but hailing from Treviri in Gaul), Girolamo (Bethlehem's ascetic), Delfino and Amando (bishops of Bordeaux), Pammachio (member of the roman aristocracy, founder of the *xenodochium* in Porto next to Ostia and of a monastery in Bethlehem), Vitricio (bishop of Rouen), Fiorenzo and Alezio (bishops of Cahors), Onorato (founder of a center of monastic spirituality in Lérins, similar to the Nola's one), Melania senior (roman patrician, a Paolino's relative, guest in Cimitile after the journey to the Holy Land where she sojourned for 27 years), and Rufino Turannio (hailing from Aquileia, then moved to the Egypt where he met ascetic and cenobitic communities in the desert that he had passed through with Melania senior, with her he founded a monastic community in Jerusalem), Sulpicio Severo (member of the rich aristocracy gaul-roman and founder of the scetic-monastic community in Primuliacum, next to Tolosa, similar to the one of Martino in Marmoutier, to which inspired also Paolino), Niceta di Remesiana (who conducted an evangelization of the danubian region and visited Cimitile two times during his journeys from Gaul to Dacia), they all are friends of Paolino [8]. Among his epistolary contacts there are also the bishops of the important African seat:

Aurelio of Carthage, Agostino of Hippo, Alipio of Tagaste, Profuturo of Cirta (now Costantina), Severo of Milevi (now Mila).
Furthermore, many famous men at the time, travelling from East to West, visited the ascet Paolino [9], spreading monastic models tested in the ascetic and cenobitic communities of Egyptian desert, and promoting its imitation [10].
Trying to identify the matrix and the reason of the adoption of the triconch typology for the christian basilical churches, is necessary to consider that the *trychora* was used in pagan architecture for the construction of mausoleum and cemetery rooms [11].
Numerous studies have proved the diffusion and the popularity all over the Mediterranean basin where, during Christian epoch, was used as the funerary model. Among the first testimonies there are the two *trycorae* cells of San Callisto's catacombs.
In Cimitile, the triconch is directly linked to the cult of the martyr Felice and to the presence of relics, specifically recalled from Paolino in his works. It is probable that the model adopted by the Nolan at the beginning of 400 A.C., represented the prototype of comparable planimetric configurations which constitute an homogeneus sequence in the places of the first Christian communities of the V century. The theme of the central space fused with the longitudinal compartment is solved with the recourse, even symbolic, to different planimetric structures melt in an uniform organism: the triconch - tied to the cult of the martyr's relics, to the simbology of the *martyria* and of the mausoleums, to the authentic cimiterial function, and also to the imperial ceremonials – the naïve with axial development, correlated to the liturgic functions and to the requirements of devotional pilgrimages' itineraries.
The *trycora* in Cimitile, covered with marble and with the vault adorned by mosaics, assumes through Paolino's words an evident symbolic value, highlithened by the lines which describes the painting: *Pleno coruscat trinitas mysterio: Stat Christus agno, vox patris caelo tonat et per columbam spiritus sanctus fluit. Crucem corona lucido cingit globo, cui coronae sunt corona apostoli, quorum figura est in columbarum choro. Pia trinitatis unitas Christo coit habente et ipsa trinitate insigna: Deum revelat vox paterna et spiritus, sanctam fatentur crux et agnus victimam, Regnum et triumphum purpura et palma indicant. Petram superstat ipse petra ecclesiae, de qua sonori quattuor fontes meant, Evangelistae viva Christi flumina* [12]. In Paolino's lines clearly appears the symbolic depiction about the Trinity, which alludes the shape of the triconch apse, that marks how a *martyrium,* the place dedicated to the custody of Apostles and Martyrs' holy relics, located under the altar inwards the *trycora*: the *sancta sanctorum* with the fragment of the wood of the Cross, granted from Melania to Paolino, as said to the *titulus* placed under the frame.

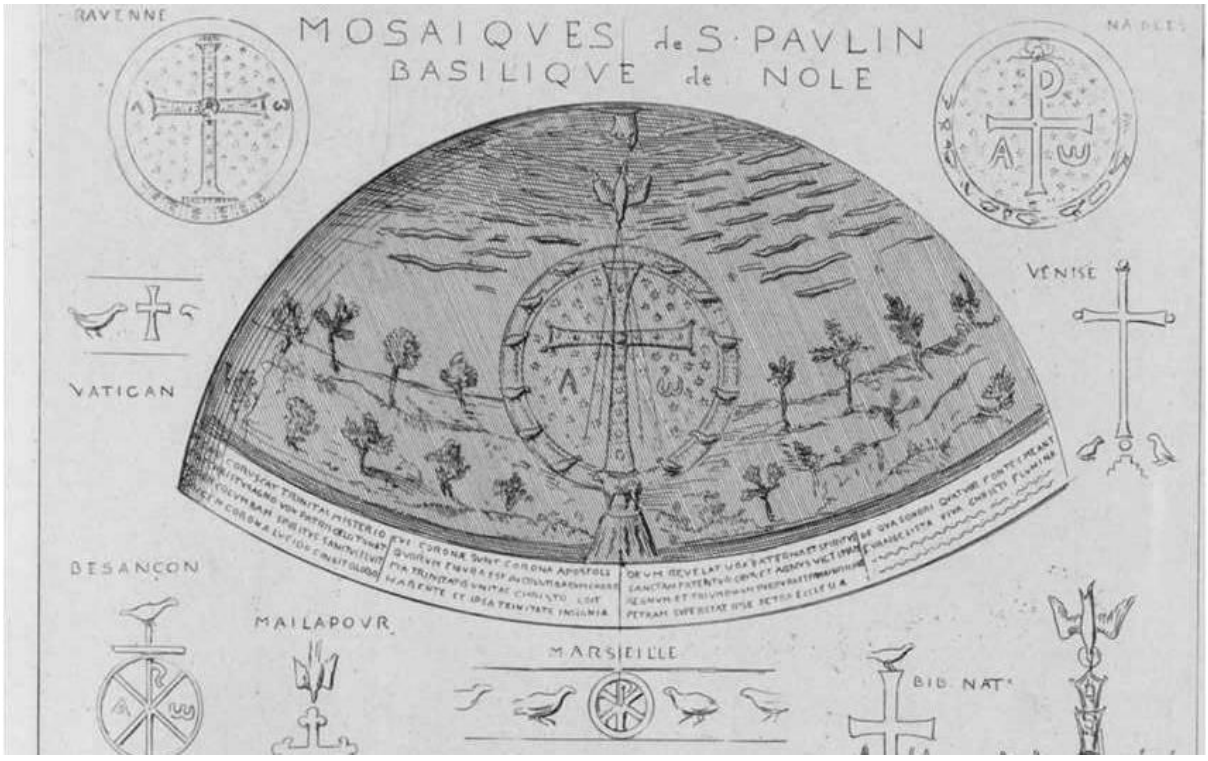

Fig. 4: Mosaic in the apse of the basilica in Cimitile (reconstruction by Charles and Georges Rohault de Fleury, *Les Saints de la messe et leurs monuments*, Paris 1900).

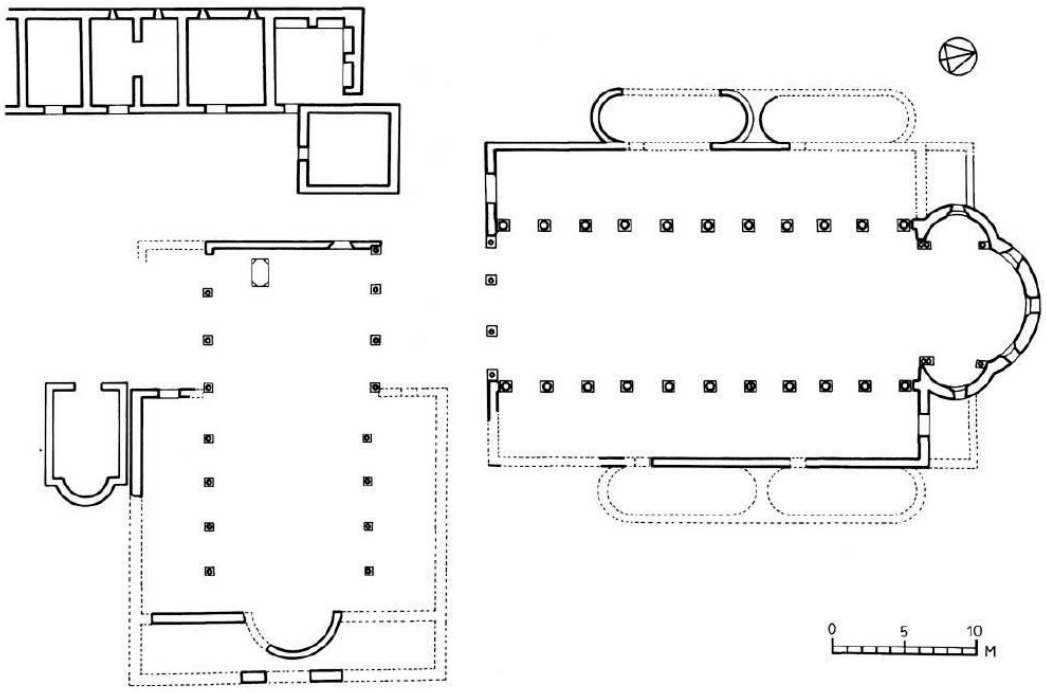

Fig. 5: Basilica *vetus* and basilica *nova* in Cimitile (401-403 a.C.) reconstruction by Tomas Lehmann, *Paolino di Nola: poeta, architetto e committente delle costruzioni*, 1998.

The today's San Giovanni's basilica, built in the XIII century, uses the apse and a part of the central naïve of the basilica *nova* built by Paolino. The largeness of the central naïve is now recognizable by the identification of the visual axis fixed by the ancient arcades, comparables with the alignment of the survived plinths setted *in situ;* but originally the living-space was occupied by three longitudinal naives detached by arcades. Two sequences of columns made of colored marbles, green and grey, which re-used some of the most ancient materials of I-II centuries A.C., separating the three naives cobbled with big sheets made of white marble. The employment of the sheets made of marbles and the bases of the columns, and also the apside's *opus sectile,* made possible to suppose the presence of workforces operative in the roman basilica of San Paolo fuori le mura in Cimitile [13].
The *basilica nova,* through the re-utilization of marbles and columns, gives back the "image of an imperial tradition still alive, with its need of uniformity concerning the architectural order", by the utilization of colonnade lines with similar materials for the naive (cipollino and bigio venato), and breccias coralline for the chancel to mark, even through the different chromatic effects, the transition from a setting to another one [14].
The structure undoubtedly obey to symbolic and functional decrees: at the same time, it is a *martyrium* – built in a place aim of particular devotion, as a space linked to the worship of the martyr Felice's remains and of the relics of the real cross given from Melania senior to Paolino – but also a basilica, center of devotion and pilgrimage.
The insertion of the *basilica nova* inside the basilical compound and the relationship with the martyr's grave, which imposes an inversion of the usual basilical orientation east-west, it pushes back to other eastern models. The new structure, in effect, is built on the basis of a north-south axis. This orthogonally inserts to the space of the basilica named *vetus* through a *triforium* opened on a courtyard, so that it is possible to see the altar of the new grave's construction, located along the basilica's naïve, *vetus.*
The connection among different basilical structures related to a specific devotional space, refers to eastern examples, probably dependent on the prototype of the SS. Apostoli in Costantinopoli's church, perceived as an imperial mausoleum with the portion destinated to the *martyrium* placed at the centre of the structure [15]. The great chruch built on the grave of the Apostle Giovanni (beginning of the V century) on the original squared *sacellum* in Efeso*,* there were inserted four basilical buildings organized as a cross, and in the greatest syriac compound of San Simeone Stilita the old *Qal'at Sim'an,* built at the end of the V century, converged towards the central space four basilicas organized as a cross.

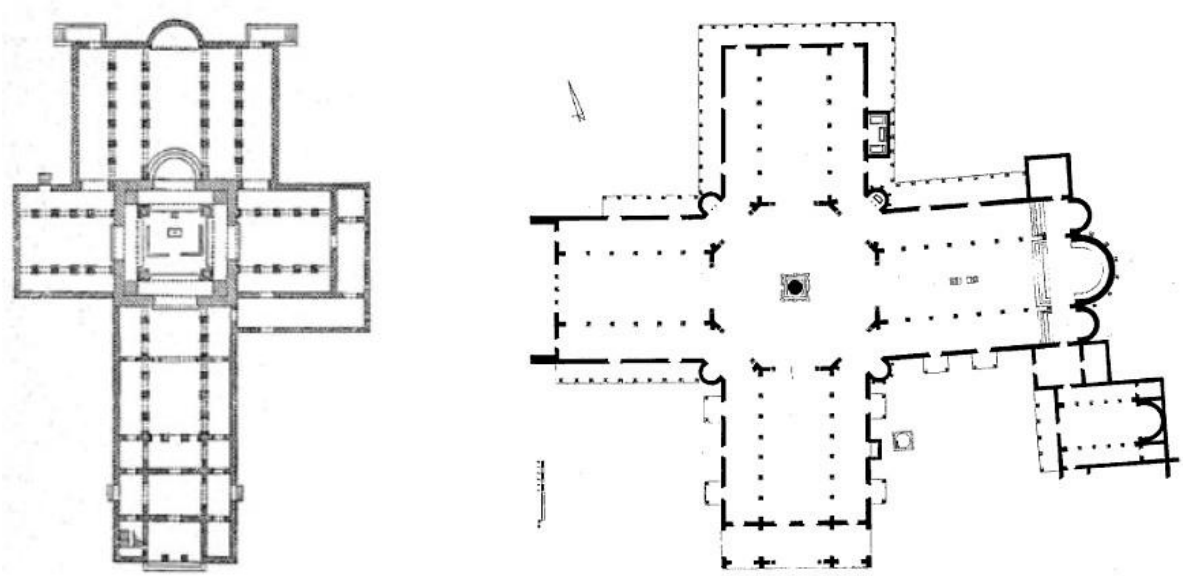

Fig. 6: San Giovanni (Efeso) and San Simeone in Qal'at Sim'an (Syria).

In both cases the examinated structures were part of an ample organisms provided with conventual buildings and locations addressed to groups of pilgrims.
Pasquale Testini identified with the *trycora* of Paolino one of the most interesting element in a basilical compound. Cimitile represents, according to the popular academic, «the summary of the architectural evolution of a great martyrial center, arose among a pagan funerary center and thanks to some elements – triconch, iconostasis of the second half of the IV century – is related to the Orient and in particular to Egypt» [16].
The archeological investigations, during the last years, has produced new interesting elements about the spread of the triconch typology all around the Mediterranean area. Certainly the most immediate reference, remain the Egypt with its great desert as indicated by Testini, since in the Christian Egyptian architecture the basilical map and the triconch apse knows a specific diffusion. The basilicas with a triconch presbytery represent, in effect, the expression of the local egyptian tradition, developed as an alternative to the themes and the models imported [17].
For example, the churches of the two coptic convents of Sohag, White (Deir el-Abyad) and Red (Deir el-Ahmar),built at the beginning of the V century, and the Christian church of Denderah built in the VI century using the temple's room of Hathor [18]. Here, the planimetric model with three naives presents a great apse tripartite deeply connotative, according to Grabar nearly an autonomous aedicule, derived by the models of the Hellenic style buildings and by the funerary tradition of roman mausoleums, attributable, in particular, at the idea to insert a location at the naïve's extremity with the role of *martyrium*, which utilization was popular in the Christian architecture in eastern area [19].
This aspect is recognizable, for example, in the basilica of Ras Siyagha (Monte Nebo) in the triconch cell of the V century located in correspondence to Moses's grave, set under the apse. Even is Sohag, the presence of a triconch local is ascribable to the founder's sepulture, the Coptic monk Schenudi (Shenoute), archimandrite of the monastery of Atripe next to Sohag [20].
Another great Egyptian sanctuary is located in Hermopolis, in the basilical church of El-Ashmunein, founded in the V century (430 ca), which proposes an analogous model. But, in this specific case, the triconch typology is absorbed by the orthogonal disposition of the naïve, configurating itself as a transept with a hollow end, differently from the connotation of an autonomous ambiance recognizable in the *trycorae* of Sohag and of Cimitile. Also in Hermopolis, the crypt underneath the apse was intended to preserve the remains of a saint [21]. The Christian basilica in Marea (V-VI century A.C.) shows a similar treatment, nearby Alessandria, with a triconch typology composed by two lateral apses with a colonnade that act like transept and central apse with smaller dimensions, with a crypta and adjacent *pastophoria*, as underlined by the excavations made in 2003 by the équipe of academic guided by Hanna Szymañska [22].
It is interesting to note how, even in the basilica of Cimitile, is adopted the same solution that has been adopted in the convents of Sohag and in the church of Denderah, that is the introduction of two columns laying on the triumphal arch to solve the conflict between the presbyterial space and the naïve [23].



Fig. 7: View from above of *trycora* in Julia Concordia.

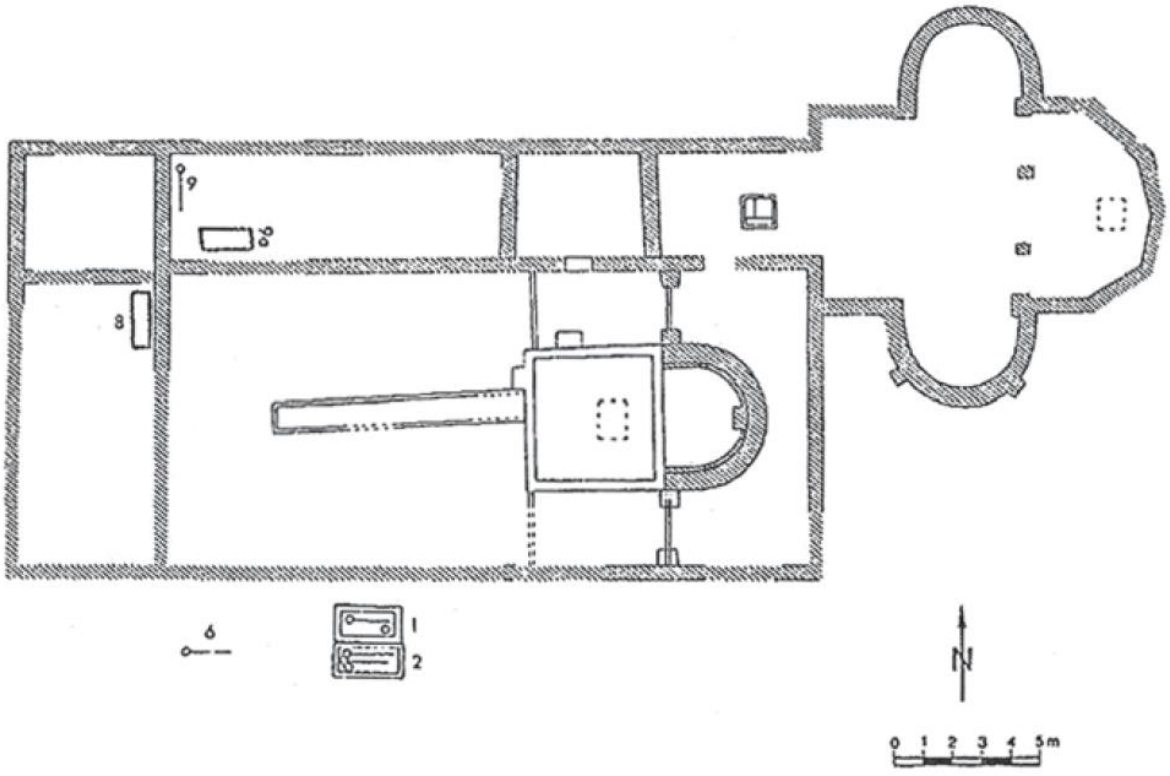

Fig. 8: Paleo-christian buildings in Invillino, Colle Zucca (Italy – First half of V century)

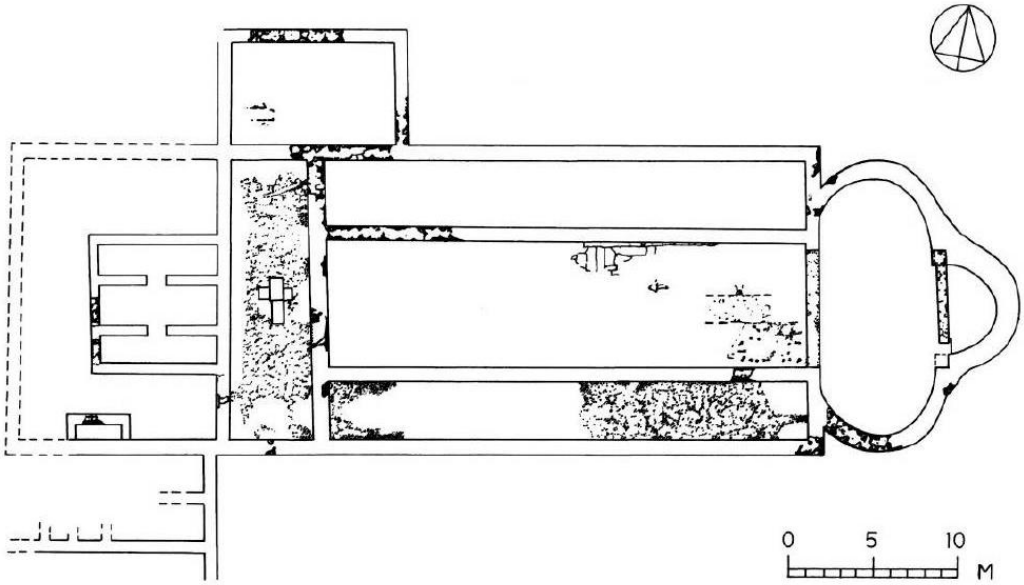

Fig. 8: Basilica in Knossos (Crete – Greece - early V century)

In regard to the naïve, the apse is elevated like many churches in the northern of Africa and Tripolitania, using the term of Sant'Agostino *gradate* [24].

The structure of the *basilica nova* in Cimitile shows on the triconch apse's sides, in correspondence to the lateral naives, two locations with different liturgical functions, *protesis* and *diaconicon,* following the example of the Syrian-Palestinian, revealing in the *trycora* architectural structure "the presence of eastern influences penetrated into the traditional fabric of the latin basilica" [25].

The two compartments, especially present in the paleo-christian churches of the first religious communities in Tunisia, Algeria and, generally, in the paleo-christian basilicas in the roman-Africa, were addressed to contain the saints' relics (*prothesis*) and used as sacristy (*diaconicon*).

Archeological sources and specific studies, have registered remarkable progresses during the last decades, extending, with renovated attention, the strengthened historiographical referential model.

Starting from Julia Concordia to the recovery in Friuli [26], up to the Illyricum territory, have been discovered paleo-christian showing the existence of commons intention or the derivation from a common tradition, as the basilica in Cnosso (early V century) with three naives preceded by a narthex, an atrium and a triconch presbytery, and the Sant'Andrea church in Betika in Istria, datable at the beginning of the V century [27].

The adoption of the *trycorae* characterize the north-eastern Italy that, between the IV and the V century, resulted included in the diocletian provinces of *Venetia et Histria* [28].

Unfortunately, the limits of this contribution doesn't consent to examine all the highlighted cases in the most recent studies, but it's obligatory to remind, although fleetingly, the basilicas in Pannonia, in the actual Hungary and in the Balkan territories, where Niceta, a friend of Paolino, conducted an intense activity and that can be considered as the channel of occidental influences in the regions of the Danube.

Finally, through this analysis emerges how, extending the strengthened historiographical model and underlining the connections among the expressions of the architectural paleo-christian tradition in the Mediterranean world, the Christianity of the "suburban" regions doesn't appear as an isolated phenomenon, but as the expression of strengthened relationships among the greatest centers of Christian art and the numerous local realities.

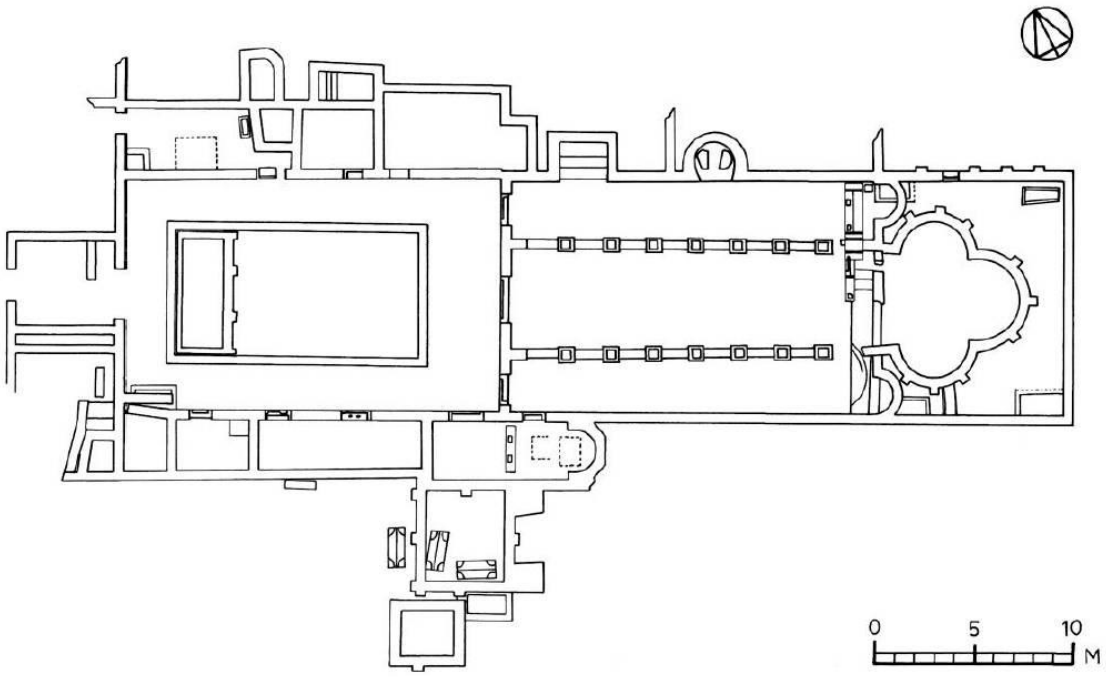

Fig. 9: Sant'Andrea church in Bétika (Istria - early V century).

Bibliographical References

* Traslated by Maria Vergara.
[1] KRAUTHEIMER, Richard. *Architettura paleocristiana e bizantina*. Ed. 1986. Torino: Einaudi, p. XXVIII.
[2] On topic compares LAVIN, Irving. *The House of Lord. Aspect of the Role of Palace Triclinia in the Architecture of Late Antiquity and the Early Middle Ages*. In *The Art Bulletin*, vol. 44, n. 1 (1962), pp. 1-27.
[3] SETTIS, Salvatore. *Per l'interpretazione di Piazza Armerina*. In *Mélanges de l'Ecole française de Rome*. *Antiquité*, t. 87, n. 2, pp. 873-994.
[4] *Carme 28*, vv. 95-98, quoted in LAVING, p. 17.
[5] For a broad framework of issues relating to architectural production of the period compares BOZZONI, Corrado. *Dal tardoantico alla rinascenza carolingia*. In *L'architettura del mondo antico*, edited by BOZZONI, Corrado; FRANCHETTI PARDO, Vittorio; ORTOLANI, Giorgio; VISCOGLIOSI, Alessandra. Roma-Bari: Editori Laterza, 2012.
[6] ALCIATI, Roberto. *And the Villa became a Monastery: Sulpicius Severus' community of Primuliacum*. In *Western Monasticism ante litteram*. *The space of monastic observance in Late Antiquity and the Early Middle Ages*, Brepols Publishers: 2011, pp. 85-88.
[7] On topic compares SAVINO, Eliodoro. *Campania tardo antica (284-604 d.C.).* Bari*:* Edipuglia, 2005.
[8] On relations with bishop Niceta compares MARIN, Demetrio. *La testimonianza di Paolino da Nola sul Cristianesimo dell'Italia Meridionale*. In Archivio Storico Pugliese. a. 27, 1-4, 1974, pp. 162-190.
[9] For the news concerning in these brief biographical notes, please refer to *Introduzione*. In *Paolino di Nola. Le Lettere*, edited by SANTANIELLO, G. Vol. I. Marigliano: Libreria Editrice Redenzione, 1992, and references cited therein.
[10] BIANCHI, Enzo. *Le origini del monachesimo cristiano*. In *387 d.C. Ambrogio e Agostino. Le sorgenti dell'Europa*, edited by PASINI, P., Milano: Olivares 2003, pp. 226-228.
[11] DUVAL, Noël. *Forme et identification: questions de méthode.* In *Mélanges de l'École française de Rome. Antiquité,* t. 91, n. 2, 1979, pp. 1015-1022.
[12] *Paolino di Nola. Le Lettere*…cit., vol. II, pp. 248-250.
[13] PENSABENE, Patrizio. *Marmi e reimpiego nel santuario di San Felice a Cimitile*. In *Cimitile e Paolino da Nola. La tomba di San Felice e il centro di pellegrinaggio. Trent'anni di ricerche.* Atti della giornata tematica dei Seminari di Archeologia Cristiana edited by BRANDENBUR, Hugo; PANI ERMINI, Letizia. Città del Vaticano: 2003, pp. 136-139.
[14] PENSABENE, Patrizio. *Marmi e reimpiego*…cit*,* p. 186.
[15] KRAUTHEIMER, Richard. *Architettura*…cit, p. 77.
[16] TESTINI, Pasquale. *Archeologia cristiana*. II ed. . Bari: Edipuglia, 1980, p. 691.
[17] PENSABENE, Patrizio. *Elementi di Architettura Alessandrina.* In *Studi Miscellanei. 28.* Roma: L'Erma di Bretschneider, 1991, p. 78.
[18] On topic compares MEINARDUS, Otto Friedrich August. *Atlas of Christian sites in Egyp*. Cairo: Société d'Archéologie Copte, 1962; CAPUANI, Massimo. *Egitto copto*, Milano 1999; GABRA, Gawdat. *Coptic Monasteries. Egypt's Monastic Art and Architecture*, Cairo: American University. In Cairo Press, 2003; FALCIONI, Paola. PIETRANGELI, Annalisa. *Il «Convento Rosso» e il suo territorio: alle origini di un sito monastico*. In

Progetto Progetto Pilota Deir el Ahmar, Deir Anba Bishoi «Convento Rosso». Roma: Università degli Studi Roma Tre, 2004, pp. 119-127.
[19] MONNERET DE VILLARD, Ugo. *Les Couvents près de Sohâg (Deyr el-abiad et Deyr al-ahmar)*. Milano: 1925; GRABAR, Andrè. *L'âge d'or de Justinien*. Paris: Libraire Gallimard, 1966, italian edition. *L'età d'oro di Giustiniano. Dalla morte di Teodosio all'Islam*, Milano: Rizzoli Editore, 1966, p. 35.
[20] I*bidem*, pp. 37- 38. ORLANDO, T. *Shenoute d'Atripé,* in *Dictionnaire de Spiritualité*, t. XIV, Paris: 1989, coll. 797-804; AMELINEAU, Emile, *Les moines égyptiens. Vie de Schnoudi*. Mus. Guimet Vulg. 1. Paris: 1889.
[21] BARAŃSKI, Marek. *Excavations at the Basilica site at El- Ashmunein/Hermopolis Magna in 1987-1990*. PAM (Polish Archaeology in the Mediterranean), n. III. Warsaw: 1992, pp. 19-23.
[22] Compares MCKENZIE, Judith. *The Architecture of Alexandria and Egypt: 300 B.C. – A.D. 700.* Yale University Press. New Haven and London 2007, pp. 271-287; SZYMAŃSKA, Hanna; BABRAJ, Krzysztof. *Marea. Fourth season of excavations.* In *Polish Archaeology in the Mediterranean* (= *PAM*). XV. Reports 2003. Warsaw: 2004, pp. 53-62; *Idem*. *Marea 2007. Eighth season of excavations*. In *PAM*. XIX. Reports 2007, Warsaw: 2010, pp. 71-76.
[23] GROSSMANN, Peter. *Esempi d'architettura paleocristiana in Egitto dal V al VII secolo*. In *Corsi/Ravenna*, 28. 1981, pp. 149-176; PENSABENE, Patrizio. *Elementi*…cit., pp. 53-54.
[24] Epistola 23, 3; TESTINI, Pasquale. *Archeologia*…cit., p. 584.
[25] TESTINI, Pasquale. *Archeologia...*cit., p. 687.
[26] MIRABELLA ROBERTI, Mario. *La basilica paleocristiana di Concordia*. In *Antichità Altoadriatiche*, XXXI, Udine 1987, pp. 93-106; FRANCESCUTTO, Massimiliano. *Luoghi di culto e Castra: il territorio friulano tra Tardoantico e Alto Medioevo*. In *Atti Acc. Rov. Agiati*, a. 262 (2012), ser. IX, vol. II, A, fasc. II, pp.151-188.
[27] VARALIS, Yannis. *Deux églises à choeur tréflé de l'Illyricum oriental. Observations sur leur type architectural*. In *Bulletin de correspondance hellénique*. Volume 123, 1999. pp. 195-225.
[28] VEZIC, Pavuša. *Dalmatinski trikonhos.* In *Ars adriatica*, 1,2011,pp. 27-66; CAMBI, Nenad. *Triconch churches on the Eastern Adriatic*. Atti del X Congresso Internazionale d'Archeologia Cristiana, vol. II, Città del Vaticano:1984, pp. 45-54.

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A multidisciplinary cognitive approach aimed at the safeguard of the ruins of Mongialino's tower in Mineo (Sicily)

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Abstract
This paper presents the outcomes of the multidisciplinary study carried out on the tower of Mongialino in Mineo (Sicily), a complex architectural heritage today reduced into ruins. The site has a strong landscape and territorial value, the vestiges of the donjon rise on a rock promontory that dominates the valley of Margi, already inhabited in ancient greek age. The unstable conditions of the building, affected by important collapses and lesions, require a safeguard intervention and that implies a deep knowledge and understanding of the construction. The first step of this process is a suitable documentation and representation of the artifact through the integrated use of current technologies of surveying able to provide a metrically accurate three-dimensional model of the architectural object. The circular planimetric shape of the donjon and its towering position require to solve both the problems related to the 3D data acquisition and those related to the representation of a cylindrical shape object. In this paper we propose a multidisciplinary approach concerning both the reading of the technological, typological and material elements that constitutes the constructive apparatus of the building (masonry, ribs, ring-like vault), and the geometric analysis addressed at the virtual reconstruction of the original shape. The peculiarity of the object, perhaps an unique case in Sicily of a cylindrical tower with inner cylindrical nucleus, its status of ruin immersed into a context of remarkable environmental value, encourage this cross-disciplinary approach. This way it is possible to catch the essence of the object to protect and therefore to foreseen the necessary interventions that will be able to pass it down to future generations.

Keywords: Digital Cultural Heritage, 3D modeling, geometrical analysis, building technology

1. Introduction

Nowadays data acquisition research on cultural heritage concentrates increasingly on the identification of rigorous methods of investigation, which must be able to define a suitable methodological approach for the creation of more detailed guidelines. For this reason the study of the castle of Mongialino in Mineo, Sicily, has been carried out using a method which involves the integration of specific investigations aiming towards the documentation of the architectural element in its complexity and its totality. This research has analysed the historical-documental, geometric-spatial and typological-formal aspects of the defensive structure, interesting scholars from different interdisciplinary fields of study. Its typological features as well as its severe state of decay and danger have made it necessary to carry out a survey using a 3D Laser Scanner, which was the most appropriate method for its conditions and provided a synthetic drawing which includes the various investigations of the scholars involved.
The study, in fact, uses a three-dimensional model obtained from laser scans as a model of objectively accurate research, through which it is possible to identify the geometric rules as well as the classification of the materials and of the building techniques – both traditional and imported – in order to validate the historic-documental theory.

Moreover, the 3D model obtained gives us an appropriate analysis of the wall structures and of their textures in order to define their state of conservation as well as being able to achieve reliable results about the level of their stability. This provides an accurate evaluation of the state of conservation of the architecture and, the fundamental components being known, guidelines for an intervention plan for its renovation, which will be more coherent since there is the opportunity to analyse carefully the result, understanding its principles and the criteria which document the data acquisition process.



Fig. 1: The tower of Mongialino rises on a rock promontory that dominates the valley of Margi

2. Reading the signs: historical and territorial overview

Mariagrazia Salerno

Sicily is a territory of castles. The island, which is a flourishing land in the heart of the Mediterranean, has been, in its history, the crucial set of fighting between kingdoms which competed for the control of the *Mare Nostrum*.

The fortified architecture in Sicily is an important testimony of the history and of military and constructive techniques: in the island, that was in a permanent state of siege, the defensive constructions changed appearance or maintained partly functional elements, reflecting the *modus operandi* of new lords; all this leads to a diversification of the fortress theme.

Numerous castles arose: next to and in the towns, often equipped with sighting towers with protective walls; others are located along the coast or protecting ways that connected the urban sites [1].

The south-eastern Sicily, like the rest of the island, has been cradle of civilization since prehistoric period. In the centuries various dominations, from the Greeks to Northern Europe people, have followed: not only the lands were fruitful, therefore suitable for agriculture and human settlement, but the particular physiognomy of the (Catania) Plain, surrounded by the southern foothills of Erei and, in the north-west, by Mount Hyblaean, makes these locations strategic for the control of major waterways and terrestrial ones. In this study, Mineo's territory is analyzed, in which, throughout the medieval period, there are several defenses guarding a portion of the Plain called "valle dei Margi". Here rises the Tower of Mongialino, placed to protect the territory and the internal road that connected the stronghold of Mineo with the Agrigento one. The fortalice, otherwise referred to Montalfone or Griffon or Falcone or Gaffone or Montecaffuri, because of the different naming it took over the centuries, is located on a rocky and steep spur (315 m above sea level) overlooking the valley of Casalgismondo, ploughed by the Pietrarossa river, a feeder of the Monaciand Gornalunga rivers, which, introducing in the Iron River, flows, after a long arcuate path, into the river of Margi. At the foot of the rocky outcrop rose a small village and a religious complex, which is ruined too.

The date of construction of the manor is uncertain: Gambuzza [2] and Tomarchio [3] reported that the building was constructed in the period of Arab incursions: in 829 the Arabs conquered Mineo and its lands, in which they erected the "Malgia Khalil". The first mention of Malgia Khalil is that of the Arab chroniclers Ibn 'atir, An Nuwayrî and Ibn Haldun. They narrated the Muslim conquest of the Byzantine fortress, which was stripped of the peripheral elements of defense (we do not have any information of the consistence of this previous fortress) and reduced to a garrison of secondary importance. The signs lead approximately to the location of the castle. Near the castle, there was a large farm, preceding the birth of the castle as reported by the Arab chroniclers and subsequent notary deed until the frederician age; De Spuches asserts that the castle was built by Manfred, lord of Butera, who was proclaimed lord of Mongialino in 1143; it has recently been suggested that the construction of the fort

is due to the presence of the Cistercians in the territory of Mineo; it is assumed that the two churches of the feud of Mongialino were dedicated to S. Cataldo and some architectural elements, placed in the way of other more recent ones, show a typical Cistercian craftsmanship [4]; finally, a last hypothesis is that the manor is dating back to the Angevin age [5]. Indeed in 1273 Charles of Anjou established a commission to assess the condition of defensive garrisons in the area; the commission began its work in Mineo in April 2 and ended in June 18 of the same year in Enna. Their objective was to assess existing safeguards to reorganize, renovate and build new ones where there was a need or a garrison destroyed.

The historical reconstruction has proven that the life of the castle was closely linked to that of *Vetustissima et Jucundissima* Mineo. The town of Mineo took part at the Catania Emirate and followed its destiny until the Normans occupied the island.

It is supposed that Count Roger, between 1062 and 1063, has occupied the fortified places in the interior of the island, and among these Mineo and surroundings. The feudal catalog from 1320 reveals that since the foundation of the Norman kingdom were instituted the feuds of Mongialino, Serravalle, Balchino, Camemi, Lamia, Bucalca or Bucalta (today Buscialca), Anicara (today Nicchiara) [6]. These populated feuds did not became part of the state property of Mineo, but they were linked to it because the officers of the city extended their authority or jurisdiction over there, and finally because the feuds were subjected to the payment in cash to take advantage of civic uses. Vast estates of the territory of the state property of Mineo, however, were granted to knights, who became direct vassals of the crown. The feud Mongialino was never divided in other lordships, and was composed of the following subfeud: Casalvecchio, Frasca, Serri, in the territory of Mineo, Pietrarossa Soprana, Pietrarossa Sottana, San Cataldo, and Montecaffuri, where today stands the ruins of the castle. Several feudal lords succeeded in Mongialino but the long-lasting dynasty was that of Enrico Statella, who in 1408 came into possession until the end of 1800. This feud, under Charles V, was still subjected to the city of Mineo and so forced to comply with the dictates of civic uses; this is confirmed by the acts referring to the Civic Council of 1530, year in which were established the "feghi dell'Università". The 1693 earthquake, which destroyed many towns of the Val di Noto, caused extensive damages to the dungeon. The time and the carelessness of the owners have accentuated the decline, but nevertheless it is possible to understand its features.

From 1800 until 1988 the castle and part of the feud became property of privates.

Only in that year the town of Mineo bought the castle of Mongialino to build there a Museum of defensive garrisons and of the sacredness of the landscape.

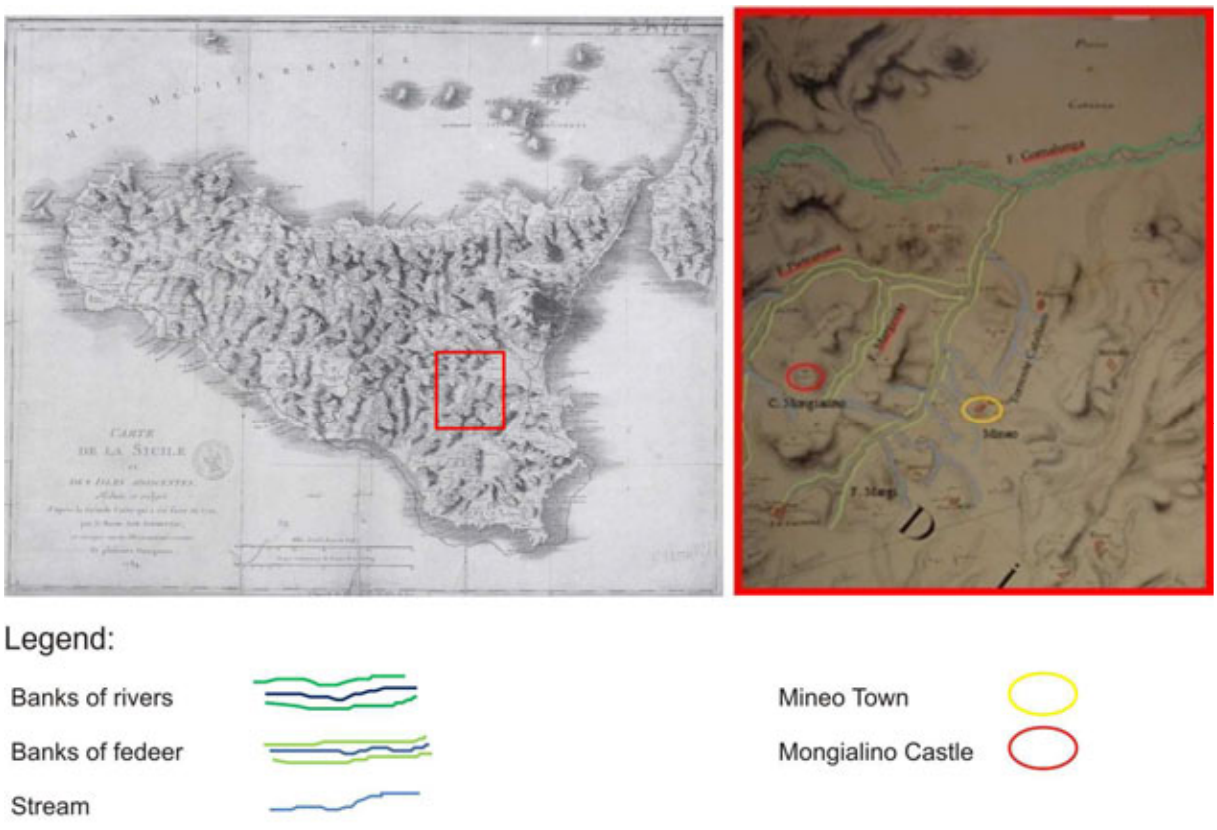

Fig. 2: The valley of the Margi river system, elaboration on the map of Von Schmettau 1720-1721



Fig. 3-4: Views of the ruins of Mongialino Tower

3. Reading the signs: digital survey and the project for knowledge

Mariateresa Galizia

The medieval castle of Mongialino lies on Mount Alfone, an inaccessible promontory in the territory of Mineo, Sicily, which overlooks the whole valley of the Margi and is so perfectly integrated with the surrounding area that a survey of the whole territory is seen as necessary for the graphical representation of a part of the rock on which it rises. Access to the castle is possible by means of a steep ramp following the lines of slope of the terrain, which leads to the top of the limestone elevation. In the lower part of the fortress there is a religious building with a church with two small rooms on the ground floor and one room on the upper floor. A barn and a henhouse formed part of it as well. The church, which dates back to 1600, was in use until 1800. Services were held for the people coming from the surrounding countryside.

The planimetric map of the architectural unit shows a 'whistle-shaped' cylindrical tower overhanging both the north-west side and the south-west side where it is possible to observe what remains of the polygonal surrounding walls, which are instead clearly visible on the north-east and south-east sides.

In the upper part the polygonal surrounding walls, of which we can see the remains of the first ring along the hilly path, enclose a courtyard with warehouses and pens. On the walls it is possible to see the merlons, the putlock holes placed at equal height, which make us imagine the existence of a walkway to guard the territory, and the arquebus embrasure to protect the castle.

From the digital survey the circular dungeon shows a huge wall thickness of about 2 metres with a widening at the base: a section with an embankment which ensures the stability of the building. A central column unit, which is hollow inside and concentric with the tower, was used as a tank for collecting rain water.

The inner room is a ring-shaped corridor about 4 metres wide. On the wall surface it is possible to see some holes which leads us to assume the existence of a wooden stairway accessing the upper level. It seems that its floor lay on a stone stringcourse, placed at a height of 3.90 metres, overhanging the inner walls onto which it is fixed. The ring-shaped barrel vault is arranged in pointed arches with two centres placed radially. Through a narrow square passage which opens onto the vault it is possible to access – once probably by using a ladder – the upper floor (third floor). This covers only half of the circumference of the base of the tower, and leaves the other half uncovered forming a terrace, thus giving the defensive structure what is defined as a 'whistle shape'. Moreover, evidence of this shape is to be found on the third floor in the toothing between the wall surfaces which are placed at right angles to one another, and in the upper part of the drainpipe, which is built into the brickwork and placed at the base of the top floor parapet (which has a regular height).

From a vertical viewpoint the cylindrical front of the tower shows, on the second and third floors, two different types of openings: splayed and straight loopholes (some of them having a seat). In all likelihood at the time of the construction there were only the splayed loopholes and, over time, some of them were rearranged and turned into windows fitted with seats. This hypothesis is supported by the interruption of the stringcourse where the windows with seats are, as well as the lack of plastering by these openings. Two of the three splayed loopholes have been damaged by the collapse of the structure, and now it is possible to see only partial traces (one of the two has been walled, so it is possible to see it only from the inside). The third loophole is in fairly good condition and is placed at about the middle of the arches supporting the vault.

The instrumental survey of the geometric-spatial, static-conservational and environmental characteristics of the place was conveniently carried out using the 3D terrestrial laser scanner Riegl VZ-400 [7,8,9]. The phase of the in situ survey took into account a territorial and architectural scale approach. The data acquisition project involved a total of twelve stations, five of which were placed along the driveway lying under the fortress and at a distance of about 550m between each of them for

the territorial scale representation, and 7 additional scans were placed near the object for the architectural scale representation. During the phase of acquisition homologous points were used for the following union of clouds instead of targets. In addition, during the scanning phase high resolution (Mpixel) photographic images were obtained from a Nikon D 700 Fx format -14 mm release, integrated with the instrumentation. The obtained data were processed using Riscan Pro software for the alignments of the clouds and, then, they were exported onto Cyclone, where layers were created for each scan, by choosing different colours for the single clouds. On these clouds slices were carried out on the model using vertical, radial and horizontal planes. The model thus obtained was cleared of intrusive elements so as to make the graphical representation on Cloudworks more accurate.
This digital model came to represent a collection of information which was decoded through single fields of study related to each other. Indeed, it represents a simulation model still open to further research in order to carry out more detailed structural exams, which will be able to clarify some doubts about the interpretation of certain formal and constructive elements, thus providing the basic principles for a rigorous construction theory of the architecture. The outcome of the digital survey is a 3D representation model forming the basis for a computer reconstruction of the castle according to the principles of the London Charter [10], which established that digital heritage visualization has to be both intellectually and technically rigorous (reliability, documentation, intellectual integrity, sustainability and access). The obtained model is the result of a logical process in which the various sources for the reconstruction theories to be put forward (material remains, current and previous graphical documentation, current and previous photographic documentation, written sources, iconographic apparatus, typological comparisons, metrical observations, stylistic observations) were used and made public.
The result obtained to date represents a product to be included in a possible Cultural and Environmental Heritage databank: a digital archive with 3D information which can be shared by scholars in this field, is open, can be constantly updated and integrated with other types of data, or can simply be used for study and for the dissemination of knowledge.
Furthermore, as required by the London Charter, the model of 3D visualization makes it possible to devise a strategy which may ensure the long-term sustainability of the documentation and of the results of digital visualization concerning cultural heritage in order to prevent loss in mankind's cultural, economic, social and intellectual heritage.

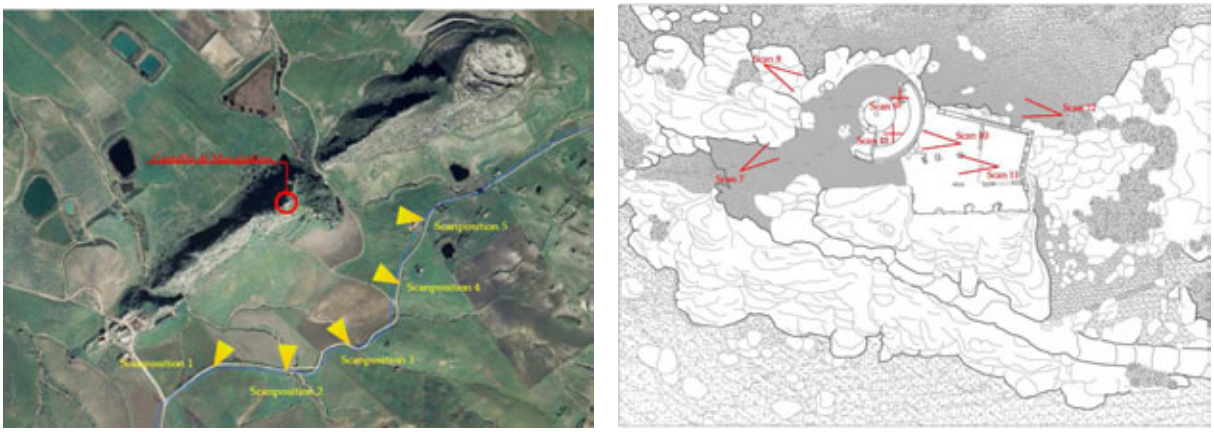

Fig. 5-6: In situ survey: territorial scan positions (on the left) and architectural scan positions (on the right)



Fig. 7-8: Views of the point clouds in confidence mode

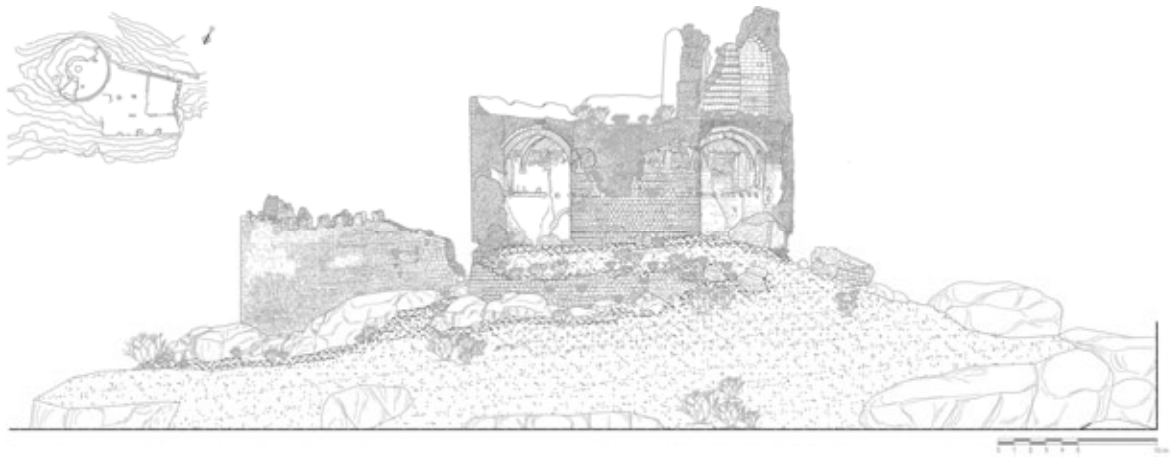

Fig. 9: North-West elevation

4. Reading the signs: the geometric interpretation of the architectural shape

Cettina Santagati

The interpretative process aimed at understanding the architectural shape of Mongialino's Tower has taken into account the few written sources that describe the consistence of the castle [12,3] and, above all, the metric and spatial data by 3D laser scanning survey. The several collapses have largely affected the structure so now it is difficult to get a unitary spatial reading of the architectural text, indeed essential for its proper understanding and, therefore, conservation.

The digital model of the tower – its virtual replica – has been an effective and irreplaceable research tool in this phase, as it allows in real time: -the close exploration of inaccessible or dangerous areas easily subjected to collapses; -the control of the geometrical/spatial interpretative hypothesis that have been formulated; -the volumetric quantification of the masonry portions that have been spoiled; -the virtual anastylosis of the collapsed pieces still present on site.

The first step of our approach forecasted the geometrical study of the circular plan of the tower [12]. At a first metrological examination, we confirmed that the planimetric dimensions are compatible with the ancient local measurement unit – canna (about 2,062 m) – according to multiples and sub-multiples. As previously described (Section 3), the external diameter is 20,64 m (almost 10 canne), the thickness of the mansonry is 2,06 m (almost 1 canna), then follows a ring-like vaulted room and the central cylindrical core whose diameter is 8,18 m (about 4 canne) and that holds inside a cavity used as holding tank.

Furthermore, we also have verified that the radial arches that support the ring-like vault divide the plan in uniform circular sectors. The theoretical geometric reconstruction of the collapsed area brings to a plan divided into twelve parts, according to a regular dodecagon structure. The dodecagon is one of the principal regular polygon and it is done by dividing the circle by number 3. This is a geometric shape whose tracing is very simple, because it is based on the construction of equilateral triangles with side equal to the radius of the circumscribed circle.

Often, in castle's architectures we can recognize symbolisms linked to numbers mystique. In this case the number 12 could be linked to the time and to humans (like 12 months, 12 zodiacal signs, 12 hours, 12 doors of heaven), to the divine trinity, to the multitude, to the 12 apostles.

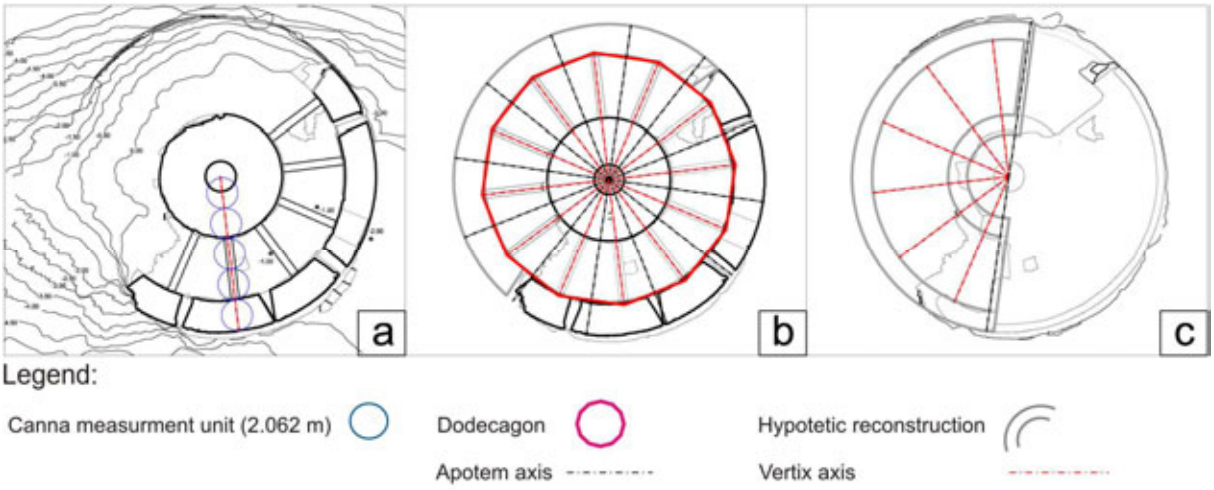

Fig. 10: Studies on the plan: a) metrological analysis; b) geometrical analysis and plan reconstruction of the first two elevations; c) geometrical analysis and plan reconstruction of the third elevation.

In the second step we investigated the shape of the inner room to have proofs on the Vito Amico description. The presence of a cantilever stone stringcourse of about 3.90 m of height on both sides of the walls brings to the supposition of a wood planking level and so to the division into two levels. The stringcourse is made by supporting and decorative ashlars. The firsts act like cantilevers, pierce the solid wall and support the floor frame, the others give continuity to the floor. Furthermore, the presence of a planking level is beyond confirmed by the sings of some holes at different height that leads to imagine a stair that connected the two mentioned levels. Among these, 4 holes placed from one side to the other of the room, at the same height and under the only intact splayed arrow loop, lead to hypothesize a halfway landing.
The openings of the tower belong to two different typologies: splayed arrow loops and right-angle arrow loops (some of them have a seat). It seems that the planimetric distribution of the openings does not comply with a strict symmetry: some of the openings are in axis with the dodecagonon sides, others are not. We could assume that in a defensive architecture the opening of an arrow loop should respond more to some functional needs than to aesthetic ones. Nevertheless, if we consider the intrinsic symmetry of the used circular shape and the division in twelve parts, the choice to not have a balanced succession of plenums and voids, it disadvantages the stability of the building and, maybe, it has started weakness mechanisms.
The next step was the geometrical study of the ring-like vault [13]. This is a toric surface supported by radial pointed arches whose ratio between span and rise is 4/7, with a division in modules M of about 60 cm (that corresponds to the double roman feet unit). The springline is at about 5.40 m from the ground (9M) and the distance between the stringcourse and the springline is equal to 1.50 m (2,5 M). The vault directrix profile is a segmental arch whose springline is at about 7.00 m from the ground and whose centers are at the same height of radial pointed arches springline.
As regards the upper level, it is likely the access had place through small passages into the vault. The reduced dimensions of the only surviving passage leads to imagine the use of a retractable stair. The current impossibility to access this level and the few surviving ruins do not allow to recognize the two other elevation described by Vito Amico, but only one of them.
We suppose that the plan of the upper level was a semi-cylinder, that corresponds to the collapsed zone, with a terrace. Some of the still present signs confirm that hypothesis: the traces of a radial wall that closed the upper level, the continuous parapet of the terrace, the logline for the water disposal that is placed at the end of the parapet and is build in the masonry.
Some further checks on the digital models highlighted that the radial wall of the upper level lies on the vault rather than on the supporting pointed arches and the entrance to the tower is perfectly in axis with the pointed arches. These two circumstances are not so optimal from a static point of view.
Finally, we studied the geometry of the upper level vault by using the few surviving parts. The first thing that we noticed is that the upper radial supporting arches are not in axis with the lower ones. The absence of other elements of reference does not allow to carry out a deeper check that could help to understand if this is a building tracing mistake. Furthermore, starting from the existing traces of the vault we can suppose another toric surface supported by pointed arches and whose directrix is a buttress arch with springplane staggered of about 1.50 m (2,5M).

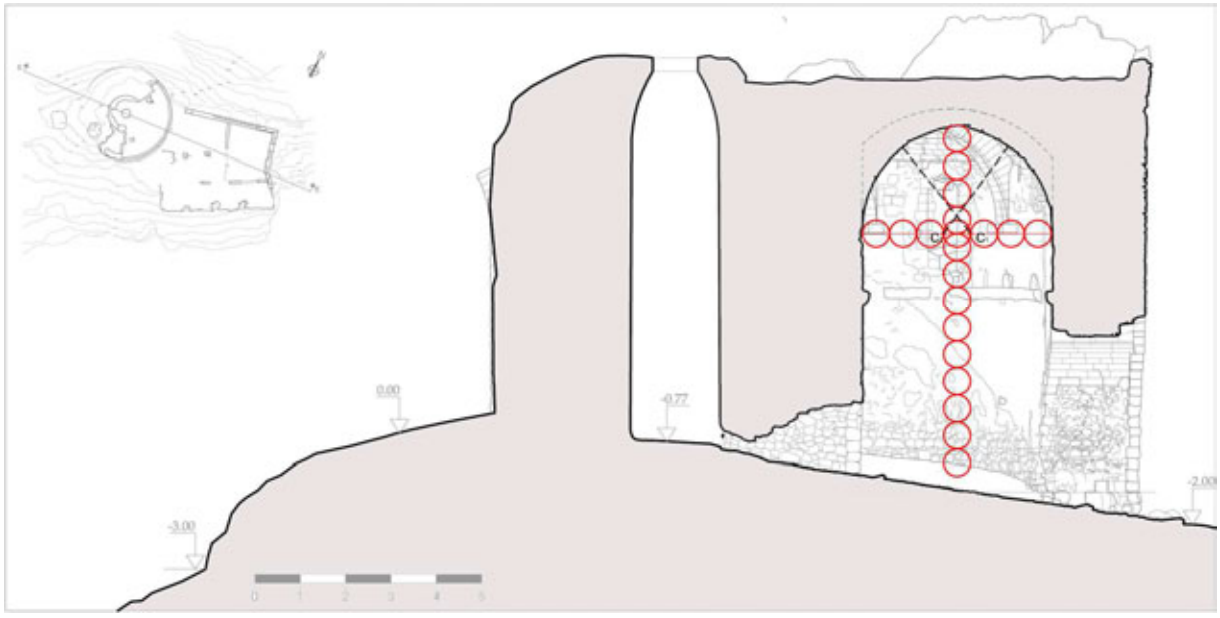

Fig. 11: Cross section and geometrical analysis of the supporting radial pointed arch.

The geometrical studies and the proofs highlighted up to the present allow to propose a first hypothesis on the original shape of the tower: a cylindrical building whistle-like, with terrace. On the base of these evidences and interpretations we are working on the virtual reconstruction of the Mongialino Tower.
Our reconstruction hypothesis and their representations will be guided by London [10] and Seville Charter [14] on Cultural Heritage Computer – Based visualization principles. In particular, we are applying and verifying the principles that deal with Authenticity (principle 4), Historical Rigor (principle 5) and Scientific Transparency (principle 7). Due to the weakness of the sources, the methodological approach will attempt to follow a rigorous path highlighting all the estimated choices sharing and making them visible also to the community. The goal is to make the methodological approach visually transparent the both to the scientific community and also to non experts [15,16].

5. Reading the signs: materials and constructive techniques

Alessandro Lo Faro

The massive bulk of Mongialino's tower binds strongly on the rocks on wich it stands through the use of construction materials also. All the building elements that constitute the dungeon are in fact made using the limestone carried out Mineo's territory. Probably the same rock on which the tower is has contributed to its construction. The sands of the nearby rivers were mixed with lime for mortar that bind the masonries and plasters that cover them.
We interpreted the masonry of the dungeon through the detailed examination of the portions of walls now ruined and the laser scanner acquisition: the arrangement of the ashlars is largely readable as it is detached from plaster. The eminently defensive function justifies the massive thickness of solid masonry with an obvious variation between the tower and the outer fence, perhaps built later and reshaped several times.
Analyzing the masonries according a constructive point of view, we are recognized 3 different typologies of walls, that we call M1, M2 and M3.
The tower has a cylindrical outer thickness of about 206 cm; the columnar inner core is equal to 308 cm. In both cases it is possible to distinguish a cobblestone wall, called M1, consisting of 2 outer irregular coursed rubble wall, with visible face of approximately 25x30 cm.
These sets have containment function and thickness varying from 30 to 50 cm. The core of both walls is constituted by a conglomerate in mortar and rubble limestone of small size (average size 3-30 cm). The settlement is every 50 cm, generally. They seem completely absent squarely dressed stone having function of ligament: the external sets are without necessary bond.
In the upper part of the dungeon, in correspondence of the third elevation, is possible to recognize another typology of wall, which we define M2. Its thickness decreases by 2 rows of ashlars, reducing about 140 cm. It is always a cobblestone wall, with outer surface thick from 30 to 40 cm and concretional core of rubble and mortar. Compared to the type M1, the beddings are highlighted by narrow joints with fragments of tiles and bricks placed at each row of blocks.
The surrounding walls and the buildings near the tower have been realized using an additional type of walling, here called M3. Its constructive technique is particularly poor and close to described masonry previously: a double surfaces in unsquared dressed stone, with a core of limestone mortar and rubbles. The thicknesses ranging from 70 to 100 cm, with particularly thick mortar joints. Greater care is found only at the corners, where are readable the dressed stone having ligament function.
The different types of wall texture find here are all cobblestone wall: the impressive thicknesses (up to 3 meters in the columnar core) are a consequence of the defensive function of the tower but above all by the walling technology. It requires considerable thickness, with a massive behavior of masonry, against the ineffective bond between the blocks and the weak cross connection between the outer sets.
The horizontal closures of the intermediate elevations, as recalled by Vito Amico, were wooden floors, of which today remains the stone shelves and the traces of the scaffolding holes: there the timber joists supporting the continuous timber flooring, with a wheelbase of about 90 cm.
The second and the final elevation of the dungeon are defined by an annular vault realized in dressed ashlars supported by polycentric arches, set at a distance of about 320 cm [17]. In the first elevation the arches are composed of a succession of blocks, according to the sequence (a / 2 + a / 2) - a - (a / 2 + a / 2), i.e. a parallelepiped of dimensions 45x50x (7 ÷ 20) cm, then with variable height (Fig. 12).
The arches, whose visible edges are slightly grooved, resting on stone cantilevers, just deeper (60 cm) than other ashlar. The laying of the arcs occurred initially placing the cantilevers inside the wall, and the first of these blocks over them, while also the masonry rises to a 30° inclined plane. The bar rel vault rises from this height. Thanks to the instrumental survey, it was possible to trace both the shape of the support arch than that of the vault. It has the geometry of a segmental arch because its centre is about 4 meters below the impost.
The barrel vault in the first elevation is realized using dressed blocks of tender limestone, organized according the rowlock course. The height of ashlars is generally 30 cm, variable width (11 ÷ 18 cm)

and length (30 ÷ 55 cm). The courses have staggered joints, about ¼ of total length, i.e. 13 cm. They are also occasionally used blocks having lateral squared surface to compensate for any unevenness.
The support arches and barrel vaults do not have any bond from each other. At the surfaces of contact between the arch and the vault, you can see traces of the ribs, i.e. the housing for the wooden joists on top of the arches. Set up the centre, that is tracked stone arches, these are placed on the shutterings for the assembly of the blocks that form the barrel vault [18]. The abutment, as stated clearly due to the collapse, is made up of "heavy" materials: rubble stone tied with plenty of mortar, following the principles inherited from the Roman *caementum*.
We have no trace of the vault that closed the last elevation, with the exception of the supporting arches, of which some remains ashlar abutment.

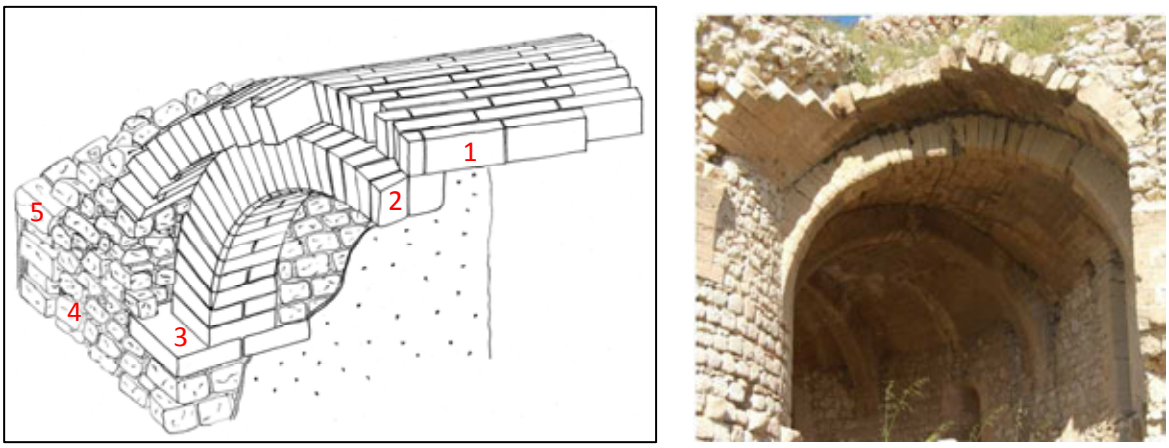

Fig. 12-13: Detail of the vault system: 1) blocks of the barrel vault; 2) ashlar of support arch, so called **a**; 3) cantilever stone block; 4) M1 masonry; 5) outer set of M1 type masonry. On the right a view of the ruined vault.

The *modus construendi* of this vault is similar to that of the lower level, although its geometry is different: it rested about 150 cm higher than the impost of the supporting arches. The vault's ashlars have more regular size, equal to 24x (30 ÷ 40) x 30 cm. The support arches are resting on brackets slightly protruding, of which only traces remain evident in the columnar core. Here also decorative pieces seem to have assumed, by their strength, functional value.
The poor and unadorned simplicity of the adopted solutions, both spatial and constructive models, seem to recall the first French Romanesque, specifically the large common rooms and the cloister's aisles of the Cistercian abbeys. In those spaces the use of the barrel vault, (round and / or lancet arch) interspersed with reinforcement arcs of stonework, was the technological solution most frequently adopted. Here in Mongialino the working technique of stone blocks appears cruder and have a variability in size cannot be found in the examples of France. The function to compensate for the irregularities of the stone shall be entrusted to the mortar joints. In medieval fortified architecture the Cistercians workers were well estimated by contemporaries, so that the Emperor Frederick II came to entrust them with the construction of its castles [19]. It well designed, that is, the power of their logic and essential art. The lesson widespread in Sicily by Frederick architectures (Castle Maniace in Syracuse, Tower of Frederick in Enna) about the stoneworking according to the canons of stereotomy, however, appears in our tower still far away.

6. Conclusion

This study is important not only for a proper historical/typological placement of the building, which is unique in the Sicilian landscape, but also for its preservation and transmission to future generations. The 3D model becomes an essential tool for the understanding of the static behavior of the structure, of the causes that led to the collapse and the proper conservation project. The reading of the cracks and understanding of damage mechanisms give some necessary indications to the choice of rehabilitative therapy [20]. The apparent symmetry of the plan tower's collides with its inherent weaknesses, which partially justifies its current state of ruin. Among these we highlight: the presence of openings (the entrance, some loopholes) close to the impost of the supporting arches, i.e. where the thrusts are concentrated; the third elevation masonry stay directly on the vault; the weak cross-connection between the sets of masonry; the heavy abutment; the lack of connection between vaults and arches of reinforcement, are just a few examples.
The present study would have these future outlooks: analysis of typological and formal models of the tower; the virtual reconstruction of the object; verification and measurement of the cracks.

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Bibliographical References

[1] BOSCARINO, Salvatore. *Castelli di Sicilia, memorie e conoscenza*. In AA.VV., Castelli medievali di Sicilia, Palermo: Regione Siciliana Centro regionale per l'Inventario e la Catalogazione e la Documentazione dei BB.CC.AA., 2001, pp.25-26

[2] GAMBUZZA, Giuseppe. *Mineo nella Storia, nell'Arte e negli Uomini Illustri*, Mineo, 1980.

[3] TOMARCHIO, Giuseppe. *La Fortezza di Mongialino (Castello di Montalfone)*, Caltagirone, 1987.

[4] PANDOLFO, Bruna. Presenze cistercensi nel territorio di Mongialino. Indagini su due chiese inedite dedicate a San Cataldo, *Accademia di Scienze, Lettere e Belle Arti degli Zelanti e dei Dafnici di Acireale.*

[5] SALERNO, Mariagrazia. *Rilievo e/è salvaguardia: il "Castello" di Mongialino a Mineo (CT). Modelli di rappresentazione per l'analisi della geometria, forma e tecnica costruttiva.* AA 2012-2013.

[6] DRAGO, Giuseppe. *Usi civici e sui demani, comune di Mineo*, vol.I, 1929, pp, 13, 63-71

[7] BERTOCCI Stefano, BINI Marco. Castelli di pietre. Aspetti formali e materiali dei castelli crociati nell'area di Petra in Transgiordania. Firenze: Polistampa, 2004, ISBN: 9788883046865

[8] SANTAGATI Cettina, GALIZIA Mariateresa, D'AGOSTINO Graziana. Digital reconstruction of archaeological sites and monuments: some experiences in south eastern Sicily. In Ch'ng E, Chapman H., Gaffney V (eds) "Visual Heritage in the Digital Age", Cultural Computing Series, London: Springer, 2013, pp 205-232. ISBN 978-1-4471-5534-8, ISSN 2195-9056

[9] GALIZIA, Mariateresa. Il disegno delle torri medievali di Enna nel paesaggio urbano tra passato e presente, Catania: Giuseppe Maimone Editore, 2012.

[10] http://www.londoncharter.org/

[11] AMICO Vito, Lexicon Siculum,1757, Catania

[12] INZERILLO Laura, *Il Gotico Chiaramontano, Aragonese e Catalano nella Sicilia occidentale*, Palermo: Edizioni Caracol, 2008, ISBN 978-88-89440-29-2

[13] SANTAGATI Cettina, 3D Laser Scanner aimed to architectural heritage survey: from the point's cloud to the geometrical genesis determination, *International Archives of Photogrammetry, Remote Sensing and Spatial and Information Sciences*, 36 (5), 2005.

[14] http://www.arqueologiavirtual.com/carta/?page_id=437

[15] GABELLONE, Francesco. Ancient contexts and Virtual Reality: From reconstructive study to the construction of knowledge models. *Journal of Cultural Heritage*, vol. 10, Supplement 1, 2009, pp. 112–117.

[16] MALFITANA Daniele, CACCIAGUERRA Giuseppe, FRAGALÀ Giovanni, LEUCCI Giovanni, MASINI Nicola, SANTAGATI Cettina, SCARDOZZI Giuseppe, SHEHI Eduard, Visualizing the invisible: digital reconstruction from an integrated archaeological, remote sensing, and geophysical research of a late roman villa in Dürres (Albania), *Digital Heritage International Congress (DigitalHeritage), 2013*, vol. 2, pp 511-517, ISBN 978-1-4799-3168-2

[17] ACLAND, James H. *Medioeval Structure: the Gothic Vault*. Toronto: University of Toronto Press, 1972. 67 p.

[18] BARES, Maria Mercedes. *Il castello Maniace di Siracusa*. Siracusa: Emanuele Romeo Editore, 2011, p. 116.

[19] CADEI, Antonio. Architettura. Introduzione. In DI STEFANO, Carlo, CADEI Antonio. *Federico e la Sicilia – dalla terra alla corona.* Siracusa: Arnaldo Lombardi Editore, 1995, p. 367-374.

[20] LO FARO, Alessandro. SALEMI, Angelo. Qualitative analysis of mechanical behavior and restoration proposal of churches with single nave in seismic area. In URAL, Oktay. SAHIN, Muhammed. URAL, Derin. *Visions for the Future Housing*. *Proceedings of XXXVIII IAHS World Congress.* Istanbul: Istanbul Technical University, 2012, p. 483-490.

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USE OF NEW TECHNIQUE OF IMAGE BASED MODELING AIMED TO PERSPECTIVE RETURN

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Abstract
The diffusion of Image-based 3D modeling techniques, through image-based free, low cost and open source software, have increased drastically in the past few years, especially in Cultural Heritage domain (Architecture, Archeology, Urban planning) [2, 3]. Computer vision techniques use photographs from dataset collection to rapidly build detailed 3D models. The simultaneous applications of different algorithms (MVS), the different techniques of image matching, feature extracting and mesh optimization are inside an active field of research in computer vision. Computer vision techniques - Structure from Motion (SfM)- allow to fulfill detailed 3D models from photos dataset collections. The results are promising: the obtained models are beginning to challenge the precision of laser-based reconstructions. This research investigates the limits and potentialities of 3D models obtained by using image based techniques in Architectural Heritage field, in order to verify the applicability of the method for the perspective return of the solid perspective of the artistic repertoire in my territory. My approach to this challenging problem is to verify the reliability of the 3Dmodels by Autodesk 123D Catch (web-based package). This paper aimed to demonstrate the efficiency of 123D Catch to obtain an accurate 3D model to operate the perspective return of artistic models.

Keywords: Image-based modeling, 3D reconstruction, Photogrammetry, Computer Vision, Architectural/Artistic Heritage

1. Introduction
Image-based modeling method can be employed to extract original texture and illumination directly from images for visual 3D modeling [21], without the need for complicated processes, such as geometry modeling, shading and ray tracing. These techniques – named Structure from Motion (SfM)- are usually less accurate, but offer very intuitive and low cost methods for reconstructing 3D scenes and models [1, 9, 10, 11]. There are now a number of software packages that offer the ability to acquire 3D models from a set of images without any a priori information about the scene to be reconstructed. 3D reconstruction from images has undergone a revolution in the last few years [12, 13, 14]. Thus, there is a growing attention among academics and practitioners due to the great potentialities of these systems [24]. Among all available web based software (ARC3D, 123D Catch, Hyp3D, my3Dscanner) I have chosen 123D Catch for the easiness of use, the visual quality of the reconstructed scene and the possibility to interact with and develop the results. Furthermore, Catch 3D mesh is suitable for all 3D modeling software. This web-based package exploits the power of cloud computing, allowing to carry out other tasks but it works like a black box and the user does not have the possibility to interact with the software in order to improve the outcomes [25, 26].
I will use 123DCatch on the bronze tile in S. Caterina urn in Dome of Palermo.

2. 123D Catch Model

123D Catch is a web-based, at present time free, package of Autodesk. It overcomes Autodesk's Photofly project launched in 2010 summer, using technology developed by Realviz [8, 22]. The used approach underlying 123D Catch technology is well described in [20].
Exploiting the photogrammetric approach and the algorithms of Computer Vision, 123D Catch is able to reconstruct internal parameters of the digital camera and the position in space of the homologous points from a number of correspondences between sequences of photographic images, suitably taken [17].
The 3D coordinates of all points of the scene have been found and the polygonal model has been reconstructed through the correspondence pixel-pixel.
To use 123D Catch you have to:

1) Capture a photographic sequence of convergent photos of the object with an overlapping of about 70%;
2) Upload the photos to Autodesk cloud (user can decide whether to wait the 3D reconstruction or to be advised by email);
3) Improve the results by manual stitching of homologous points on triplets of images and submit again the scene to the cloud;
4) Create a video;
5) Export the 3D polygonal model thus obtained in OBJ format and use it in other 3D packages. In professional field, 123D Catch has carried out good results both under metric and visualization output and both on large and small architectural scale.

To use 123D Catch you need:

1) A pc with a low Ram profile also, for example 3 giga and a fast internet connection (the mesh elaboration takes place on cloud);
2) A camera with resolution range of 6/12 Mpix.

123D Catch mesh processing is excellent if data set is composed of a range of 30/200 photos. The number of the dataset photo collection depends on the scale of the object [23].
There are two strong conditions to carry out a useful mesh: 1) use the same camera and the same focal length; 2) have a structured photos data set collection where each image captures the entire object. These latter two conditions are mandatory to have a regular geometric and metric mesh without any distortions. The second condition is an unfavorable limit in architectural buildings application but in archeological, architectural element, museum collection or small scale objects the output mesh is in almost cases excellent [18].
Below there is a pipeline to use image-based modeling techniques for architectural heritage digitalization.

Data set:

· 123D Catch photos dataset is structured and its development is easy to get. The number of images goes from 30 to 200 and depends from the object scale;

Running time and hardware resources:

· 123D Catch calculation take place on cloud and so you do not need of particular hardware resources;

Output:

· 123D Catch output is a mesh file and this is an advantage; nevertheless, Catch tends to automatically close all the holes and does not declare where this operation happens, one should be very carefully into covering the whole object and into inspection the output mesh;

Metric accuracy of architectural element:

· 123D Catch 2.71 mm

Metric accuracy of architectural building:

· 123D Catch 0.03 m

2.2 Bronze tile 123D Catch Model of S. Cristina urn in Palermo Dome

The data set, to carry out the 123D Catch model, is composed of 21 photos made on two different paths around the object with two different gradients.
The number of photos has been designed according to the real dimension of the object. The output carried out, as you can observe in the figures reported below, shows a good visual accuracy.
Furthermore, its metric accuracy has been verified through a comparison with a direct survey: the horizontal and vertical sections, between 123D Catch model and the drawing obtained from direct survey, result perfectly overlapped.

The 123D Catch OBJ model has been exported in standard resolution: I did not used the maximum one because the goal of the research was to analyze the geometrical aspects of the urn in its perspective construction and not to have the best resolution. The imperfections that you can see in the 123D Catch model are in the real object and that is because it has been created in bronze material [4, 15, 16,27, 28, 29].



Fig. 1: S. Cristina urn in Palermo Dome.



Fig. 2: 123D Catch data set and wireframe visualization of OBJ model of a part of S. Cristina urn in Dome of Palermo

Bronze tile of S. Cristina urn	
Dimension of the object Number of images	0,51x0,63 m 21
Resolution	8.5Mpixel
Camera	Nikon 3200
Focal distance (mm)	24
123 D Catch processing time (min)	23
123D Catch mesh	793,736 triangles 468,357 vertices

Tab 1: parameters values

Once I exported the 123D Catch OBJ model, I can use it in other 3D packages to make the perspective return. I have chosen Rhinoceros5.

3. Rhino elaboration for perspective return

In order to perform the perspective return in the geometric space, it is necessary to reconstruct the trunk prismatic box that contains the tile. Therefore, it is necessary to find the planes that form the walls of the tile. To do this, I had to dissect the 123D model with horizontal and vertical planes with the same step away in Rhinoceros 5 (Figg. 3, 4).

The intersection between the level curves, obtained by bundles of horizontal and vertical planes, intercept the exact points on which to pass the four planes that make up the tile (Figg. 5, 6, 7). In this way, I obtained profiles that generate the geometric shape in the space.

Extending the carried out planes, we obtain the pyramidal solid through their intersection (Fig. 8). Within the solid, is identified the trunk prism and the straight line where there is $F'_{n\pi}$, the vanishing point of the straight lines perpendicular to the framework.
As you can see in Fig. 9, the extended straight lines of the lateral walls are not aligned. This happens because in the figure the object is not read from the perspective point of view.

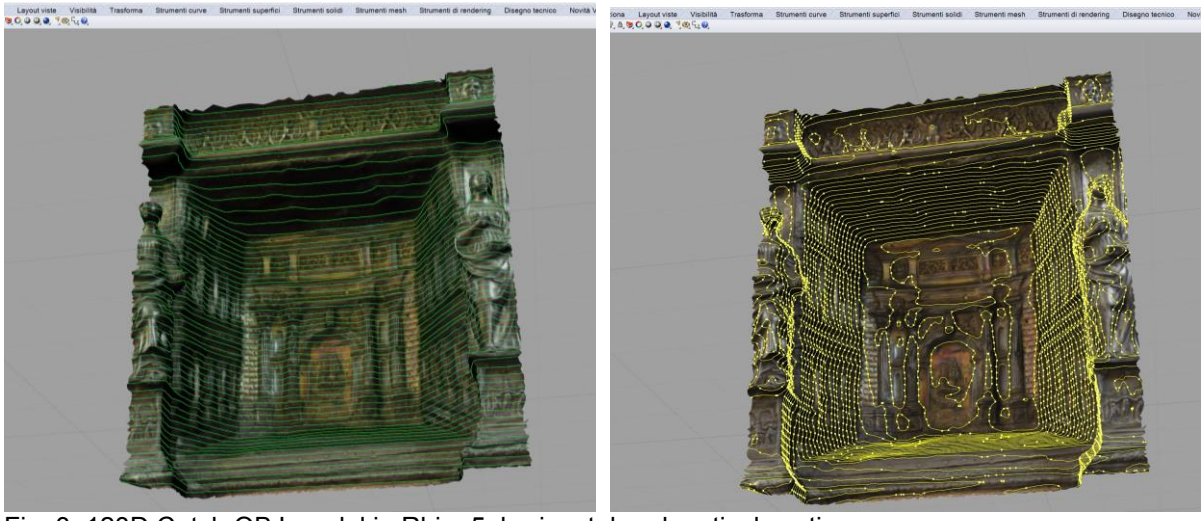

Fig. 3: 123D Catch OBJ model in Rhino5: horizontal and vertical sections.

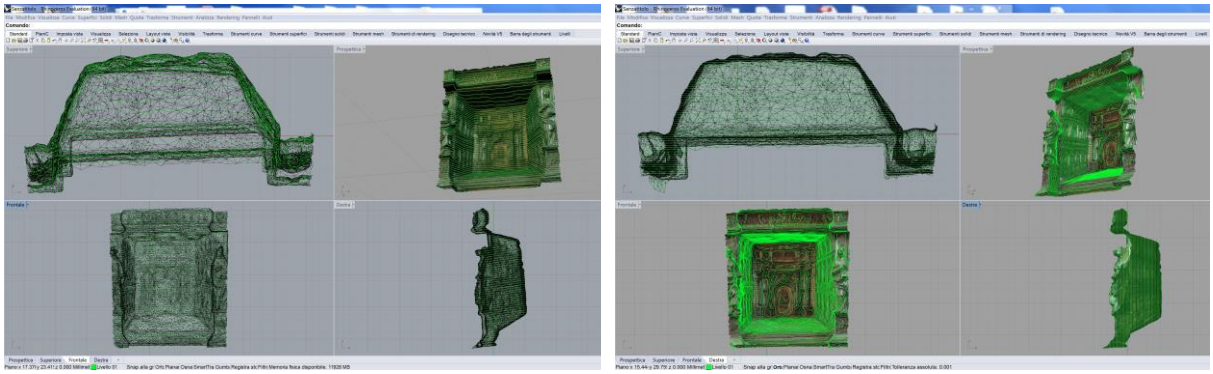

Fig. 4: 123D Catch OBJ model in Rhino5: horizontal and vertical sections.

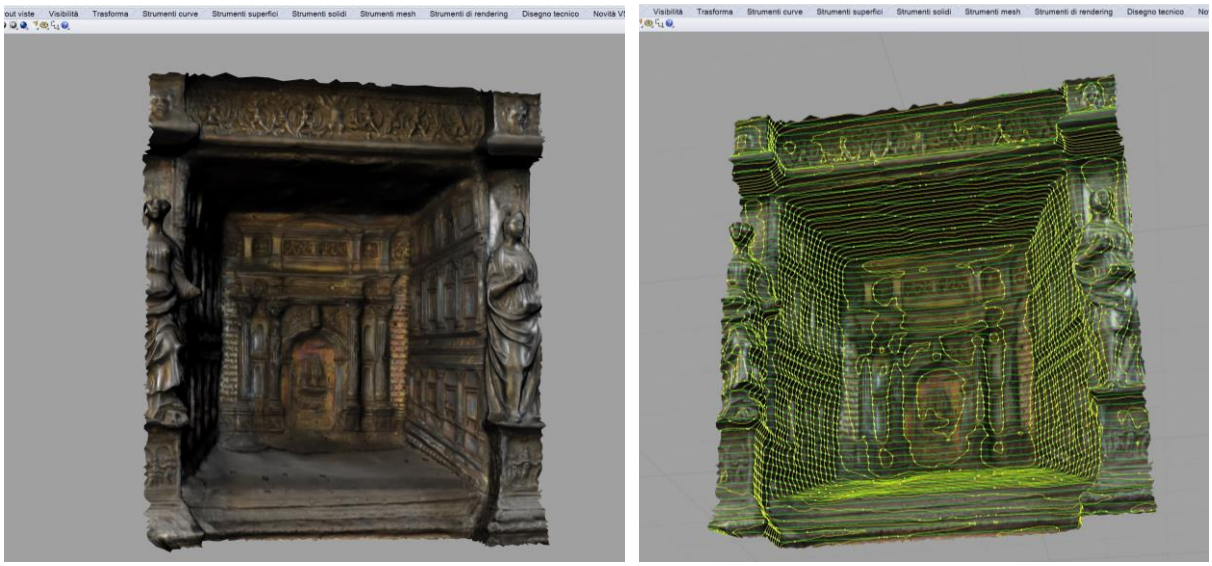

Fig. 5: 123D Catch OBJ model in Rhino5: rendered model and intersection between horizontal and vertical sections.

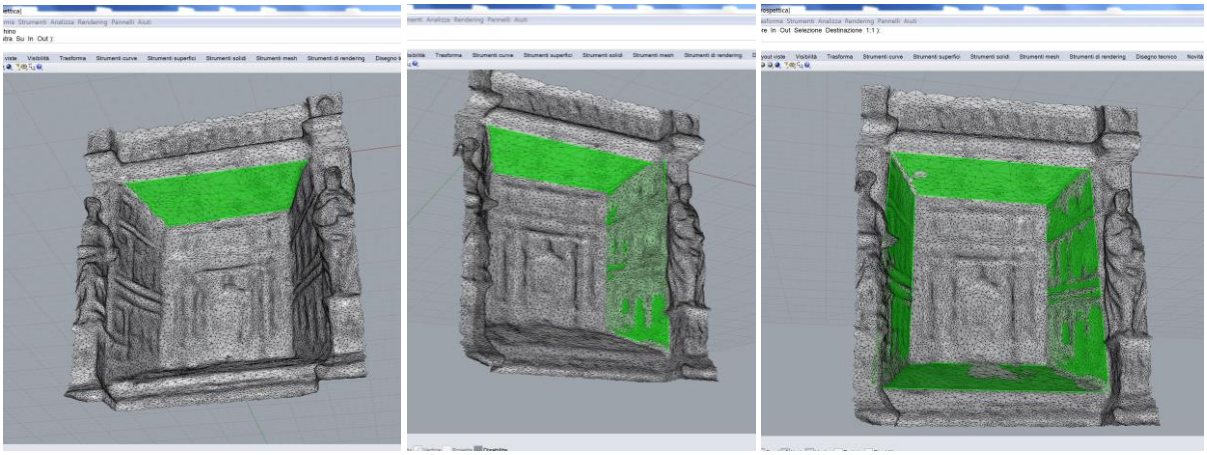

Fig. 6: 123D Catch OBJ model in Rhino5: planes that make the prismatic object.

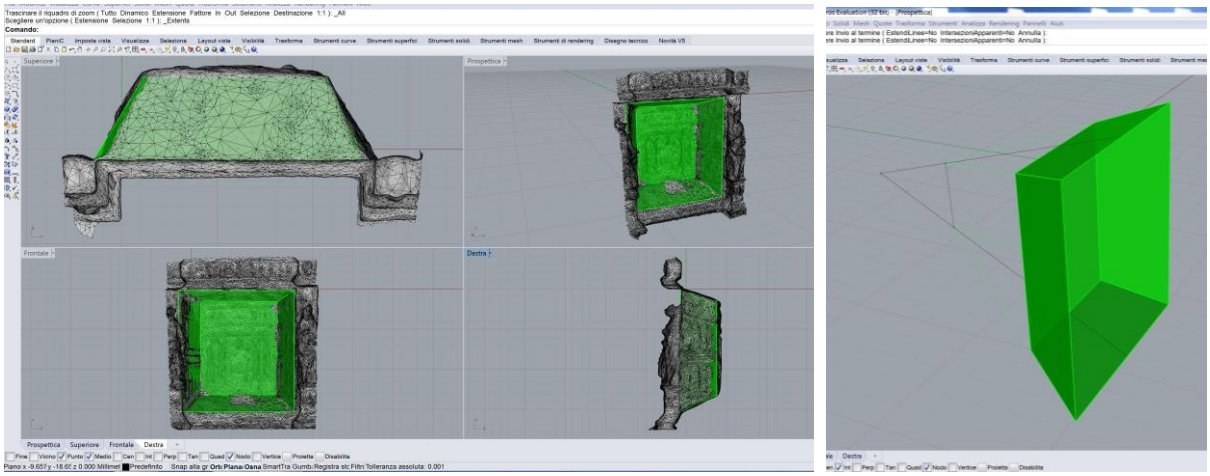

Fig. 7: 123D Catch OBJ model in Rhino5: planes that make the prismatic object in the four views and pyramidal solid.

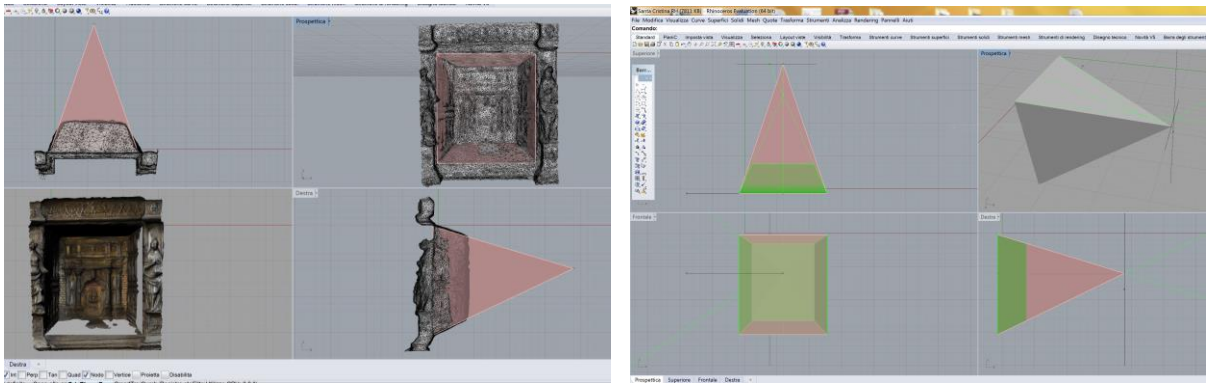

Fig. 8 123D Catch OBJ model in Rhino5: geometric analysis for perspective return.

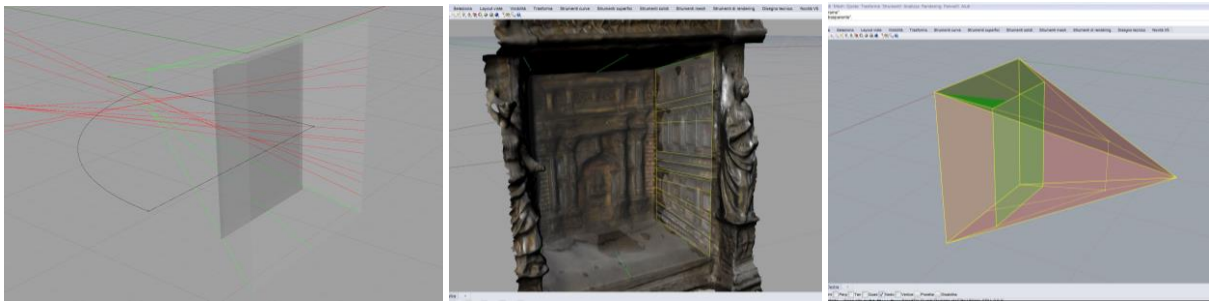

Fig. 9: 123D Catch OBJ model in Rhino5: geometric analysis for perspective return.

The 3D model elaborated in Rhino is the first step for the descriptive geometric analysis, aimed to carry out the perspective return of the object.

4. Perspective return

Thanks to the geometric 3D model carried out in Rhino, I was able to individuate the *F'nπ* (vanishing point of all the straight lines perpendicular to the framework) position on *f'α*. The framework is on the front of the scene and the trace *tα* of the plane *α* (the perpendicular plane to framework) is on the bottom of the framework and its vanishing straight line *f'α* contains *F'nπ* (Fig.10).
We obtain other two planes: β and γ with tβ, tγ, f'β, f'γ. The plane β is the one that contains the floor of the box and the γ one is the right vertical wall. The plane β has been found applying the line of maximum inclination of β, mp*β carried out from the real section made on Rhino and imported to have the perspective return [5, 6, 7, 19].
Through the rotation of the point of view once from F'pb and once from F'pg we have all the elements to have the perspective return.
Therefore, we can read the real depth and the perceived depth.

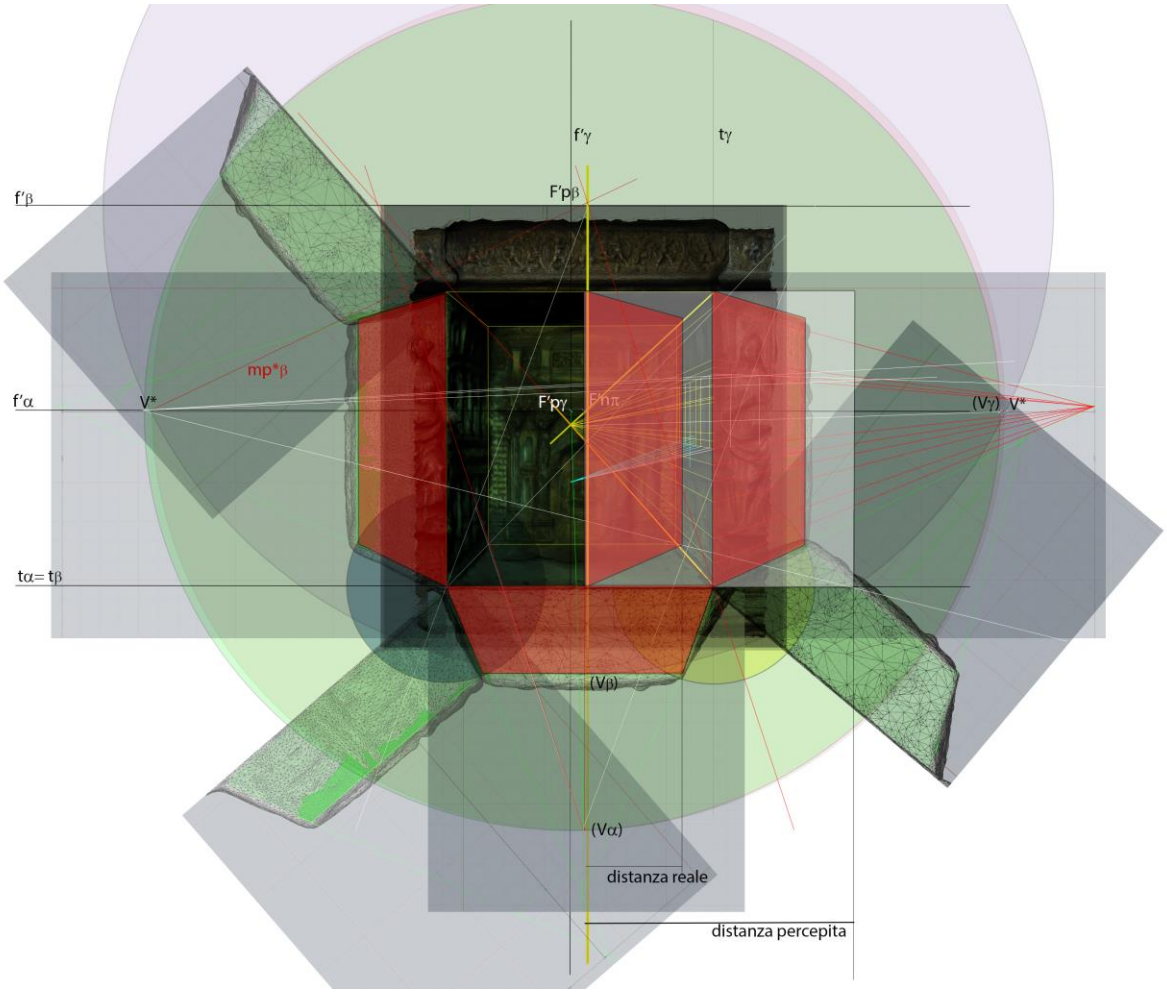

Fig. 10: Perspective return of the bronze tile of S. Cristina urn.

However, if on one hand we have returned the real size of the box, to the other side we should verify if the builder had considered the geometrical rules to obtain, on that box, that one perceived image. Therefore, it would be appropriate to draw the real box and study which aberration must be used to have that view from that point of view. Nevertheless, this study has not been addressed yet. Moreover, this is not the appropriate contest to do so.
At last, we have to consider that work with the bronze is not as easy as with marble and some little imprecision could be made for this reason.

5. Conclusion

This paper was aimed to verify the reliability of the image-based modeling techniques applied to architectural elements in order to make a return perspective.
The result obtained showed that these techniques were entirely satisfactory, at zero cost and with a very low processing time. The metric and visual accuracy allowed me to follow all steps from data acquiring to 3Dmodeling, to geometric analysis, to return perspective, with a result (Fig. 10) quite satisfactory.
Using of 123D Catch is a suitable choice when you have to elaborate architectural elements or museum items.

Bibliographical References

[1] AGARWAL, Sameer, FURUKAWA, Yasutaka. Reconstructing Rome. Computer IEEE, 43 (6), 2010. pp. 40-47

[2] BANDIERA, Adriana, BERALDIN, J-Angelo, GAIANI, Marco. Nascita ed utilizzo delle tecniche digitali di 3D imaging, modellazione e visualizzazione per l'architettura e i beni culturali. "Ikhnos". Lombardi editore, Siracusa. 2011, pp. 81-134.

[3] BANDIERA Adriana (et al.), Nascita ed utilizzo delle tecniche digitali di 3D imaging, modellazione e visualizzazione per l'architettura e i beni culturali. Ikhnos, Lombardi editore, 2011. pp. 81-134.

[4] BELLAFIORE Giuseppe. La Cattedrale di Palermo. Flaccovio Editore, 1999, Palermo.

[5] D'ALESSANDRO Maria, INZERILLO Michele, PIZZURRO Pietro. Omografia e prospettiva. Istituto di Disegno e di Topografia della Facoltà di Ingegneria di Palermo, 1983, quaderni interni.

[6] D'ALESSANDRO Maria, PIZZURRO Pietro. La Prospettiva solida nella scultura scenografica del Serpotta. Rilievi fotogrammetrici con restituzione grafico-numerica. Arti grafiche Giordano, 1989, Palermo.

[7] DOCCI Mario, MAESTRI Diego. Manuale di rilevamento architettonico e urbano. (2009) Edizioni Laterza, Roma-Bari

[8] FILIPPUCCI, Marco. Nuvole di pixel. La fotomodellazione con software liberi per il rilievo d'architettura. Disegnarecon, 3, 2010, pp. 150–163.

[9] FRATUS DE BALESTRINI, Elena, GUERRA, Francesco. New instruments for survey: on line softwares for 3d recontruction from images. In: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XXXVIII-5/W16, 2011, pp. 545- 552.

[10] FURUKAWA, Yasutaka, PONCE, Jean. Accurate, Dense, and Robust Multi-View Stereopsis, IEEE Computer Society Conference on Computer Vision and Pattern Recognition, July 2007.

[11] FURUKAWA, Yasutaka (et al.), 2010. Towards Internet-scale Multi-view Stereo, IEEE Computer Society Conference on Computer Vision and Pattern Recognition, July 2010.

[12] HIEP, Vu Hoang, KERIVEN, Renaud, LABAUT, Patrick, PONS, Jean-Philippe. 2009. Towards high-resolution large-scale multi-view stereo. In: IEEE Computer Society Conference on Computer Vision and Pattern Recognition, July 2009.

[13] KERSTEN, Thomas, STALLMANN, Dirk. 2012. Automatic texture mapping of architectural and archaeological 3d models. In: The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XXXIX-B5, 273-278.

[14] KERSTEN, Th. (et al.), 2012. Automatische 3D-Objektrekonstruktion aus unstrukturierten digitalen Bilddaten für Anwendungen in Architektur, Denkmalpflege und Archäologie. Publikationen der Deutschen Gesellschaft für Photogrammetrie, Fernerkundung und Geoinformation, 21, pp. 137-148.

[15] KRUFT Hanno-Walter. (1972). *Domenico Gagini und seine Werkstatt*. Bruckmann, München.

[16] KRUFT Hanno-Walter. (1980). *Antonello Gagini und seine Söhne*. Bruckmann, München.

[17] GALIZIA Mariateresa, SANTAGATI Cettina. (2013). Low-cost image-based modeling techniques for archaeological heritage digitalization: more than just a good tool for 3D visualization? Virtual Archaeology Review (VAR Journal), 4 (9), nov 2013, 123-129

[18] INZERILLO, Laura (2004). Procedure di costruzione della prospettiva nel progetto del disegno. Disegnare Idee Immagini, vol. 28, 84-91.

[19] INZERILLO, Laura (2012). *Essere Prospettici. Be Perspective*. Aracne editrice, Roma.

[20] INZERILLO, Laura, SANTAGATI Cettina. (2013). Il progetto del rilievo nell'utilizzo di tecniche di modellazione dense stereo matching. Disegnare Idee Immagini, 47/2013. Gangemi, Roma, 82-91

[21] NGUYEN, Hoang Minh, WUNSCHE, Burkhard, DELMAS, Patrice. 2012. 3D Models from the Black Box: Investigating the Current State of Image-Based Modeling. Proceedings of the 20th International Conference on Computer Graphics, Visualization and Computer Vision (WSCG 2012), Pilsen, Czech Republic, June 25-28, 2012

[22] REMONDINO Fabio, EL-HAKIM S. (2006). Image-based 3-D modelling: a review. The Photogrammetric Record, 21(115), 269–291.

[23] SANTAGATI Cettina, INZERILLO Laura. (2013). 123D Catch: efficiency, accuracy, constraints and limitations in architectural heritage field. International Journal of Heritage in Digital Era, 2 (2), 263-290

[24] SANTAGATI Cettina, INZERILLO Laura, Di Paola Francesco (2013). Image-based modeling techniques for architectural heritage 3D digitalization: limits and potentialities. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences , XL-5(W2), 550-560.

[25] SNAVELY, Noah, SEITZ, Steven M., SZELISKI Richard. 2008. Modeling the World from Internet Photo Collections. International Journal of Computer Vision, 80(2), pp. 189-210

[26] SNAVELY, Noah. (et al) 2006. Photo tourism: Exploring photo collections in 3D. ACM Transactions on Graphics, 25(3):835–846, 2006.

[27] URBANI, Leonardo. (eds) (1993). La Cattedrale di Palermo, studi per l'ottavo centenario della fondazione. Sellerio Editore, Palermo.

[28] ZANCA, Antonio. (1989). La Cattedrale di Palermo dalle origini allo stato attuale. Accademia Nazionale di Scienze Lettere e Arti di Palermo.

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MULTI CRITERION DECISIONS IN A FUZZY LOGIC ENVIRONMENT

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Abstract
The past few years have witnessed a rapid growth in the number and variety of applications of fuzzy logic, ranging from consumer products, industrial process control and vision systems to medical instrumentation, information systems, signal processing and decision analysis. The foundations of fuzzy logic have become more stable and its impact within the basic sciences - and especially in the mathematical and physical sciences - has become more visible and more substantive.
The choice among several alternatives in a social context depends on the values that the linguistic variables take, with respect to the selected criteria. These values indicate the satisfaction degree of the alternatives with respect to the criteria.

Keywords: Linguistic variables, fuzzy numbers, extension principle

1. Introduction
A great deal of effort involved in the design of fuzzy logic-based applications are expended in the determination of the rules and membership functions. The rules are usually better known than the membership functions. The difficulty in determining the membership function arises from the same factor that makes fuzzy logic attractive, that is the usage of linguistic labels and descriptors on variables. Linguistic descriptors are highly context-dependent. For example, what is considered "high temperature" in chemical processes may correspond to just a "middly high temperature" in nuclear processes when both are expressed on an absolute scale. In this sense, the experience of skilled human process operators can be considered to be a measure of the degree to which the operator understands the meaning of the descriptors in the context of the plant or process he is operating (membership function). This, coupled with his knowledge of the process behaviour and control procedures (rule base) enables him to control the plant.
Even within the same application domain, the embodiment of the rules and membership functions in the operators' knowledge may vary from one operator to another. In the early stages of developing fuzzy logic applications, it will be advantageous to first try out the fuzzy application on a simulated model of the process. A set of basic rules and membership functions can then be built as the starting point. To this end, the code described has the following characteristics [1]:

I allows to test out different combinations of membership functions and rules;
II interfaces to different processes or models; and
III can be used for fuzzy logic modelling, control or pattern recognition.

These features are accomplished without rewriting the fuzzy logic codes that are tailor-made for specific applications.

2. A fuzzy model for multi criterion decision
There are situations that are decisional situations. In this case, it is more natural to deal with uncertainty by using fuzzy set theory instead of probability theory. A model for decisions in a fuzzy based techniques for linguistic approximation is presented. The proposed model represents the strong subjective value choices dependent on fuzzy information.

The problem consists of choosing between the alternatives of a set $A = \{a_1,..., a_m\}$ starting from fuzzy information on the appropriateness of each alternative, based on a fixed criterion. This information is provided by a family of fuzzy sets $S=\{S_1,..., S_M\}$, where each S has a membership function defined on the real axis and represents a linguistic term. Starting from this point, it is assumed that the fuzzy sets are fuzzy numbers, preferably of triangular or trapezoidal type.
The adequacy is interpreted as a measure of decision-making, with the criteria being met by the alternatives.
This method consists of choosing the preferred alternative, starting from S, and then to express in linguistic terms the reached decision.
As an example, consider the problem of choosing between four alternatives on the data represented by S = (S_1, S_2, S_3, S_4), as depicted in figure 1.

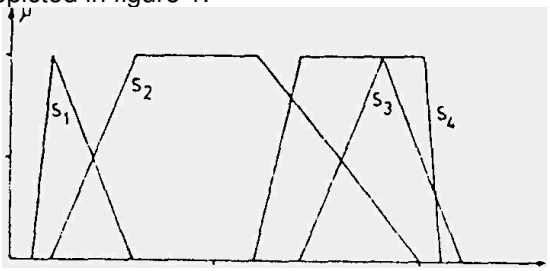

Fig.1 : Choice made between four alternatives.

The descriptive ambiguity is intuitively reasonable to suggest the choice of a_3 or a_4. In order to formalize this choice, a concept of dominance based on the separation between two fuzzy sets is introduced.
The σ **separation** between two convex fuzzy sets A and B is:

$$\sigma(A, B) = 1 - \vee_x(\mu_A(x) \wedge \mu_B(x))$$

The δ **dominance** of A on B is:

$$\delta(A, B) = \vee_x(\mu_{\leq A}(x) \wedge \mu_B(x))$$

where ≤A is the fuzzy set “less than or equal to A set” defined as follows:

$$\mu_{\leq A}(x) = 1 \quad \text{if} \quad x < x^*$$
$$= \mu_A(x) \quad \text{if} \quad x \geq x^*$$

where x^* is the smallest value of x like that $\mu_A(x) = 1$ as shown in figure 2.
This definition of dominance is not the only possible one, even if it represents in a satisfactory manner the separation of the peaks μ_A and μ_B. The aim of this paper is to determine the subset of S associated with the non-dominated alternatives.
The set in which the elements of S are defined is linearly ordered. A not dominated fuzzy set is the one whose peak is on the right with respect to all the others. It is seems clear that δ does not provide information on the overall shape of the functions of ownership. Therefore, there could be situations, as shown in figure 2, where $\delta(A, B) = \delta(A, B')$, despite the peak μB is markedly to the right of that of B. This means that it is not possible to base it exclusively on δ to order the elements of A.

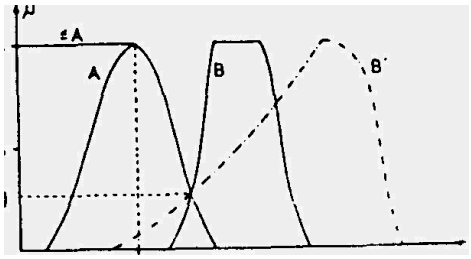

Fig. 2: Situations where δ (A, B) = δ (A, B')

By indicating with R_δ (i, j), the dominance relation on S by using the data of figure 1 results:

$$R_\delta = \begin{vmatrix} 1.0 & 0.5 & 0.0 & 0.0 \\ 1.0 & 1.0 & 0.8 & 0.5 \\ 1.0 & 1.0 & 1.0 & 1.0 \\ 1.0 & 1.0 & 1.0 & 1.0 \end{vmatrix}$$

Note that the third and fourth rows have all the elements equal to 1 and the corresponding alternative (a_3, a_4) are not dominated, as previously argued. The next step is to find a method to identify a single alternative as not dominated.
First of all, an array of weights is introduced whose components are defined as follows:

$$W_i = \wedge \mathrm{j}\ R_\delta\ (i, j) \qquad \mathrm{i} = 1,..., \mathrm{M}$$

where W_i is interpreted as the global degree with an alternative, the ith element, that dominates the others. At this point, it is possible to build up an algorithm that allows to define the fuzzy set associated with each of the alternatives that are not dominated. The algorithm is based on the average deviation of all the other alternatives.
The first step is to introduce the following functions of *m* independent variables:

$$\mathrm{g_k}(x_1, ..., x_m) = [x_k - (\Sigma_{i \neq k}\ W_i)]/(\Sigma_{i \neq k}\ W_i),$$

where *k* denotes the positions in *W* such as W_K=1 (in this example *k=3,4*) the *x* are chosen in the S_i domain.
The second step is to replace *x* with the elements of S. Determining, by means the extension principle, the Z_k fuzzy sets associated with each alternative not dominated.

$$\mu_{Zk}(\mathrm{u}) = \vee_{gk(.)=u}(\vee_i\ \mu_{Si}(x_i))$$

It is possible to carry out $Z_k = g_k(S)$ by interpreting it as the fuzzy weighted difference between S_k and the $\{S_i: i = k\}$ set.
The introduction of g_k and then of Z_k, can be justified by noting that the alternatives clearly dominated have a low role in the achievement of the final decision. In particular, if $W_i = 0$ for some *i*, the alternative correspondence is not preferred at all.
The array of the weights referred to the example of figure 1 and *W=(0 0.5 1 1)* and then in correspondence with $W_k = \mathrm{I}$ (*k=3* and *k=4*) make it possible to determine Z_3 and Z_4 (figure 3). From this figure, it is possible to observe that a_4 is preferred to a_3. The trust, in this case, is rather low. The trust can be measured in fuzzy terms as depicted in the next paragraph.

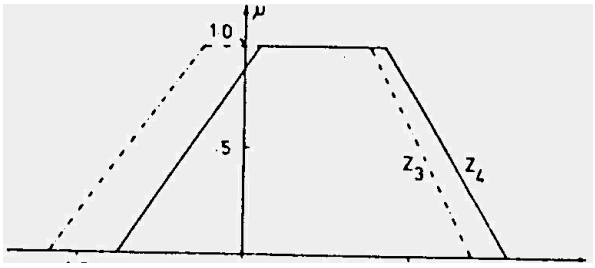

Fig. 3: Determination of Z_3 and Z_4 with W_k=*1*

3. Linguistic accuracy and truth qualification

The problem is how to represent the preference of an alternative on the others by expressing linguistically the perception of the truth on the choice made. In this context, a decision can be expressed, for example, using the following proposition:

"is very true that a_k is marginally preferred to all the other alternatives."

Formally, it is possible to carry out:

"a_k is *P* with respect to all the others is τ"

where *P* is the intensity of preference and τ is the qualification of truth

supposing *P* is a fuzzy set defined on the same population of Z_K. In addition, τ is fuzzy, this proposition can be translated into a fuzzy set semantically in the similar manner. First of all, it is to build up the fuzzy set *L*:

$$\mu_L = \mu_\tau(\tau_\mathrm{P}(u)).$$

in order to determine *L* in a similar manner to Z_K from the semantic view, by means of a process of **linguistic approximation**.
The first step is to define the set A of linguistic terms that represent the possible decisions and the possible fuzzy representation of *P* and τ. For the latter, for example, it is possible to choose the fuzzy sets depicted in the following figures:

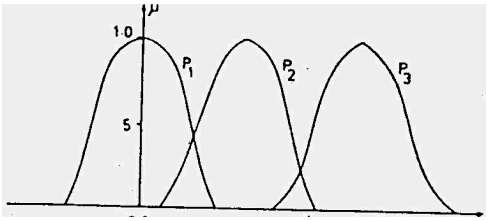

Fig. 4: Fuzzy representation of *P*.

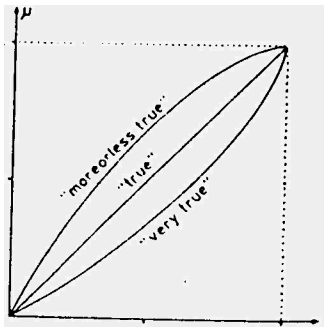

Fig.5: Fuzzy representation of τ.

At this point, it is possible to choice the element of Λ, semantically, nearest to *Z*, where *Z* represents any element of Z_k.

Each $L_i \in \Lambda$ is represented by an array $P_i(p_i^1, p_i^2 \ldots p_i^k)$ of characteristic parameters, chosen in order to describe, sufficiently, in the correct manner the shape of the function of belonging.

This step is particularly critical because the choice of parameters determines the success or failure of the linguistic approximation. The experience suggests choosing the following four parameters:

i) $p_i^1 = \sum_{k=1, \ldots N} \mu_{Li}(x_k)$, where $N = |\Lambda|$

ii) $p_i^2 = \sum_{k=1, \ldots N} (H^2)(\mu_{Li}(x_k)))^{1/2}$, where $(H)h = h, \quad 0 \le h \le 1/2$; $1-h, \quad 1/2 \le h \le 1$

iii) p_i^3 : first moment of μ_{Li}

iv) p_i^4 : second moment (dispersion) of μ_{Li}.

These four parameters are calculated for Z and then a weighted Euclidean metric introduced to calculate the distance (semantics) of Z by each of $L_i \in \Lambda$:

$$d(L_i, Z) = (\sum_{k=1, \ldots 4} w_i^2 (p_i^k - p_z^k)^2)^{1/2}$$ (the weights π^1 are chosen by the decision maker).

It is possible to determine the *Li* elements in order to satisfy:

$$d(Li, Z) < \varepsilon,$$

where ε is a tolerance measure subjectively prefixed.

By indicating with $\Lambda(Z)$ the set of L_i evaluated in this manner, it is possible the optimum search by solving the following problem:

$$\min_{Li \in \wedge} d^*(L_i, Z)$$

where d^* is a metric not necessarily of the same *d* type.

4. A problem of choice of investments

A private investor has a capital to be invested by choosing between five possible areas, taking into account four criteria. Alternatives and criteria are in the following order:

a_1	products market
a_2	share market
a_3	gold and/or diamonds
a_4	real estate
a_5	Bondholders
c_1	risk to loss the equity capital
c_2	vulnerability of the equity capital
c_3	amount of interests
c_4	realization of the cash capital

The rating of the alternatives to respect the criteria is expressed linguistically in tab. 1.

	c_1	c_2	c_3	c_4
a_1	high	more or less high	very high	fair
a_2	fair	fair	fair	more or less good
a_3	low	from fair to more or less low	fair	good
a_4	low	very low	more or less high	bad
a_5	very low	high	more or less low	very good

Tab. 1

It is possible to select one option taking into account that the criteria have different weights as linguistically expressed in the following table:

c_1	c_2	c_3	c_4
moderately important	more or less important	very important	more or less unimportant

Tab. 2

The first step is to determine the suitability of each alternative with respect to the criteria. It is supposed to calculate the adequacy as a fuzzy weighted sum of ratings (figure 6):

$$S_i = \sum_{j=1,\dots,4} \alpha_j r_{ij}$$

where the sum and the product are performed by using the extension principle.

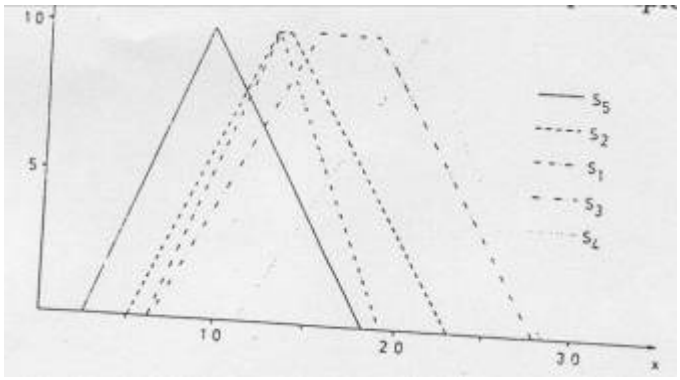

Fig.6: Calculation of the adequacy as fuzzy weighted sum of ratings.

The use of fuzzy numbers (triangular or trapezoidal) allows to simplify greatly the computational phase by using parametric representations. At this point, it is to possible determine the dominance relation R and the array W of weights, respectively:

$$R_\delta = \begin{vmatrix} 1.0 & 1.0 & 0.81 & 0.49 & 1.0 \\ 1.0 & 1.0 & 0.90 & 0.58 & 1.0 \\ 1.0 & 1.0 & 1.0 & 0.85 & 1.0 \\ 1.0 & 1.0 & 1.0 & 1.0 & 1.0 \\ 0.77 & 0.79 & 0.63 & 0.34 & 1.0 \end{vmatrix}$$

$$W = (0.49 \quad 0.58 \quad 0.85 \quad 1 \quad 0.34)$$

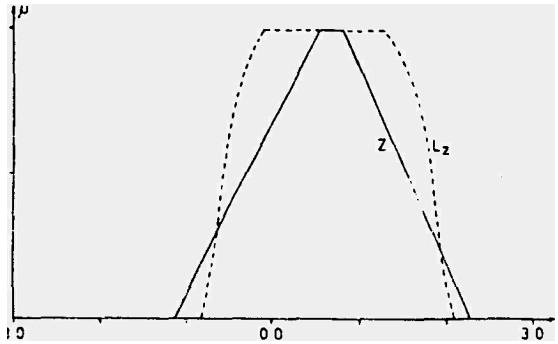

Fig. 7: determination of Z_4=g_4, by finding an appropriate linguistic approximation L_z

It can be noted that S_4 (real estates) dominates the other alternatives therefore it is possible to proceed to the determination of $Z_4=g_4$, by finding an appropriate linguistic approximation L_z (figure 7).
In the calculations, it has been tacitly assumed a set of linguistic terms Λ in order choose the best "approximate". Recalling that the standard form of a decision is a proposition like this:

"a_k is P all of the others is τ".

In this case, it results a_k = "real estates" and L_z is equivalent to:
P = "from indifferent to marginally better off"
τ = "more or less true".
By comparing the linguistic statement with the weights derived from $R_{\delta,}$ it is possible to observe that it is rather prudent. Confirming that a decision is based on uncertain fuzzy data it is itself uncertain. This circumstance can be moreover highlighted by changing in marginal mode the data of the problem. By supposing to modify the importance of c_4 from "more or less important" to "not be less important to moderately important", it generates an alteration of S_i (figure 8) and R_δ:

$$R_\delta = \begin{vmatrix} 1.0 & 1.0 & 0.91 & 0.58 & 1.0 \\ 1.0 & 1.0 & 0.99 & 0.72 & 1.0 \\ 1.0 & 1.0 & 1.0 & 1.0 & 1.0 \\ 1.0 & 1.0 & 1.0 & 1.0 & 1.0 \\ 1.0 & 0.96 & 0.81 & 0.51 & 1.0 \end{vmatrix}$$

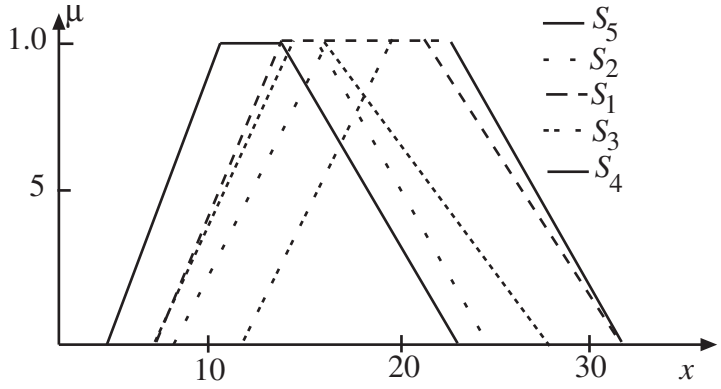

Fig. 8: Alteration of S_i and R_δ due to modification the importance of c_4 from "more or less important" to "not be less important to moderately important"

The array of weights becomes W = (0.58 0.72 1 10.51) and thus the dominant alternatives become a_3 and a_4. There are two sets of preference, Z_3 (gold/diamonds) and Z_4 (real estates). By calculating the corresponding L sets, it is possible to find that they coincide (figure 9) and then a_3 and a_4 are indifferent. Looking at figure 8, it is possible to deduce that a_4 is dominant. At this point, in order to choose between a_3 and a_4 other criteria should be introduced, for example, it could suggest the alternative with the least "fuzziness".

5. Conclusions

This methodology starts from the assumption that in those situations in which the fuzzy sets are used effectively to represent the uncertainty. Making a decisions is an action typically based on fuzzy logic. It is not appropriate to give the final choice as artificially defined precision.
The decisions must assume a linguistic connotation rather than a numerical one. The developed procedure presents a computational complexity that requires the use of computers, with it being essential that all the stages in the decision are put interactively against the decision-making structure which is resolvable in the following phases:

- Phase 1: Problem formulation (alternatives, criteria and basic linguistic terms definitions);
- Phase 2: Definition of decision set (building of A set starting from the linguistic labels assigned to P and τ);
- Phase 3: Initialization of the approximation linguistic procedure (array parameters, metrics and of the E tolerance definitions);
- Phase 4: Decisions revision (linguistic evaluations modification and sensitivity analysis on the dominance).

Bibliographical References

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[1] Nahrul K. Alang Rashid and A. Sharif Heger, A General Purpose Fuzzy Logic Code, Fuzzy Systems, 1992., IEEE International Conference on, 8-12 March 1992 Page(s):733 – 742

[2] B. Bouchon Meunier, La logique flou, Presses Universitaires de France, Paris, 1993.

[3] B. Ferri, A. Maturo, Un modello matematico decisionale fuzzy per la valutazione di fattibilità nel recupero del patrimonio storico architettonico, in Strategie, processi e modelli decisionali per la gestione dell'ambiente, Edizioni Goliardiche, Trieste, 2004

[4] R. Yager, A characterization of the extension principle, Fuzzy Sets Systems, 18, 3, 205217

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THE HISTORICAL DRAWING AS A SYSTEM OF IDENTITY OF A TERRITORY. THE VOMERO IN THE EXPANSION PROJECT OF THE NINETEENTH CENTURY TOWN

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Abstract
The transformation project of the city of Naples, performed in the second half of the nineteenth century, was characterized mainly by adhering to the theoretical concepts and operational set in Europe in the programs of expansion and rehabilitation of the city. Between areas of the urban expansion, the project, curated by Adolfo Giambarba, also involved the Vomero hill. A uniform mesh of parallel roads and radial overlapped to the land of the hill, giving rise, in the plateau, to a new neighborhood, as opposed to existing villages, provided for a building curtain based on the intensive use of the lot. In the current urban fabric of the Vomero the image of the nineteenth-century city is strongly marked from speculative building of the contemporary city, which reads the stratification of urban and architectural interventions of the past.
The paper aims to identify on the basis of a comparison of survey drawings of the 1872 - 1880 and drawings of project of Giambarba the overcoming of the topographical criticalities of the hilly terrain for the construction of the new neighborhood, to identify actions hinge with the ancient villages which still you perceive in the urban landscape of the Vomero. The historical drawing becomes an indispensable tool for documentation - aimed at the protection and preservation of an architectural and urban heritage - through which it is possible to identify the history of a territory.

Keywords: historical drawing, architecture, city, territory, protection

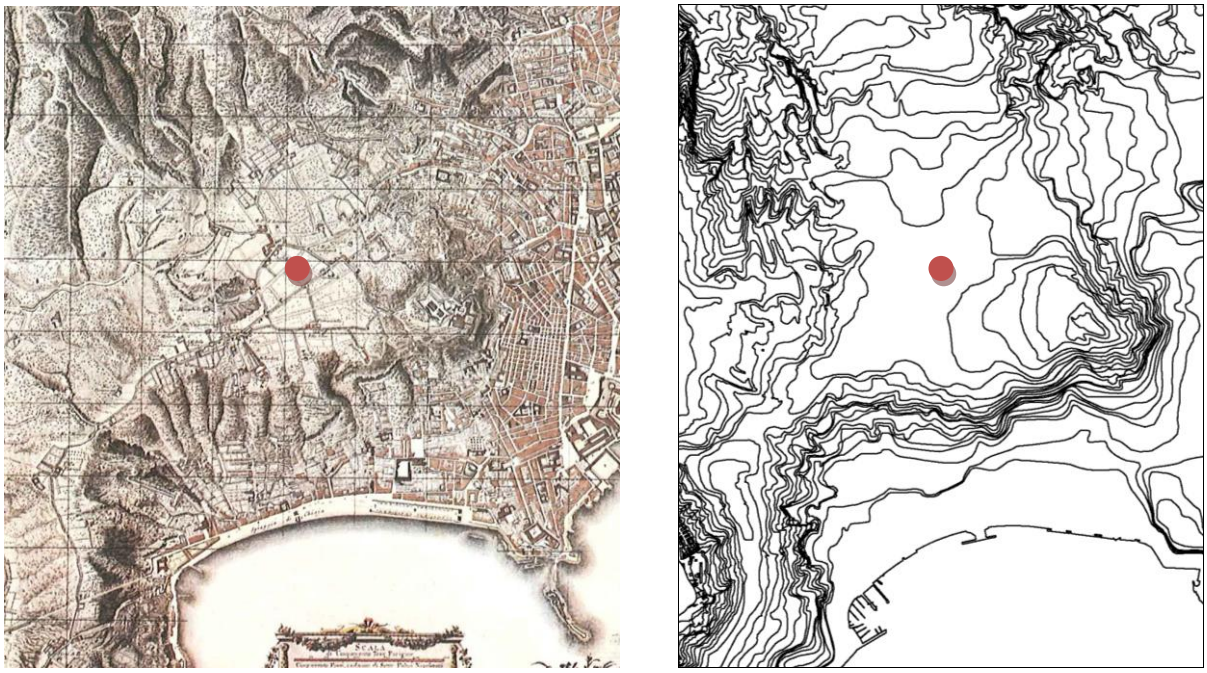
1. The orography of the Vomero hill before the expansion of the town of Naples

At the end of the nineteenth century it was still possible to admire the hill of Vomero for its ancient beauty, as well as it was celebrated by distinguished poets, writers and painters. Praised in the most famous guides for visitors for the healthy climate, the productivity of the fields planted with orchards and especially for the landscape of the gulf that could be perceived from its top, the hill was characterized by a vast plateau that stretched old villages including the Vomero, Case Puntellate, Belvedere, Antignano, Arenella and Due Porte, which included houses, farms and mansions. Numerous were villas scattered along the crest of the hill overlooking the Riviera di Chiaia. Surrounded by lush gardens and orchards were villa Salve, villa Belvedere, villa Giordano, villa Regina, villa Floridiana. Other important and large villas were located within plateau and in the vicinity of the fort St. Elmo [1]. The Vomero was accessible from the lower town, to the west, across the road of the Infrascata, the current Salvator Rosa. In addition, some streets with steps: la Pedementina di San Martino, Calata San Francesco, la Salita del Petraio, vico Cacciottoli, passing, with very steep paths, the difference in height that divided the hill from the plain, reached the Corso Vittorio Emanuele, built in 1852 and from here the lower part of the city until to arrive the sea level. To the east, via Tasso, opened in 1884, starting from St. Stephen's square, at the beginning of the road Belvedere, arrived to the Corso Vittorio Emanuele, following halfway up the slopes of the hill of Vomero, which still remained a rather isolated from the rest of the city.
The orography of the Vomero hill, before the expansion of the town of Naples, made at the end of the



Fig. 1: *Map of Naples,* Federico Schiavoni, 1863-1869. Sheet 12 (Arenella) [2]. Detail of the area between the village Antignano, to south, and Arenella to north. Original graphical scale 1: 2000.

nineteenth century, finds its most important representation in the plant of the city of Naples drawn by Federico Schiavoni, between 1863 and 1869 (fig. 1) [2]. At sheet 12 (Arenella) are represented the villages of Arenella and Antignano; the sheet 8 (the Archetiello) shows the village of Case Puntellate, while at sheets 17 (Forte St. Elmo) and 16 (Villa Ricciardi) is represented il Casale of Vomero, whose name, however, does not appear in the nomenclature of places, unlike in the plants of the Duca di Noja (1775) and Rizzi Zannoni (1790). The plan of the whole city, drawn to the graphic scale of 1:2000 in 24 sheets engraved on copper plates, formed the basis on which it was drawn up the plan of risanamento and expansion of the town of Naples by Adolfo Giambarba, chief engineer of the 1st technical direction of the City [3]. The building fabric is represented with the contour of the buildings treated with a dense pattern with continuous and inclined lines that are interrupted to represent the entrance hall of the buildings, in which is shown the projection of the coverage and the position of the scale; for the sacred buildings it shows the floor plan. With regard to open space, the map shows the design of gardens and cultivated fields, crossed by narrow paths shown with a dashed line. With the technique of maxiclive it is rapresented the jumps of share and steep terrain. The road system, primary and secondary, is enhanced by a careful and meticulous existence of a detailed quoted plane that valorizes the whole plant of the town. Federico Schiavoni, professor of geodesy, University of Naples, was charged, in fact, from City Hall to prepare a geodetic network for the triangulations of the



Figg. 2, 3: Left, *Map of Naples*, Rizzi Zannoni, 1790 [4]. Right: Representation with isoipse of the plateau Vomero - Arenella (processing: arch. Floriana Papa). In red the plateau.

plant; documented are, moreover, the mareographic observations along the coast that predisposed to achieve greater precision in the drafting of the plan quoted.
The plateau of the Vomero-Arenella stretched from north to south: from the ancient Via Confalone to Via Cimarosa, the ancient road of the Vomero that leaded to villa Pietracatella and Floridiana, rising from an altitude of 180 mt. above sea level at an altitude of 195 mt., reaching an intermediate level of about 170 mt., in the area where today stands piazza Medaglie d'Oro. Then, the plateau was characterized, along a stretch, by a narrow compluvium, where it developed the ancient Via dell'Infrascata, whose route ran at an altitude of about 160 mt, along the slope of the hill Arenella. To the east, the plateau was limited by vico Acitillo, located perpendicular to the road Belvedere, while to the west the land sloped down towards the ancient center, reaching the Corso Vittorio Emanuele at an altitude100 mt with the road by Girolamo Santa Croce, which ran halfway up the hill. Only in some parts of the plateau was barely visible the height of S. Martino, who reached altitude of about 250 meters. These height differences in the territory of the Vomero, documented in the plant of the Schiavoni, are well represented in the sole of Rizzi Zannoni [4], in which the technique of chiaroscuro allows you to view three-dimensional position of the plateau in the territorial context of the city. In a representation with isoipse the territory of Vomero-Arenella is summarized in its physical configuration, which highlights the height differences that separate it from the rest of the town (figg. 2 - 3).

1.2 The Vomero in the iconography of the nineteenth century. The view of Heilmann

Many were the views made from the fifteenth century until the nineteenth century, of the town of Naples whether painted or engraved, where you can find the profile of the hill of Vomero, that characterized the urban landscape, with the presence of the fortified building of the St. Elmo.
The point of view chosen by painters makes it difficult to read the plateau that stretched inland, on top of the hill, focusing on representations of the lower part of the city, with the exception of some views, such as those implemented in nineteenth century by Alfred Guesdon, who performed the first representations of the city from above, on board a hot air balloon, during his many travels in Europe [5]. In his views can be glimpsed with more information even of the plateau on top of the hill (fig. 4).
A view special and unusual, for the choice of point of view, is that of Heilmann de Rondechalet, followed in 1841 by the square of Castel S. Elmo, in which you can read at 360° the town of Naples (fig. 5). The view, single sheet folded several times, consists of six parts, each with a nomenclature from which it emerges the location of many buildings and places of the hill, the town and its surroundings. Thanks to the use of a perspectograph, tool used by painters of the period, consisting of a squared frame in which it was framed the scene to represent, the artist, gradually turning the tool, drawn six contiguous views of the entire scene of the urban landscape, having as reference the Hermitage of Camaldoli.
Most important is the legend of the view composed of 366 entries, published for the first time in 2000



Fig. 4: *View of Naples,* Alfred Guesdon, 1849 [5].

with his title, edited by Giuseppe Zampino, providing detailed documentation of how it appeared the city and its surroundings in the middle of the nineteenth century [6]. The city is drawn between the Camaldoli and the Vesuvius, between Pizzafalcone and Posillipo, having as background the outline of the mountains Lattari, the Sorrento Peninsula with Mount Faito, the island of Capri, up to the mountain Epomeo of island of Ischia. In the representation is sacrificed the part immediately below the hill, not being it included in the cone of vision of the observer.
The hill of Vomero is drawn in the sixth table, in which, referring to the legend, it is possible to identify in the foreground, from left, The Belvedere of Villa Floridiana, then called, later,Villa Lucia; after the bridge on the road to Belvedere, it is possible recognize the villa Floridiana; below there are the villa Ruffo Palazzolo Haas, Villa Belvedere, and to right Villa Giannone with the Salita del Petraio.



Fig. 5: *The panorama of Naples and its surroundings. Drawn by the Castel S. Elmo,* G. F. Heilmann de Rondechalet, 1849. Tavola VI. [6] Legend: 1. Punta Parata a Ischia. 2. Villaggio di Campagnano. 3. Il Telegrafo. 4. Castello e Borgo di Procida. 5. Villaggio ad Ischia. 6. Monte Epomeo a Ischia. 7. Casino Reale a Ischia. 8. Casino Sentinella sopra Casamicciola. 9. Il borgo di Lacco a Ischia. 10. Punta di Chiuppeto a Procida. 11. Capo Miseno. 12. Position of Campo Morto, Campi Elisi, Piscina Mirabile. 13. Monte de' Selvaggi. 14. Position of the cento Camerelle, Tempio di Ercole e Sepolcro di Agrippina. 15. Location of Cuma, the ruined town. 16.Monte Barbaro, ancient mountain Gauro. 17. Gli Astroni. 18. Torre Piscicelli. 19. Villa Patrizi. 20. Position of the Solfatara. 21. Valley Soccavo that leads to Lake Agnano and the Grotta del cane. 22. Comune di Soccavo. 23. Villa S. Severini. 24. Bridge on the road to Belvedere. 25. Masseria Pastena. 26. Villa e Masseria Minieri e strada Belvedere. Via su Posillipo. 27. Villa Ricciardi. 28. Monastero di S. Maria La Libera. 29. Chiesa di S. Francesco di Paola al Vomero. 30. Parte del Borgo del Vomero. 31. Villa Bonocore. 32. Villa Testa. 33. Villa Cortese. 34. Belvedere della villa Floridiana (now called Villa Lucia). 35. Villa Floridiana. 36. Villa Belvedere. 37. Villa Tommasi o Cardinale Ruffo. 38. Villa Giamone (now Giannone) or Sentelli. In red is shown the crest of the hill.

2. The drawing of extension of the town on the hill of Vomero

The highland area of Vomero-Arenella was concerned at the end of the nineteenth century by a planned expansion of the city of Naples provided simultaneously to the intervention of risanamento the slums of the city. The hill still represented a mainly agricultural territory with few and sparse episodes of building constructions than those related to farms and farmhouses, linked to the work of the land, and villas that were the second homes of the Neapolitan nobility. The project of 1885 provided for the center of town the thinning of the existing housing through the demolition of warehouses and alleys and the reconstruction of the area through a new road network with the creation of "blocks" of the building fabric, while the outlying areas, including the Vomero, were involved in the expansion plan of the city, which provided new districts in the plains and hills. A neighborhood in the plains was built to the east of the city and was planned in a marshy area, then reclaimed by backfilling works. Were built affordable housing, for the inhabitants of the houses to be demolished. In addition, it was also planned an extension to the east of the city at the Riviera di Chiaia, formed by Amedeo district. The planned neighborhoods in the hills arose, however, in the area of the Vomero-Arenella-Antignano, between Via della Salute, extension of the Corso Vittorio Emanuele, and Salita St. Raphael to Materdei to the Vomero, and finally on the southern slope of the hill of Capodimonte (fig. 6).



Figg. 6, 7: *Napoli.* Left: Extension plan and the risanamento of the city of Naples, 1885. The carmine color indicates the area of cleansing, the red indicates the expansion plan [3]. Right: Extension plan of 1886, particular. [7]. Are highlighted the principal axes of the system of roads with names that were subsequently allocated to them and the system of squares that you will later configure:1. Piazza Vanvitelli. 2. Piazza Medaglie d'Oro. 3. Piazza Muzji. 4. Piazza degli Artisti.

The project of risanamento and expansion was characterized by adherence to the theoretical concepts and operating targets established in Europe in the programs of expansion and consolidation of the towns, oriented on the improvement of sanitary conditions and urban development. The project of risanamento and expansion was characterized by adherence to the theoretical concepts and operating targets established in Europe in the programs of expansion and consolidation of the towns, oriented on the improvement of sanitary conditions and urban development. The design criteria were inspired by the models already performed for the major European capitals and especially for Paris of Hausmann, those models feature a new report road-block.

On this concept were written many development plans in Europe and in Italy. Recall that in addition to the previously mentioned Hasmann of Paris, one of Cerdà for Barcelona in 1859, of Lindhagen for Stockholm in 1866, the Ring of Vienna from 1859 to 1872, the plan of Antonelli in 1852 for the city of Turin, the plan Trotti for the town of Bari in 1867 and Poggi's plan for the city of Florence in 1885.

The Law on Risanamento and expansion of the city of Naples was based on a rough draft, and there were numerous proposals for the definition of the implementation plan: we remember those produced by Lamont Young, Pisanti and Cassitto, Carelli, Giambarba, Folinea, Fantacchioli, Cozzolino. In 1886 it was finally approved the draft prepared by the engineer Adolfo Giambarba regarding the construction and the urban planning and by engineer Gaetano Bruno for sewer and aqueduct. The tender was won by the Company pel Risanamento of Naples, who undertook to carry out the proposed works within a decade, a term that was not respected, especially for economic conditions and the special conditions in which they poured the banks. The work officially began June 15, 1889

and different were laws that followed for the implementation of the plan. The initial project underwent several variations especially in relation to the road layout of the east area.
The basic concept of the expansion project that also affected the Vomero hill was to make the roads as much as possible straight, alternate with a system of squares and square lattices forming and radial, with blocks of regular size, in the logic of academic models. This policy was carried out both in the flat part of the city, in the districts to the east and on the Riviera, both in the hill, showing little sensitivity to the problems of landscape and orography of the area, focusing on building a curtain coded according to the typologies of the period.
New roads were built in the hill of Vomero superimposed on pre-existing ones, while also providing the demolition of some old buildings and road layouts. He remained, however, unstable the link with the town center, despite the realizations of the funicular railways, already provided for ten years before the construction of the new neighborhood. In the plan attached to the expansion plan of 1886 is represented the project of Arenella Vomero district on the basis of the status quo of the area. The design of the new district has a road system with a mesh orthogonal having as axes main the current streets Bernini and Scarlatti, in the which intersection was then designed a square called Piazza Vanvitelli [7]. The upper section of Via Scarlatti, because of the steep slope, it was designed with two bends (now Via Morghen) and a stairway for pedestrians, through which you can reach Castel St. Elmo or the funicular Montesanto (fig. 7).



Figg. 8, 9: *Napoli.* Left: building between Via Scarlatti and via Luca Giordano, in a current photo. Right: architectural detail of a building on Via Luca Giordano, in a current photo.

The axis perpendicular to Via Scarlatti, exceeded with a flyover the ancient road Infrascata, that ran along the compluvium between the hills of Vomero and Arenella, flowed into a large octagonal square, to achieve, always in a straight line, the Arenella, today Muzji square. From the large octagonal square (now Piazza Medaglie d'Oro) departed eight radial roads, including via Tino di Camaino which reached an old stone Village Antignano. The orography of the place, however, has conditioned the drawing in the neighborhood, although currently a first impression of what the area is not perceived, because everything is now hidden by a stratified building that over time has become more and more dense, causing loss of contact with places. Via Scarlatti, for example, was built near the crest of the hill, in the stretch that extended above the Riviera di Chiaia. The nineteenth-century neighborhood, with its towering curtains of the isolates, has represented a closure to the external environment and especially to a landscape that was supposed to attract the eyes and not be an obstacle to its perception. However, the visibility of the gulf from Via Scarlatti would never have been possible given the slight slope of the land on which the road was built and the considerable distance from the point of maximum slope of the land. In parallel to Via Scarlatti ran it yet another road: Via Cimarosa along which there was the garden of the villa Floridiana, before you get to the lookout over the sea. "It's not a different design of the neighborhood, but a much looser building intensity and different typologies would have been desirable, but this would be at odds with the idea of nineteenth-century capitalist city" (Alisio, 2000, p. 61). The hill of Vomero found its point of greatest altitude in the vicinity of the fort of St. Elmo and slowly degraded while to the east to the west its slopes were quite steep towards the Conte di Cerra and Salvator Rosa.
The banks that invested capital for the construction of the new district were before the Tiberina Bank and after the Bank of Italy. Following numerous economic difficulties and above all to the fact that there was now a strong demand for housing in the hills, proving the population is not immediately in

favor of leaving the lower town of old town to reach the upper area, the Bank Tiber, which he had bought soils for the construction of the new district, was forced to give up the full implementation of the ward and to divest its ownership in 1899 to the Bank of Italy, that in order to facilitate private investment adopted the process of splitting lots, for a quicker sale and convenient. Inside the checkerboard pattern, which provided regular blocks, developed a buildings, of which there are still some examples along Via Scarlatti and a Bernini, characterized by an enclosed courtyard, or type in the form of a "C" with an inner courtyard / garden. The facades are almost always surmounted by a projecting cornice, were treated with neo-Renaissance stucco; in them were opened imposing portals and balconies that showed a generally triangular gable or curved. On the ground, a rusticated base ended the facade (figg. 8 - 10). The imposing neo-Renaissance style buildings were joined in the first two decades of the twentieth a building designed for small lots with buildings of two or three floors with architectural features outstretched affirmation of a new floral taste and eclectic. Many of these buildings were then demolished and replaced with speculative interventions that have unfortunately significantly altered the image of the first quarter. The new ward Arenella which was realized in continuity with the Vomero district, was realized after a few decades. In 1931-32 was opened via Mario Fiore, that, surpassing with an overpass the old compluvium of Street Count of Cerra, put in communication the two new districts representing the extension of Via Bernini.



Fig. 10: *Napoli.* Piazza Vanvitelli. Current photo on isolated between Via Scarlatti, left, and via Bernini, right.

2.1 The overcoming the critical issues orographic

The urban plant proved very hard for a territory that had a very varied orography and characterized by significant jumps in altitude and various differences in height. Many were in fact some fittings to overcome some critical issues orographic.

The relief of the plateau did not appear, in fact, uniform, but consists of numerous depressions and valleys; to overcome some of which was necessary to build bridges and overpasses some also monumental. In order to achieve, for example, the connection between the hills of Vomero and Arenella were built two overpasses to overcome the underlying ancient road of the Infrascata. The first, built in the vicinity of Antignano it was necessary to carry out the extension of Via Bernini towards piazza Medaglie d'Oro, and the second most impressive in the structure and decoration was built near the Salita Arenella. Along the continuation of Via Scarlatti at Belvedere, after passing the intersection with Via Luca Giordano, it was necessary to build a flyover on way Annella Massimo, so that the road could go to St. Stephen, in the Via Cilea. To the west, however, to overcome the compluvium defined by vico Cacciottoli was necessary to build a bridge to carry the road Girolamo Santacroce. Another bridge already existed along the Corso Vittorio Emanuele to overcome the height difference of Vico Cacciottoli (figg. 11 - 12).

Only later, in the most steep hill of the Vomero, were instead built roads with hairpin bends to allow views of the Gulf. Via Aniello Falcone, built halfway up the hill, starting by Floridiana, reached to via Tasso; were built Luigia Sanfelice and via Palizzi, on land sloping down to the sea. On the opposite side of the plateau, to the north, was built via Giacinto Gigante, also with hairpin turns, steep path that replaced the ancient Via Confalone.



Figg. 11, 12: *Napoli.* Left, top: Plant of Naples, Federico Schiavoni, 1863-1869 [2]. Sheet 12, particular. Via dell'infrascata. Left, bottom: the two overpasses/bridges in current photos. Right, top, the Schiavoni Plant [2], Sheet 12, particular. Vico Cacciottoli. Right, bottom: the two overpasses/bridges in current photos.

3. The hinge points with ancient villages

During the extension work, the Tiber Bank undertook to respect, consistent with the needs of the plan, the existing noble mansions. Some, however, were destroyed, such as the Villa Doria which stood surrounded by a large garden situated between via Solimena, via Annella Massimo and via Scarlatti; a different fate had, however, the Pontano villa, which it remains today incorporated into the building fabric. To avoid, in fact , its demolition, it was decided to change the direction of the new straight road, via Luca Giordano, designed within the new urban street perpendicular to via Scarlatti, making her fall back in the last stretch towards the church of San Gennaro. In the urban planning of the city, was planned at the beginning of the twentieth century, the development of certain areas for public parks, in the new district, some of which probably also planned to mediate the coupling between the existing fabric and the planting of new urban district. Some of these green areas, even for small parts, have been preserved, such as the gardens of Via Ruoppolo, others, however, were built as a result of further variants of the plan. These nodal points that can be defined as "hinge" between the old and the new, are still visible today where once stretched the old Country. Antignano probably is the village where you can still recognize the identifying characteristics of the ancient village. We find, behind Via Luca Giordano, streets and parts of the ancient building fabric, among which is the house of John Pontanus, built in 1472 and then rebuilt in the early nineteenth century, survived to the subsequent work of expansion (fig. 13). In addition, a plaque on the building, with large arches, which looks out on Antignano, testifies the presence in the place of a bourbonic "duty" in the nineteenth century. With the nineteenth-century expansion is suppressed a major artery of the ancient road system: the second part of the "road of Vomero" from Via Belvedere that cut the plateau from south-east to north-west and, after changing direction, forming almost a right angle, leading to the hermitage of San Martino, with the name of "Road to the Castle."



Fig. 13: *Napoli.* Left: Village Antignano. villa Pontano, followed by a picture of the ancient urban fabric. Right: Building on Via Torrione di S. Martino, 39, followed by the sanfeliciano portal.

With the construction of the new neighborhood has been preserved a section of the old road with the new street name Filippo Cifarielllo, where there is the ancient church of St. Gennariello the Vomero, also known as Piccola Pompei. Via Torrione di S. Martino is yet another stretch of "road Vomero" which probably ended in the current path of via Caccavello Antonio, close to Villa Giannone. Along the path of via del Torrione there is a beautiful sanfeliciano portal at number 39, surmounted by a coat of arms of an important ancient palace and numerous old houses.
Also Salita Arenella, which connected the plateau with the lower part of the city onto the street dell'Infrascata, preserves along the way some testimonials of the existing building fabric, saved from the urbanization nineteenth-century.

4. The current image of the Vomero in the late nineteenth and early twentieth century

The first buildings constructed by the Bank Tiberina were built along the main roads of Via Scarlatti, Bernini and forth via Luca Giordano, respecting the new building regulations which set constraints on the design, defining a specific architectural rules. The buildings followed the installation of the block with the typology of large stately apartment buildings or villas which were built mainly in the most scenic parts, such as the villas's Maria and Elena, in via Angelini. Of the buildings constructed at the end of the nineteenth century remain today only a few examples, some of them even having been demolished to make way for other buildings speculative. Flanked by tall buildings/containers sometimes also worthless architectural, built without preserving the environmental and urban value of one of the most important district of the town, are recognized in the current building fabric, the buildings of the nineteenth and early twentieth centuries for their monumentality and for details character and architectural styles that characterize their facades (fig. 14).



Fig. 14: *Napoli.* Modern and ancient buildings in (from left to right) Via Scarlatti, Via Merliani and piazzetta Durante (via Kerbaker).

At the beginning of the twentieth century, it completes the construction of the lots included in the plan of expansion in 1885, with buildings less monumental and more related to the new architectural trends. While remaining unchanged the road system, the building facades change and changes the consistency of the block which is fragmented into small buildings and it loses the homogeneous character of typology uniform of a chessboard, now emptied of its original style solutions.
Many buildings in style Liberty were built mostly in via Bonito, in via Angelini and via Morghen. Is, in fact, in this part of the hill, immediately in the vicinity of Castel S. Elmo, that it is preserved the image of the urbanization of the late nineteenth century - beginning of the twentieth century. Recall, in Via Cimarosa, Villa and Villa Rosalia Elena, the latter characterized by decorative elements in iron and, in Mancini, Villa Angelina Adele 1909. Along Via Luca Giordano and in the secondary roads of the plant nineteenth century, as via Solimena, via Merliani, via Kerbaker, via Torrione di S. Martino, still remain in their original appearance, some buildings of the era. In via Luca Giordano, corner via Solimena, well preserved, thanks to a recent renovation, is the villa Casciaro, residence of the Neapolitan artist, built in 1910. The detached house, plastered red, presents, in front, balconies with balustrades and columns and decoration with motifs in style liberty. A white band with stucco flowers runs under the eaves, along the perimeter of the villa (fig. 15). On the south side of the Vomero hill, from which it is possible to perceive a wide view over the Gulf of Naples, was built via Palizzi where he worked since 1886 the builder Gaetano Marcolini. Thanks to the presence of the funicular of Chiaia, the road had considerable housing development. Among the oldest buildings we remind villa Villa Pugliese and villa Esposito Lau, built in the vicinity of the sharp slope of the land toward the sea (fig. 16).
The history of the image of the Vomero hill is graphically represented through numerous views, watercolors, etchings and prospective system of representations in the plant that over the centuries have been produced by artists, architects and travelers from every nation, through which you can read



Fig. 15: *Napoli.* Left: Via Luca Giordano, the villa Casciaro. Middle: Via Scarlatti, modern and ancient buildings. Right: Via Merliani, modern and ancient buildings.

the drawing of the transformation of a territory that for its particular configuration has characterized the image of an entire city. Today are radically altered the Vomero hill and its plateau. No longer a hill covered with green fields, far from the chaos of the city below, but an "extension" of the city, it itself city.
The drawing of the Vomero old, whether it be a plan, a view or a table, it returns what has been and what it could in the future be permanently deleted, assuming thus a fundamental value of the testimony of a story that should be known to be preserved. The drawing, therefore, plays a key role in the iconographic documentation of a place and important for the protection and preservation of the built environment, testimony of the life of man.



Fig. 16: *Napoli. Via Palizzi.* Left: The drawing of the facade of Villa Pugliese [8]. Right: drawing of the facade of the villa Esposito Lau [8]; Middle: current views of the two villas.

Bibliographical References

[1] CELANO, Carlo. *News of the beautiful, ancient and curious of the city of Naples.* Naples, 1692, Edited by the G. B. Chiarini, Naples: Stamperia di Nicola Mencia, 1859, vol. IV, p. 745-753.

[2] *The map Schiavoni in 24 sheets.* In: *Le Bussole. Tools to know the town. Reprint*. N. **7,** dicembre 1992. Napoli: Elio De Rosa Editore by Cosmofilm snc, 1992

[3] RUSSO, Giuseppe, *The Risanamento and Expansion of the town of Naples.* Naples: Società pel Risanamento, 1959

[4] RIZZI ZANNONI, Giovanni Antonio. *Plan of the town of Naples as it exists in the present year MDCCXC,* Biblioteca Facoltà di Architettura, Federico II di Napoli.

[5] FINO, Lucio. *The landscape painting in Naples in the graphics from the seventeenth to the nineteenth century*. Naples: Grimaldi & e C. Editori, 1990

[6] ZAMPINO, Giuseppe (a cura di). *The panorama of Naples and its surroundings. Drawn by the Castel S. Elmo, G. F. Heilmann de Rondechalet*. Naples: Grimaldi & e C. Editori, 1990

[7] ALISIO, Giancarlo, *Il Vomero*. Naples: Electa, 1987.

[8] LA GALA, Antonio, *The Vomero and the Arenella. A picture story.* Naples: Guida, 2002.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The “diaeta” in the roman home

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Abstract
6 century B.C., the diaeta was a room used as a receiving area and also where they partook of meals in the roman home, the diaeta often opened outwards to a small garden, where they grew fresh produce attempting an alimentary self reliance, this was added to the production of medicinal herbs and ornamental plants. Some examples are the house of Fauno or the Villa Imperiale and others. The diaeta held a section reserved for the atium, a small space used during the day, where the family gathered to study or relax, listen to music and a place where they could be together and out of the public eye. Vesta a roman and latin divinity, who was attributed the cult of the family and public hearth, reflects that which in a home is the centre of care and needs, and daily qualms and activities. The meeting place for those who share an area. The hearth, the centre of all activities.

Keywords: diaeta, domus romana, kitchen

The home is the place of the domestic hearth where a family co-habitats. Italy is one of the countries with the highest percentage of (80%) people who are apartment owners. In this context a single family home represents the most sought after property because of its independence from the other units and the freedom from condominium regulations, combined with having more privacy and a garden. A single family home, more so than multifamily homes has deep anthropological and historic roots and symbolisms: one of the oldest man made manufactured articles, it is the place of auto representation, of memories and social and personal identification.
The predecessor of a single family home was the *domus* romana that even though slightly different defined the concept of a single villa. Limiting to an architectural point of view and going through some of its aspects like bio architecture as in rain water gathering and a correct exposition to the sun, without forgetting the use of natural materials of the time like wood, stone and blocks.
The absence of multi floor buildings can be seen in Pompei *intra muros*, the highest home preserved thus far has two floors plus the ground floor. You can see that most of the insulae that occupy the western quarters have not been constructed on but are occupied by enormous gardens. In the year 79 Pompei had not been completely occupied within its walls, and so there was no reasons to edify vertically.
The *domus* was the most prestigious and richest home this type of building had a rectangular building plan. The entranceway of the *domus* romana, was a pathway from the outside to the atrium, in most homes it didn’t bring you directly to the outside however most were slightly set back from the hallway. The atrium was the most important place in the home, it was a rectangular or quad angular form, set in the centre of the home. The hallway was divided into two parts: the vestibule and the fauces.

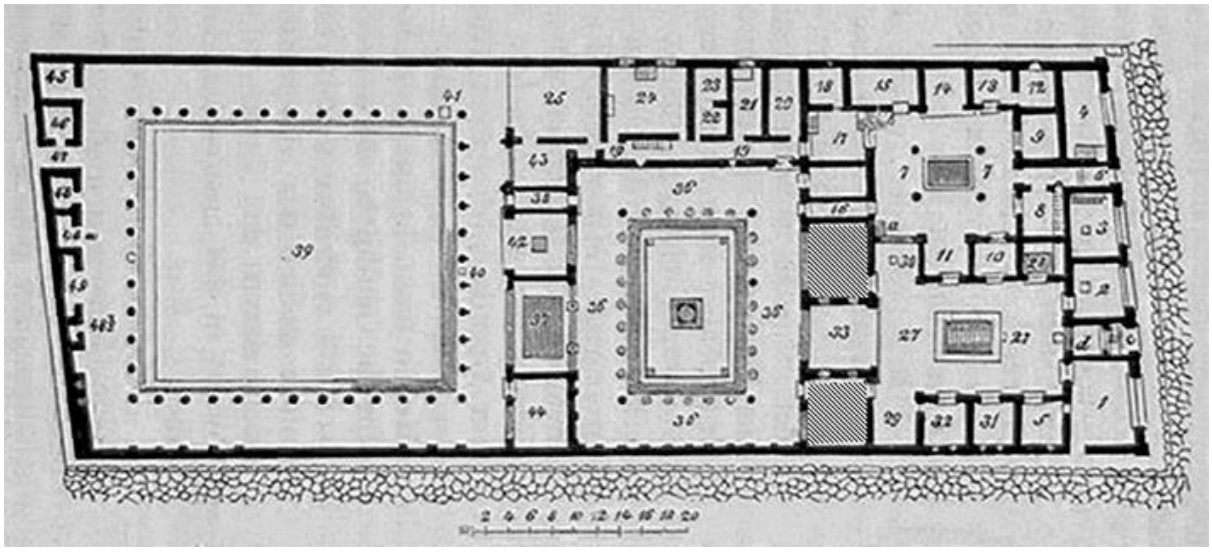

Fig. 1: Plant “Casa del Fauno” in Pompei.

“some friends arrived, and in their honor a column of smoke spiraled to the sky, of course not as dense as the one that comes from the kitchens of important people and puts the fire station in alert, a modest smoke column, that announces the arrival of guests” Seneca in *Lettere a Lucilio.*

Seneca describes a scene from daily life, and gives us essential information, the culina was an indicator of the social status of the owner. Even the most modest house had its own kitchen. In homes of antique Italy this was not always the case, because originally the kitchen was situated in the atrium, in other words in the central part of the home. The word atrium reminds us of the origins of this word, it derives from ater, black, the color of ash with which smoke rose and covered the walls of the house. In the republican era the hearth was moved in most homes to the kitchen, which became a room of its own. Because of the vapor, it was often placed to the side as long as it was not too far from the dining area.

The size of the Pompeian kitchens was between 6 and 20 mq. A fireplace was always present , it was the centre of all the kitchen activities; on average it was of stone and angular and was often about 120cm high and 80 cm deep. In a round niche of stone under the fireplace they would keep the firewood.

Before becoming one of the most important places that opened to the atrium and the peristylar, the dining room of the older homes was on the upper floor and was called the cenaculum, a name which in the following years came to mean superior level, in the absence of an upper floor, meals were taken in the tabilnum, a custom often continued in the more modest homes. However most often the homes had a vast area exclusively dedicated to meals. The triclinium, a name derived from the triple bed on which, as in the Grecian style, guests would lay.

Around a table or a serving table three beds would be placed, each of three places, on which the guests would take place according to a precise hierarchy; on the left bed, the lectus imus, the host and his family would sit (or in the absence of a son, a liberto); the bed in the middle, lectus medius, was reserved for guests of honor or in the grand homes, the place near the host, would be called “posto consolare”. On the right was the lectus summus, reserved for the other guests. Children would eat their meals with the adults but they were seated at a smaller table where they sat and did not lie on a bed; this system was uncovered in a house behind the “Terme Central”. If the room had space for only two places it would be called bicilinium; in that case the beds would be placed at right angles, as could be seen in many modest homes. Outdoor summer dining areas were organized like the bicliniul and summer meals were often arranged in the gardens, shadowed by a patio, and between the beds fountain water would flow. The beds of these summer dining rooms were of stone, plastered and painted. Indoors the beds were made of wood and only fragments remain of the carbonized wood and some bronze ornaments.

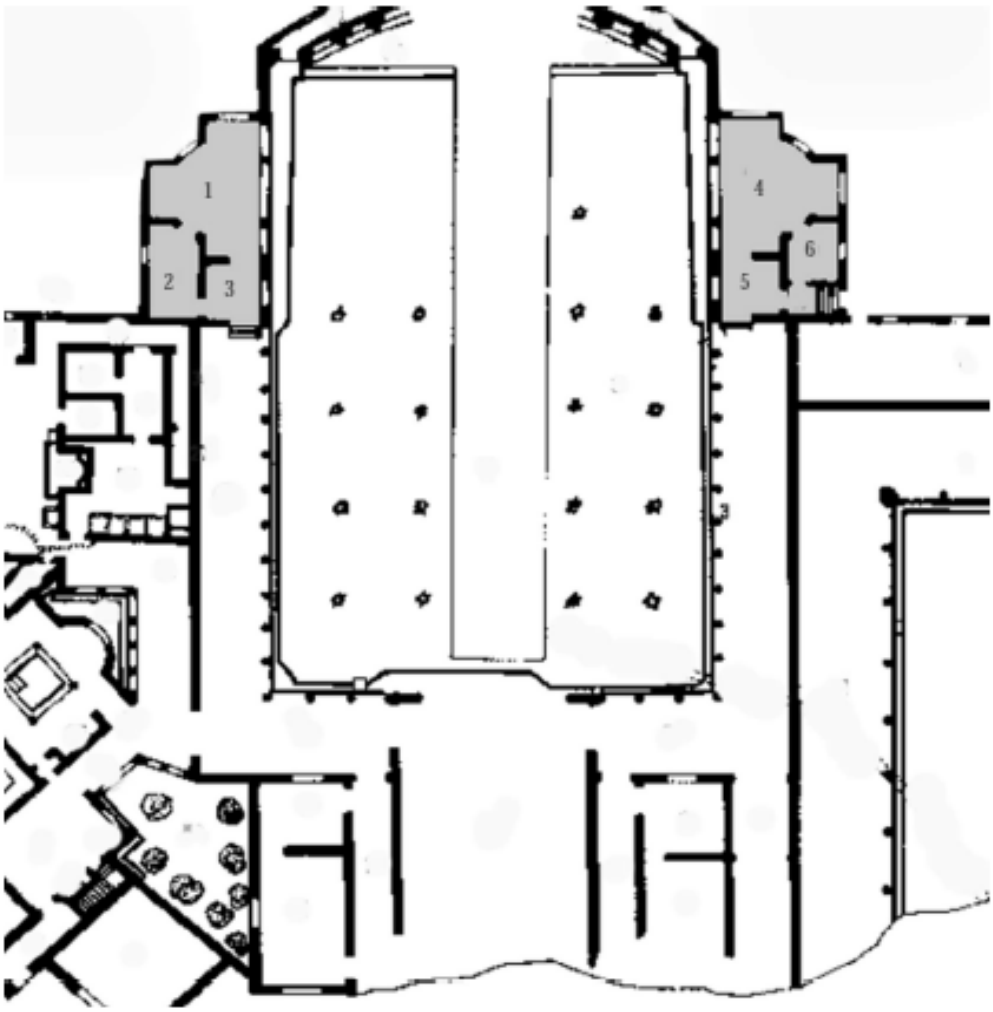

Fig. 2: Part of the plant “Villa San Marco” in Castellammare di Stabia.

The ever present garden (viridarium - hortus), guaranteed a partial self sufficiency insured by cultivation, in the garden there was every type of vegetable, and courtyard animal. The vegetable garden of the Pompeian homes (hortus, hortus viridarium, o hortus et viridarium) was conceived as an extra element in the back of the home, never in the front yard or anywhere else. The Hortus is the field, the mini farm, in which not only did they cultivate home grown foods so that they could be self sufficient but also herbal medicinal plants and ornamental plants, and also cages for the animals. When the area around the home was sufficient enough, to the hortus was added a viridarium, in which a pleasure garden was set up. This idea of a garden, as an expression of the private aspect of roman architecture, expresses the need to include nature into the living area, placing the garden at the same level as the living area, so much so that when there is no space for a real garden it is reduced to becoming an element of the house creating tall rigid forms, forming berry bushes and hedges like short vegetable walls.

It was necessary to include inside the domus an area dedicated to the family and relax. The atium was usually situated inside of a diaeta.

The diaeta was a small room used during the day, where the family reunited to study or relax and stay together away from public activities. This room was more or less isolated, usually it was open to the outdoor architecture or a pergola. For further understanding, in villa San Marco near Castellammare di Stabia we can see many examples of diaetae. The villa was situated near Castellammare di Stabia. This city disappeared along with Pompei and Ercolano during the eruption of the Vesuvius in 79. The



Fig. 2: Representation of the goddess Vestia.

villa, was set on the confines of this antique city, and can be included in the residential urban villas, where the landscape becomes an important element of the structure and conditions the development.
Inside the villa we can see clear examples of living rooms in fact on the edges of the green area to the side and in front of the ninfeo there are two groups of structures made of three diaetae very similar to each other in shape and distribution of the openings that have large windows on to the gardens and the panorama, they demonstrate the will to exploit the closed rooms as rest areas directly connected to and to benefit from nature. In the first group of diaetae, which can be reached through three gardens, the walls are decorated with small sculptures of high artistic value, among which Perseo with gladio a Medusa head and Ifigenia with the Palladian on her shoulders, then the triclinium which opens onto the garden, the walls are decorated with lively scenes, and is connected to the inside diaeta.
These living rooms were always carefully decorated with mosaics and a frescos. This way the diaetaes became places where the family could isolate themselves tranquility outdoors. The *domus* roman can be read like the *ante literam* of the farm houses. In this typology there is an in extractible chain of cultural, economic, social and historical aspects that include architecture, function and technique that originally defines the relationship between the people who live in the country and the reality of the territory, that varied thru the centuries and in the various themes, testimonial of transformation of the territory and society. In a farm house where living and production spaces are two

realities that co habitat together there is an evident representation of environmental sustainability and integration with nature that we talk about today but is difficult for us to create, the court yard has a fundamental importance, especially the open court type, because besides being the centre area it separates the living area from the fields while remaining an important part of the house, it can be defined as a small private universe. What is now the center of the house in the family? Vesta a roman and latin divinity, who was attributed the cult of the family and public hearth, reflects that which in a home is the centre of care and needs, and daily qualms and activities. The meeting place for those who share an area. The hearth, the centre of all activities. Modern day architecture gives a lot of importance to parts of the house where we spend little time during the day, the day to day stress of modern life has brought us to forget the healthy principal of sitting down together for a meal at least once a day, meals have become meager and often eaten while standing or eating things that are very different from those traditional ingredients of our heritage.

Bibliographical References

[1] JEAN-PIERRE, Adam. *L'arte di costruire presso i romani*. Longanesi, Milano, Aprile 2011.

[2] MARTUSCIELLO, Sabina. *Il luogo etico*. A cura di M. Givannini e D. Colistra, in Spazi e culture del mediterraneo, Kappa, Roma 2006.

[3] WEEBER, Karl-Wilhelm. *Vita quotidiana nell'antica Roma. Newton & Compton, Roma 2005.*

[4] GAMBARDELLA, Carmine. *Atlante di Pompei*. La Scuola di Pitagora, Napoli, 2012.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Life and Knowledge by glottology and graphics: disclosures of the ancient gamma greek letter

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Abstract
The letter "Gamma" (Γ, γ), the third of the ancient Greek alphabet, conceals a number of suggestions interweaving glottology, symbolism and graphics. A lot of words starting with "Gamma" refers to the concept of motherhood and birth: "Γῆ" , the Earth, but also Gaia, the primordial goddess which gave birth to Olympus gods by parthenogenesis; in this last word, "genesis" is "γένεσις", the beginning, the creation; besides, "γίγνομαι" means "I'm born", "γενεά", is the birth, but also the lineage. All these words can find a sort if linguistic hub in "γυνή", the woman. As a matter of fact, the graphema of the minuscule "Gamma", "γ", reminds the mystical /mythological chalice, i.e. the female womb, and its triangular shape, with the vertex downwards, sketches the Water, "▽", and the Earth, "⩛", the cold and female among the four alchemic elements. On the other hand, "γηράσκω" means "I grow hold". The word "γλῶσσα" is "tongue", but also "language", "γιγνώσκω" means "I learn, I understand, I know", and "γεωμετρέω" "I measure the
land". Actually, the graphic of the capital "Gamma", "Γ", calls up the shape of a knee, which in turn finds its etymon in "γόνυ", but also the shape of a set square, "γωνία", one of the most ancient tools for measuring and drawing.
This paper runs across a first approach investigating the associations among linguistic and graphics meanings of "Gamma" as the "root" of the two fundamentals of mankind: life and knowledge.

Keywords: Graphics, Symbolism, Glottology, Gamma letter

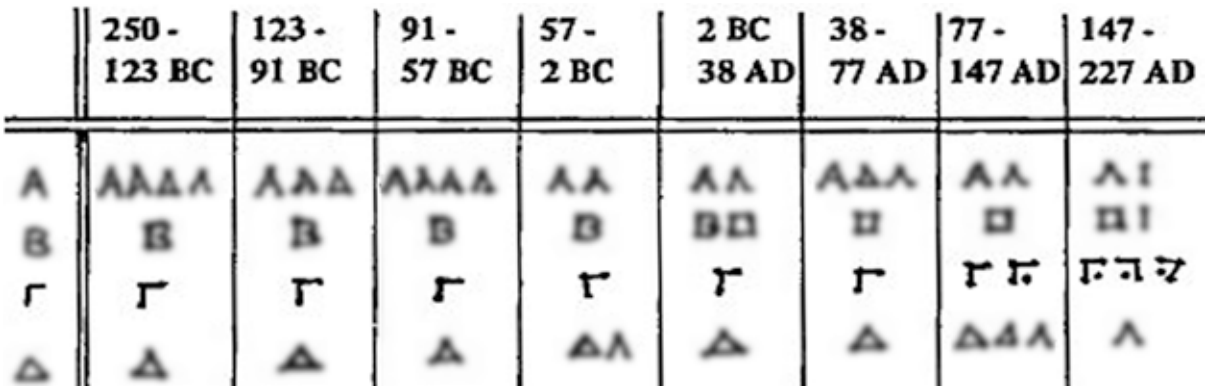

Fig. 1 Olson : Greek letterforms development on Parthian Drachms, copyright (c) Illinois Institute of Tecnology, Institute of Design

1. Introduction

The letter “Gamma” (Γ, γ) **[1],** the third of the ancient Greek alphabet, conceals a number of suggestions interweaving semantics and glottology, mathematics and geometry, symbolism and graphics. Indeed, a lot of ancient Greek words starting with “Gamma” refers to the concept of motherhood and birth. This paper runs across a first approach investigating the associations among linguistic and graphics meanings of “Gamma” as the “root” of the two fundamentals of mankind: life and knowledge.



Fig. 2 “Disclosures of Gamma .Pasqualina Luongo

2. Conception, birth, life and senescence

In the ancient Greek language, the most simple, full-sense and famous word (but also a phoneme and a logatome) starting with “Gamma” is “Γῆ” [gē]: the Earth, but also Gē-Gaia, the primordial goddess which succeeded Chaos (the extreme disorder) to give birth to Olympus gods by parthenogenesis; in this last word, “genesis” is “γένεσις” [génesis], the beginning, the creation. Besides, “γίγνομαι” [gígnomai] means “I’m born”, and “γενεά” [genēa] is the birth, but also the lineage. “Γάμος” [gámos] means both “marriage” and ”wedding”, and “γάλα” [gála] signifies both the “human milk” and a “nursling”. All these words can find a sort of linguistic hub in “γυνή” [güné], the “woman”. As a matter of fact, the graphema of the minuscule “Gamma”, “γ”, reminds the mystical/mythological chalice, i.e. the female womb, and its triangular shape, with the vertex downwards, sketches the Water, “▽”, and the Earth, “⛛”, the cold and female among the four alchemic elements. It is noteworthy that the concept of “womb” is also expressed by the term “γαστήρ” [gastér], which, in turn, denotes the “stomach” too. On the other hand, “γηράσκω” [geráskō] means “I grow hold”.



Fig. 3 “Millenial Gaia Statue” . Oberon Zell

3. Intelligence, knowledge, science and technology.

The verb “γιγνώσκω” [gignōskō] signifies “I learn, I understand, I know”, and the term “γνῶσις” [gnō̃sis] denotes “cognition”, “wisdom”, but also “survey”, “inquiry”. These terms also address to other fascinating words as “γνώμη” [gnōme] and “γνώμων” [gnōmōn]. The former represents a “countermark”, as well as the “intellect” or a “judgment”. The latter implies even more multifaceted meanings: an “indicator”, a “ruler”, the “judge”, a “gnomon” in the strict sense of the word, i.e. the pin of sundial, or, from Euclide, a “parallelogram complementary to another parallelogram”, viz. the part of

a parallelogram remaining after a similar and smaller parallelogram has been removed from one of its corner. The word “γλῶσσα” [glõssa] is “tongue”, but also “language”, and the verb “γράφω” [gráfo] represents both “I write” and “I draw”. Furthermore, the verb “γεωμετρέω” [geōmetréō] indicates that “I measure the land”. Actually, the graphic of the capital “Gamma”, “Γ”, calls up the shape of a “knee”, which in turn finds its etymon in “γόνυ” [gónü], but also the shape of a “set square”, “γωνία” [gōnía], one of the most ancient tools for measuring and drawing.



Fig. 4 *God as architect of the world* Miniature from a moralized Bible Osterreichische Nationalbibliothek, Wien.

4. Gamma in notational systems and mathematical symbols.

If on the one hand, linguistic analysis suggests the semantic association of the letter “gamma” to the many concepts so far highlighted, on the other hand – and somehow not in contradiction with the previous one – the use of the letter “gamma” from the Greek alphabet in both its lowercase and capital forms (γ, Γ), is full of meaning even in the complex system of mathematical and geometric notation **[2].** The symbol γ’, in which the juxtaposition of an apostrophe to the letter of the alphabet highlights the fact that the sign has no phonetic and numeric value, primarily represents in the system of mathematical notation of the Greek world the number “three”. A number full of magical and symbolic values that occurs countless times in the theoretical speculations of ancient classical thought. On the other hand, the number “three” is also referred to as ghimel (g) of the Hebrew alphabet in its various forms (Samaritan Hebrew, Rabbinical) and the symbolic dimension of the capital gamma reappears several times in ancient notation systems.

The introduction of the Arabic numerical system in Western culture has completely replaced alphabetic-numeric notation, leaving, however, over time, some letters of the Greek a significant role in geometric-mathematic notational systems. Not only because of the habit of associating the lowercase letters of the alphabet Greek to the concept of angular width (in Euclidean geometry) or in the case of descriptive geometry notation relating to “plans” or even for the use of certain Greek letters to indicate particular concepts such as, for example, the ratio of the circumference to its diameter, the well-known π , introduced by William Jones in 1796 , or the golden ratio represented by the letter ϕ. Moreover, Gamma function or Euler function $\Gamma(n+1) = n!$ is the mathematical model represented by the “meromorphic function, continuous on positive real numbers, which extends the concept of factorial to complex numbers”. However, what is especially interesting is the presence of “memories of signs” linked to a letter gamma in some mathematical symbols whose origin has still to be investigated. This is the case of the square root of the surprising symbol of ancient origin which is still not certain. In several Egyptian hieratic papyri from Kahun dating back to the fourteenth dynasty, there is a hieroglyph similar to the corner of a square in the upper left corner to indicate the square root of a number. In fact, Cajori in his seminal A History of Mathematical Notations clarifies how the symbolism of the square root was not always unambiguous **[3],** but the interpretation that is more functional to the discussion being developed is what can be seen in the symbol √, especially in the version with the prolongation of the horizontal line memory of a right angle not too far from the capital gamma (Γ).

The association between the right angle and gamma is also offered as a starting point for further interesting graphic analogy between the sign Γ and the set square (γωνια). Perhaps the most ancient geometric drawing instrument.

5. Between the sign and instrument Γ and the set square.

As part of the tools required for technical drawing, the set square falls into that category that can be defined as “guides” (along with rulers, curvilinears, etc.), a category alongside that of “outliners” (pencils, pens, compasses...) and that of “supports” (papyri , paper, tablets...) and “measurers” (line goniometers, protractors...) represent the tools of technical drawing.

Geometry, grouped by Euclid in an organic body that is still indispensable today, is based on logical rigor and graphical verification; abstract science interacts with geometric drawing, which uses only tools that allow for accuracy in drawing and measurement: above all the ruler and compass. Archaeological findings are valuable witnesses of the instruments that wre already adopted by the Greek and Egyptian civilizations. In addition to rulers and compasses, in the several museums it is possible to see set squares, protractor calipers (to enlarge or reduce the measurements to scale) as well as drawing pens. An instrument that did not undergo substantial changes until modern times, with the introduction of the orthogonal projections of Gaspar Monge the use of set squares and T-squares became indispensable for a geometric representation that showed fundamental support for industrial design.

With regard to the set square, created to draw straight lines at right angles, in the Roman and Greek period it had the form of two locked arms. The set square sometimes had a base (the so-called set square with base) widely used also in factories and on construction sites. From the 1600s, it became triangular (either a filled triangle or formed by three rods, as today) with particular degrees (45°, 30° and 60°) with it being difficult not to associate the idea of the Pythagorean triangle that has sides measuring 3,4,5 and is also called the sacred Egyptian triangle **[4].**

It is based on this very highly symbolic representation of the right angle and geometric figures, with it worth noting the similarity between the sign Γ of the Greek letter and the set square and therefore the relationship that somehow can be seen between the Γ and the right angle. It is the angle of excellence, the origin of the main forms of architectural space since ancient times, somehow “origin” of the elemental form of the set square and therefore also of the circle inscribed in it. The set square is the fourth of the fundamental geometric figures. Symbol of the Earth, as opposed to the Sky, it also symbolizes the Created Universe in opposition to the Non-Creation and the Creator. As an anti-

dynamic figure par excellence, the meaning of the Set Square is one of the arrest, the isolated moment, stability **[5].**
However, the significance of the Square is also expressed in the terrestrial element, intended as the Created, as a manifestation of the divine as the creator, the one who gives birth. It is no coincidence that in Pythagorean tradition, to which we owe the experimental discovery of the relationship between sounds and the analogy between the perfection of numbers and geometrical figures, the circle and the sphere as well as the regular polygonal figures and those of the solid geometry, all constructible with the set square (γωνία) and compass, were the elements with which the Supreme God made the Universe in harmony .



Fig. 5 *St. Thomas the Apostle, patron of Architects* Fresco (16th century) Cathedral of Venafro (Isernia, Italy).

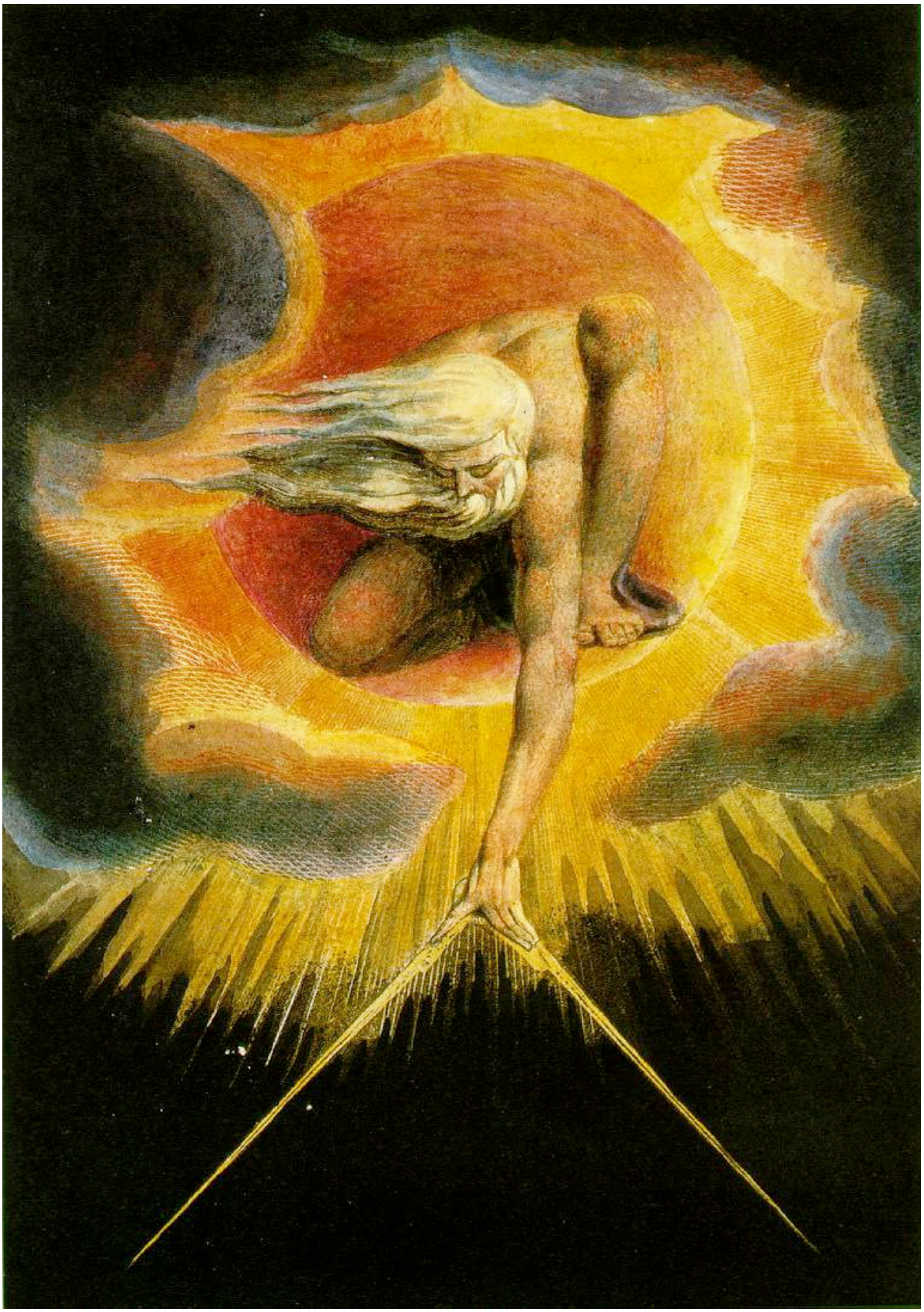

Fig. 6 *Ancient of day* William Blake, 1794. London _British Museum London

Thus, retracing the suggestions from which we started, the association between the sign Γ and the set of meanings that may be associated to the right angle is not entirely inappropriate, which represent the geometric and conceptual genesis of the set square. From the most iconic of the bent knees upon which the woman (γυνή) rests her baby “stable” to the more symbolic linked to the genesis (γένεσις), to the Earth (Γῆ) to the idea of “order” that follows the original Chaos. Even more general to the theme

of knowledge understood as awareness of the origins, the beginning of all things, and somehow the end when considering Le Corbusuer when he wrote in a letter published in his Praise of the right angle "Death is the exit for each of us. I do not know why you want to make it atrocious. It is the horizontal of the vertical: complementary and natural".

6. Concluding remarke

Symbols, signs and graphs - including letters –frequently are more communicative than the language itself, and they can last for a so long time to survive to their inventors. This is perhaps one of first reasons for their emotional charm and scientific attractiveness. Linking present concepts and meanings, or even tools and objects, to their past linguistic and graphic roots can reveal surprising and intriguing ways networking imagination, material word, existence, learning and mastery. The above argued theses clearly are deeply rooted in the classical humanities. However, they undoubtedly support – should there be any needs – that the knowledge and the interpretation of our heritage is one of the stepping stone – may be the foremost -for our future socio-economic and scientific-technological development.

Note

[1] The capital and minuscule "Gamma" letter "Γ, γ" respectively corresponds to "G, g" of the Roman alphabet currently utilized by most of modern western languages; however, "gamma" always sounds as an occlusive "g" (as in go), never as a fricative "ʤ" consonant (as in gentle).

[2] For a brief summary see: S. Giulini, I simbolo della matematica in M. Falcidieno Parola, Disegno, Segno, Alinea, Firenze 2008, pp141-189.

[3] Cajori notes how the symbolism of the square root can be divided into four groups which have as the letter R (first letter of radix), the letter l (first letter of latus with reference to the side of the square) and the sign √ and the fractional exponent ½ as basic elements.

[4] The triangle is connected to the various symbols of the ternary. It expressed mainly the Ideal of the Divinity, that of the ascent of man towards the divine transcendence, the Universal, the Macro-Cosmos, as well as the idea of the projection of the Divine or heavenly powers to Humanity and Nature.

[5] Among the geometric shapes, the Square and the Circle are continually recalled. The Square represents Space and the Circle (or Spiral) represents Time: the division of a Circle with the Cross of two perpendicular diameters represents the Quadrature of the Circle

Bibliographc references

[1] BONAZZI B. (1939). Dizionario Greco – Italiano. Alberto Morano, Napoli. pp.1228.
[2] CAJORI F., (1928) A History of Mathematical Notations, London, 1928
[3] CAYNE B.S. (1988). The New Lexicon Webster's Dictionary of the English Language. Encyclopedic Edition.
[4] CHEVALIER J., GHEERBRANT A. (1999). Dizionario dei simboli. BUR Biblioteca Univ. Rizzoli. RCS MediaGroup, Milano. 2 vols., pp. 612.Rev Upd. Ed. Lexicon Publications Inc., New York. pp. 2064.
[5] GEMOLL G. (1959). Vocabolario Greco-Italiano. Remo Sardon, Firenze. pp. LII-1148.
[6] HAMBLY M., Drawing Instruments (1580-1980), Riba, London 1982;
[7] KOLONIA A., PERI M. (2008). Greco antico, neogreco e italiano: dizionario dei prestiti e dei parallelismi, Zanichelli, Bologna. pp. 542.
[8] PIEDEMONT PALLADINO S.C., (Ed.), Tools of Imagination. Drawing tools and Technologies from the Eighteenth Century to the Present, Princeton Architectural Press, New York 2007.
[9] ROCCI L. (2011). Vocabolario Greco-Italiano. Società Editrice Dante Alighieri Srl, Roma. pp. XXVII-2064.
[10] SCARDIGLI P.,Gervasi T. (1978). Avviamento all'etimologia inglese e tedesca. Dizionario comparative dell'elemento germanico comune ad entrambe le lingue. Dizionari Le Monnier. Le Monnier, Firenze. pp.XVI-406.
[11] SCHENKEL F., BRUNETTI F. (1990). Dizionario Greco/Italiano -Italiano / Greco. F.lli Melita Editori, La Spezia. pp. 972 + 538 + 14 plates.

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The design of the architecture, of the sculpture and of the botanical in the "Villa Comunale" in Naples.

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Abstract
At the dawn of the eighteenth century the Riviera di Chiaia looks like an urban promenade overlooked by monumental religious buildings, large and small residential buildings, a long row of trees extending from the promontory of the block triangular Pizzofalcone up on the top of which is located the tower of Mergellina. This applies to the urban on which, during the eighteenth century, we will work a substantial modification of the design of places based on the design of a "Royal Villa" settled, first, on the coastal area available and, later, in the course of Nineteenth Century, expanded to the sea through the prior construction of a filled artificial. In the course of about two hundred and fifty years the continuous process of growth and change in this area has helped to set up an area of great landscape value testimonial consists of monumental architecture as the Zoological Station, pavilions en plein air as the Rotonda of Errico Alvino, sculptural groups in mythological theme or simple marble busts as well as a plant vegetation consists of rare botanicals. The research aims to document graphically, thematic categories and for different time sections, the cultural environment present in the Villa Comunale of Naples in a historical moment, as the current one, which seems to have lost its sense of responsibility due in respect of a landscaped area of great testimonial value.

Keywords: architecture, vegetation, sculpture, relief, drawing.

1. The Villa Comunale between nature and artifice
At the dawn of the eighteenth century the Riviera di Chiaia looks like an urban promenade overlooked by monumental religious buildings, large and small residential buildings, a long row of trees extending from the promontory of the block triangular Pizzofalcone up on the top of which is located the tower of Mergellina.This applies to the urban canvas on which, during the eighteenth century, we will work a substantial modification of the design of places based on the design of a "Villa Reale" settled, first, the coastal area available and, later, in the course of 'nineteenth century, expanded to the sea through the prior construction of a filled artificial. In the course of about two hundred and fifty years the continuous process of growth and change in this area has helped to set up an area of great landscape value testimonial consists of monumental architecture as the Zoological Station, pavilions en plein air as Rotonda of Errico Alvino or the Temple of Virgilio sculptures depicting mythological or marble busts dedicated to famous people as well as a plant vegetation consists of rare botanicals. The research aims to document graphically, thematic categories and for different time sections, the cultural environment found in the Villa Comunale of Naples at a historic moment, as the current one, which seems to have lost its sense of responsibility due in respect of a landscaped area great testimonial value.

2. Chiaia, the origins

A long slightly curved beach, relaxing between the headlands of Pizzofalcone and Posillipo, characterized in part by the presence of a median island and tuff wall, in the north, from the back slope of the hill of Vomero: this is the new suburban area on which attest in the Augustan period, the main line of development of the western Greek-Roman Naples. On the principle of establishing a connection between Neapolis and Puteolis through the valley of Chiaia and the opening of the crypt neapolitana, makes the Riviera di Chiaia area on the fringes, an enclave nature, protecting, for a long time, the characteristic vegetation, mainly in the Mediterranean, type semiboschiva. Subsequently, between the eleventh and thirteenth centuries, the creation of small farms located tangentially to the slopes of the hill of Vomero in the so-called field Canineo, and, on the waterfront, the building of the church of San Leonardo in insula maris, built on the islet bedrock, producing a sparse urbanization based on the agricultural use of the soils and on the fish dell'antistante gulf. Not only farmers and fishermen during the fourteenth century, the realization in the plain of Chiaia three buildings for worship - located respectively to the east, Santa Maria Chapel, to the west, Santa Maria of Piedigrotta, and in its central part, the Ascension, - provide for the entire area to a sober densification of residential building that also will integrate also with the existing defense structures such as the Torretta and the Tower of Alarçon. The balanced mixture of nature and artifice is found in the second half of the sixteenth century, through the view, engraved from the east, by Etienne Duperac and given to the press by Antoine Lafréry (1566), as well as both etching through the bucolic George Hoefnagel (1578) and it is through the scenic perspective illustration of Jan van Stinemolen (1582) with a double vantage point located to the north of Naples. This is a very unusual image, outside of any previous tradition of landscape painting. Naples appears as if seen from the hills north of the city, rather than being taken up by just one point of view to the north and apparently lying on the alignment between the Castel dell 'Ovo and the silhouette of Capri on the horizon, appears to be the combination two images obtained from different locations.

The view is, therefore, unreliable as a reference topographic overall. It does, however, provides us with a faithful documentation of urban areas more limited, such as Chiaia, the Largo di Palazzo, the area of the Old arsenals, still built in views. Only in the third decade of the seventeenth century, as shown in Fidelissimae Urbis Neapolitanae cum omnibus et nova for soloists accurate delineatio Alessandro Baratta 1629, Borgo di Chiaia looks like a building curtain continuous and compact.

In the view was clearly visible long and narrow beach that fronts, from Pizzofalcone to Mergellina, Borgo di Chiaia. On the coast line are detectable both the House of Invitti and is the church of San Leonardo in insula maris. While appearing as a simple beach area, in truth it was already infrastructured by the presence of the Angevin road, which later in 1698 will be adorned by a row of trees interspersed with monumental fountains at the behest of Luis Francisco de la Cerda y Aragon, Viceroy and the Duke of Medinaceli. The son of Juan Francisco de la Cerda and Catalina de Aragón y Cardona, inherited the titles of his father, the Duke of Medinaceli, Duke of Alcalá de los Gazules, Marquis of Cogolludo, Marquis of Tarifa and the Marquis de Alcalá de la Alameda; and his mother, the Duke of Segorbe, Duke of Cardona, the Duke of Lerma, Marquis of Denia, Marquis of Comares, Marquis of Pallars, and twice Grandee of Spain, making him one of the most important Spanish aristocrats of his time.

Morphological continuity and homogeneity of the urban backdrop that will be reinforced at the end of the seventeenth century by a promenade lined delimiting the long, narrow beach in front as it is shown in the so-called view Medinaceli, by noon, entitled Naples. Excellency Mr. Duke Medinaceli, Viceroy and Captain General in this kingdom "of 1698.



Fig. 1: The Villa Comunale of Naples, eastern entrance.

3. Chiaia in the eighteenth century

In the first half of the eighteenth century the Riviera di Chiaia proposes the same way as a garden city built on a system of urban road layouts defined by the primary and secondary, either parallel or perpendicular to the coastline. A charming urban enclave, characterized by a strong scenic waterfront overlooking the Gulf of Naples sull'antistante framed, to the east, between the dark bulk of the Castel dell 'Ovo perched fortified islet of Megaride and to the west, the lush hill of Posillipo by the widespread presence of palaces and suburban villas. Carlo Celano, in his "News of the curious and beautiful of the ancient city of Naples," describe it, during the seventeenth century, the Mediterranean beauty of Chiaia: "On the side of the East has a marina placidissima The shoulders have the Monte Posilipo fertile, that principia, as was said at the Castle of St. Erasmo, or with the common people of St. Elmo, below which the Church stands or Monistero de Certosini. In this mountain, on the side of the East, it seems that nature is studying with careful effort to keep it green, and always in bloom being that in this, at all times, and also among the most horrid winter there are bunches of work fresh flowers fruits, when in every other place are rural, here s'hanno perfectly ripe, and with a flavor more palatable to the taste of each other then I do not speak of 'gardens of cedar, orange and lemon trees, which when bloom, which are mostly twice in every year, fans coll'odore a terrestrial paradise sea that lies ahead is fertile smelling of fish in each species.

Hemispherical domes, massive palaces, terraces and viewpoints, city gates and steep ramps, pedamentine and narrow winding country roads: this is the diverse morphological abacus that makes up the urban fabric of the Riviera di Chiaia strongly compressed between the Vomero hill and the waterfront. This is the urban structure of the Riviera di Chiaia as documented in the "Topographical Map of the city of Naples and de'suoi contours" written by Giovanni Carafa, Duke of Noja and printed in 1775. Ten years before the release of the Map of the Duke of Noja, Carlo Vanvitelli, on behalf of Ferdinand IV of Bourbon, will receive, in 1765, the task of designing the "Real Passeggio": a long, narrow rectangular strip, characterized by two pavilions symmetrical input located on the eastern end - and on the west in the design of the project - marked by the presence of a double row of trees forming double five avenues parallel to Chiaia Street and tangent to the coastline. Carlo Vanvitelli elaborate different solutions tending in turn to relate or less with the geographical site of belonging. The project of Carlo Vanvitelli for the "Plan of Lido di Chjaia from the Church of the Madonna della Vittoria to San Leonardo with the delineation of the new Public Garden" is preserved in the Historical Archives of the Municipality of Naples (ASMuN). As a whole, the project vanvitelliano is composed of twelve tables that illustrate different solutions. A first solution is given knows a garden parallel to the coastline which deflects at an obtuse angle to the height of the Piazza San Pasquale (ASMuN, Cart.II, Chiaia 11); a second solution, the one closest to the one realized is characterized by the plant to five avenues symmetrical with respect to the main one (ASMuN, Cart.II, Chiaia 10); also a solution of the double extension of the public garden is documented by two artifacts that illustrate a further expansion to the west (ASMuN, Cart.I, 6 and Cart.I Chiaia 13). For a detailed analysis of the design vanvitellian see also: Cirillo O., Carlo Vanvitelli, architecture and the city in the second half of the eighteenth century, Alinea Editrice, Firenze, 2008. Eventually, the designer of the court will opt for a solution strongly characterized by formal autonomy, clearly influenced by neo-classical, all resolved within a footprint planimetric rigid, rhythmic and compact: a floor plan in the shape of elongated rectangle defined to the east and west, two heads monumental input characterized by the presence of two low pavilions neoclassical joined together by a railing tripartite wrought iron which open at the center, through two doors signers in their central axis, in plan, as well as the input also the main axis of symmetry of the rear garden. With regard to the northern perimeter of the new "Public Garden" project by Carlo Vanvitelli included a fence formed by a low wall in the basement which s'impostava a deleted profile with more than double concave semi-elliptical profile interspersed with generous pilasters rectangular base characterized by the presence of niches with allegorical statues neoclassical bordered laterally by double pilasters bugnate.Tale linear structure is interrupted by Carlo Vanvitelli in five places where you can enter as many side entrances to the long linear park.

In this way, compared to the fifth built in the Riviera di Chiaia, the "Public Garden" became a vegetative filter permeable to pedestrian cross between consolidated city and natural beach. A permeability accentuated by the characterization of the fully open southern slope of the garden is not defined on the beach front, by any fence but by inviting a structure consisting of a long bench that artificializzava, with great hardness but with equal sobriety, the difficult transition between the natural sandy of the beach and the decking on the ground tuff of the "Public Garden" designed by Carlo Vanvitelli, the son of Louis, who designed the Palace of Caserta.

As written by Arnaldo Venditti, "[...] The" real site", opened in 1781 with the celebration of the Fair, had its own regulations; open day and night to people decently dressed (they were excluded from the poor, people in uniform, the barefoot), the villa was the meeting place of good Neapolitan society, becoming animated in the summer of festivals and concerts, in the light numerous lights, which, mirrored in the sea, accompanied with lampare Mergellina."

The design of Vanvitelli be able to act as a first founding act of the successive expansions thanks to the careful planting and cultivation of natural essences originally entrusted to the gardener Felice Abbate. The track vanvitelliano well as the availability of an additional coastal area on the western side of the beach of Chiaia, as documented in the plant of the Regia Officina di Naples Rizzi Zannoni 1790, represent the environmental conditions for the successive enlargements of the "Real stroll" both towards the coast line, with implemented a progressive and extensive production of filled at sea, and it is towards the western area through a reclamation of the shoreline and an additional land policy based on further filled large areas of the sea area between the Torretta and Mergellina.

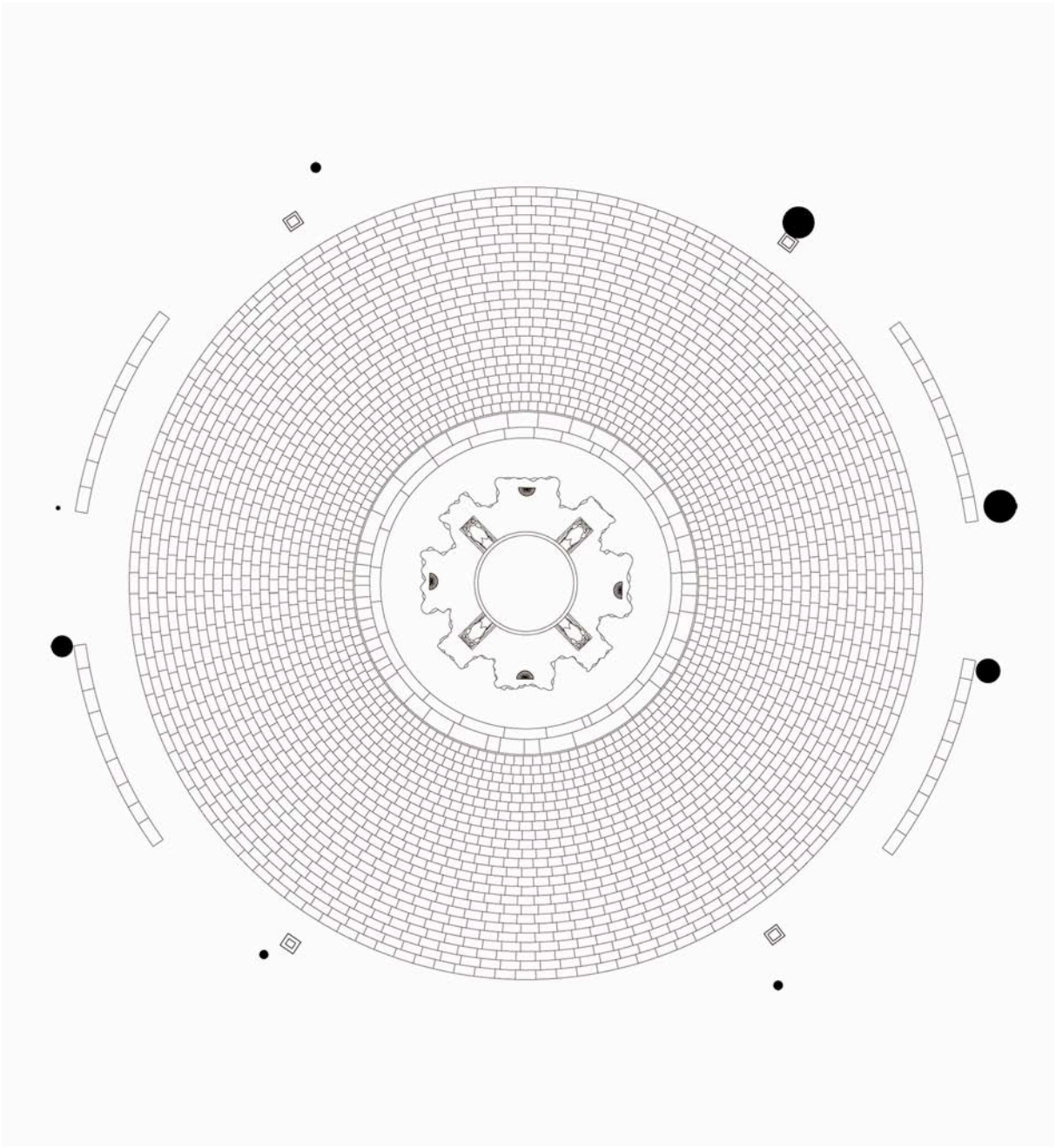

Fig. 2: The Villa Comunale of Naples, the Fountain dei Leoni plant.

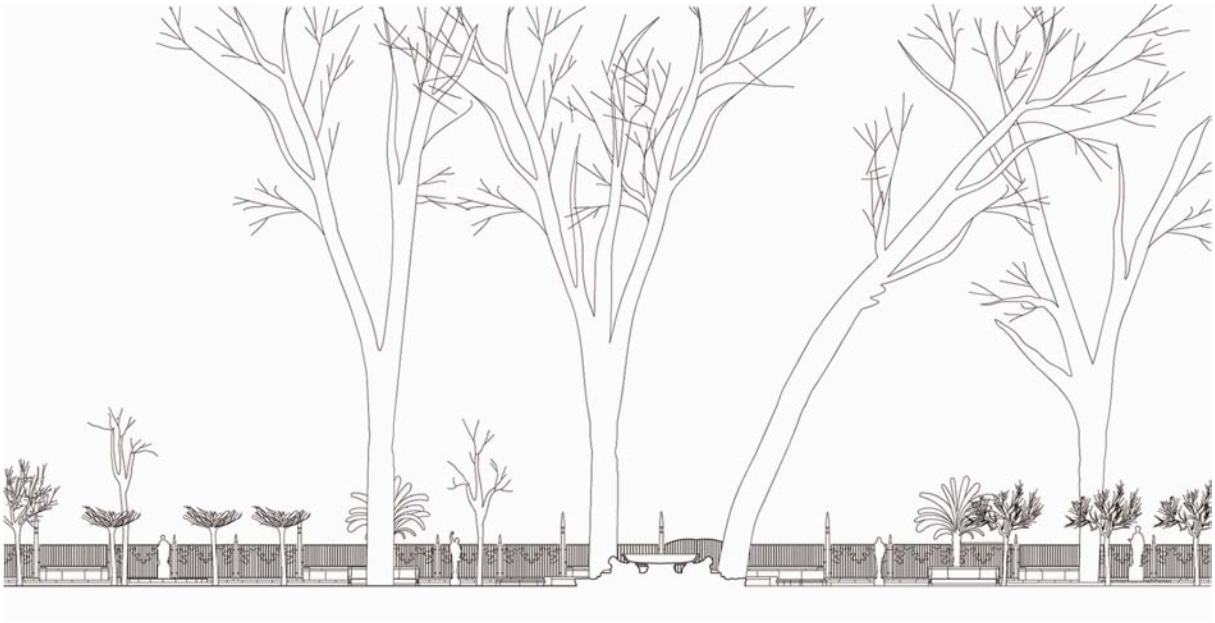

Fig. 3: The Villa Comunale of Naples, the Fountain dei Leoni longitudinal section.

4. Chiaia in the nineteenth century

Stefano Gasse, in 1807, is the architect responsible for launching the revival of the old system and to develop a project proposal for its extension. Extension which is implemented in two phases ie, the first in 1810 and the second in 1834. The first extension proposed by Gasse interested in the area from the western end of the "Public Garden" goes up to the height of the of the abutments of the existing Church of San Leonardo: a narrow strip of land with a trapezoidal floor plan, no more linear as the previous arrangement vanvitellian neoclassical, characterized by an arrangement for "grove" with parterre flowerbeds heterogeneous to "bean" or in line with the trend Anglo-Saxon era that favored the sublime and picturesque garden rather than rational mold of Franco-Germanic.

Simultaneously with the construction of the new "Grove", Stefano Gasse, along with the gardener of the Royal House Federico Dehnhart continued the work of redefining the vegetation started in the first five years of the nineteenth century by the gardener Antonio Cardone within the green rectangle vanvitelliano: citrus, plantains Carditello, weeping willows, oaks and acacias are integrated, or even replace, the earlier eighteenth century vegetation systems based on the use of lime and vine. Not only species of vegetation but also new architectural pavilions able to enrich the dynamic environmental perspectives produced by the apparent irregularity of the bean flower beds in the new "Grove" in 1819, the circular temple host the bronze bust of Torquato Tasso.

The bust is the work of Torquato Tasso Angelo Solari and six years later, in 1825, the Temple classical columns and pilasters with Ionic dedicated to Virgil. The large head of Virgil housed in the Ionic Temple of Stefano Gasse is carved by Tito Angelini. both made and designed by Stefano Gasse. Even outside the fence of the "grove" some episodes architectural, residential and infrastructural nature, emphasize the environmental evolution made the Riviera di Chiaia enlargement designed by Stefano Gasse: on one hand the construction in 1830 of the magnificent neo-classical and Acton Villa or the current Pignatelli Museum, designed by Pietro Valente and, secondly, the realization in 1834, on the northern side of the "Public Garden" vanvitelliano and the "Grove", a dirt track for trotting horses namely the so-called "Trottoir".

Only in 1858 the construction of an imposing architectural structure, the Winter Garden, will re-launch the construction of architectural objects, real "object Trouvée", on the edge or inside the fence coastal vegetation. The Winter Garden will be short lived in the scenic natural surroundings of the Riviera di Chiaia having been demolished after only fourteen years old, in 1872, from its implementation together with the two entrance pavilions of the former "Public Garden".

Two proposals for the accommodation of the Riviera di Chiaia mark the theoretical background to the project of enlargement towards the sea area of coastal land base of the garden: the draft Gaetano Genovese. The main panel of the project by Gaetano Genovese, entitled "Enlargement of the Riviera di Chiaia district that includes the transfer of the Royal Villa" shows, in the bottom left corner, the signature of the Municipal Francesco Paolo Capaldo and, in the lower right , the signature of the Municipal Commissioner Gaetano Genovese.

This difference in the shape of Genovese explicit roles as a member of the Building Board of Naples. of 1858 and the one signed by Errico Alvino in 1862. Genovese If the project raises the question about noon the progress of the coastline through a sea filled in parallel to the rear of the Riviera Road to Errico Alvino formalizes graphically, for the first time the hypothesis of a road on the beachfront not able to completely erase the relationship with the underlying beach of Chiaia via a narrow strip pedestrian service activities related to the use of the sea. The project to Alvino, processed free of charge, is part of a master plan for the city of Naples. The project designs, very rich in details and views and floor plans of the whole, they represent a first point of reference with respect to future delineation of the Naples seafront.
The presence of a high wall breakwater, to round to the sea located in places where, subsequently, Verrano really made the viewpoint della Vittoria and Diaz, the great influence of explicit Errico Alvino for the real infrastructure of the waterfront west of Naples. For some designs elements porticos along the promenade or the fascinating metal structure at the entrance of Villa Reale renewed should start to reflect on the influence played by Alvino of younger architects of him as, for example, the work of Lamont Young. In fact, the construction of the new waterfront western, made in two separate batches between 1869 and 1879, will take into account both the need to expand around noon assumed by Gaetano Genovese and infrastructure of both the foreshadowing of a new road on the sea drawn graphically by Errico Alvino. Between 1869 and 1870, two new buildings, to small and medium scale architecture are made, not far away from each other, on either side of the main avenue of the original "Public Garden" on the northern side of the so-called Casina Pompeiana, and on the south, the zoological Station, or an aquarium, biologist Antonio Dohrn wanted by the architect Oscar Capocci. Specifically, the creation of two lots relating to the redefinition of the coastline from Molosiglio until Largo Sermoneta - in the stretch to the east, between the Molo San Vincenzo and to the west, the hill of Posillipo - will not be the result of a clear and definitive project of urban planning and landscape but the compromise between political forces and business based on requests for concessions for infrastructure projects having as their first objective the construction of new residential volumes for the new Neapolitan bourgeoisie.
Among the various requests for grant administration reached Naples and the relevant Commission responsible for examining applications was chosen, August 5, 1869, that the entrepreneur Giletta Annibale took over as licensee of the work to which the Belgian Baron by Ermanno Du Mesnil. Annibale Gilletta is one of three participants in grant requests for interventions in different areas of the city: for the installation of the western waterfront were in fact examined by the appropriate Municipal Commission - consisting of Rodolfo d Afflitto, Federico Travaglini and Ettore Capacelatro - a proposal Scognamiglio of Martorelli, discarded, the first, for delay in delivery of the proposal and, second, because it operates by the financial unknown.
The first batch of the new promenade by the Panatica in Saint Lucia pushed up to Victoria Square was completed in two years or nel1872. The second batch, which included an expansion of the Villa Nazionale towards the sea and the construction of a new coastal road between Piazza Vittoria and the Fontana of the Lions in Mergellina, was built between 1872 and 1789 thanks to the creation of an infrastructure project, a concave wall subjected to the new roadway and separated from it by a parapet volcanic stones and brick, clay brick, high-impact construction and aesthetic but very vulnerable to the power of the waves of the sea, especially with south wind and the south-west, there impacted against.
Gaetano Bruno writes: "[...] when there was a gritty beach, the waves there is flaked running on the beach, or if certain times stronger climbed over the wall of the villa and the road towards Mergellina; but now the waves arrive with energy until the new wall, which stops them, reject them and part them fringes receiving the insistent pressure hydrostatic and hydrodynamic [...] "
Defined and implemented the new shoreline stone that the Panatica - close to the monumental steps from the opposite corner at the intersection of Via Saint Lucia and the new Corso Partenope connect the latter with the quay below Castel dell'Ovo - reached up to Mergellina and performed reclaiming land needed to set up your new decking enlargement towards the sea, we proceed between 1880 and 1885 to define architectural and landscape of the Villa Comunale. First, to the east, the Villa Comunale reconquest, albeit through a completely different configuration, the lost landscape and architectural homogeneity owned by the plant originally defined, a hundred years before, by the presence of the two symmetrical halls vanvitelliani. Specifically, the new eastern end of the Villa Comunale is characterized by the presence of a fence parallel to the facing building curtain on waterfront overlooking Piazza Vittoria, in its central part, it comes back a second concave geometry: a symmetric fluid that is punctuated by the presence of eight statues in white marble depicting mythological and placed on high pedestals decorated with rectangular frames and classic cantilevered shelves or in high relief. The eight architectural sculptures placed on the piers, built between 1765 and 1767 by the Garden of the Royal Palace of Caserta are sculpted by Andrea Violani and Tommaso Solari.



Fig. 4: The Villa Comunale of Naples, the Fountain of the Lions, the prospectus.

5. Chiaia in the twentieth century

Over the past few decades, consistent choices, a lot of mistakes and a general neglect have affected the "cosmic" beauty of the western coast of Naples, the last speech of reconfiguration of the Villa Comunale, designed by Alessandro Mendini in 1998, has proved incapable of reading font identification of the places opting for a transformative hypothesis that introduced, riding on a new fence punctuated by slender golden streetlights three architectural fragments made from synthetic materials and ipercolorati of yellow, blue and red. A choice in total discontinuity with the obvious material characterization of the sites in question based on the dark tones of the stone from Vesuvius, and the density of the porous tuff.

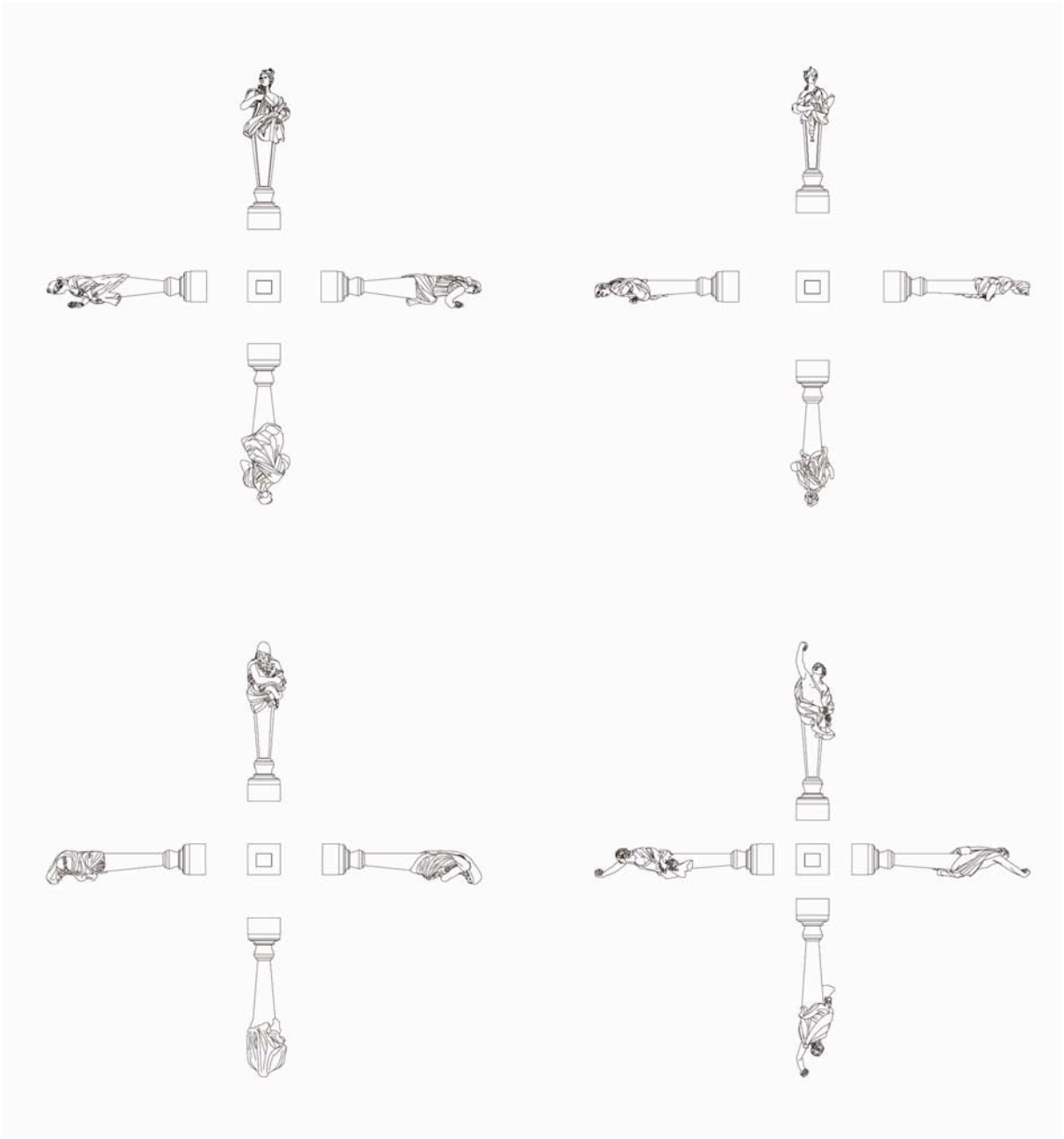

Fig. 5: The Villa Comunale of Naples, sculptors groups of four seasons located around the Fountain of the Lions, plans and elevations.

6. The Villa Comunale: Carlo Vanvitelli, the central avenue and side areas

On the western side of Piazza Vittoria is located the fence of the Villa Comunale, designed by Alessandro Mendini in 1998, decorated with eight statues carved in the course of the eighteenth century by the sculptor Andrea Violani and Tommaso Scolari. Specifically, from the southern side to the northern one, are located in the following sculptures: the Fauno performer of Andrea Violani (1763)The Apollo Licio of Thomas Solari in 1761, the Hercules Fauno by Andrea Violani in 1766, the Antinoo of Andrew Violani in 1765, the Sileno with Bacco child to Andrea Violani in 1763, the Hercules with a Telefo by Andrea Violani in 1765, the Apollo Belvedere in 1767 and Fauno playing the flute in 1761 both of Tommaso Solari. The sector represents the area of the abutments of the project originating by Carlo Vanvitelli: an open floor plan with a rectangular measuring 500 x 50 meters. structured along a central avenue flanked on the north by a line of wooded siliquastrum Cercis (Judas tree) and a system of flower beds to "bean" that closes the Villa Comunale to the Riviera di Chiaia, and on the south by a double row of trees, Cercis siliquastrum and Quercus ilex (holm oak) in turn flanked by an avenue of small size: this is what remains of the splendid plant vegetation to five parallel avenues conceived in 1775 by Carlo Vanvitelli. The main entrance to this area opens onto Piazza Vittoria: a double-leaf gate, part of the fence of the general public gardens designed by Alessandro

Mendini in 1998, flanked by two of the eight statues which adorn the eastern side of the coastal garden or the Hercules with a Telefo by Andrea Violani in 1765 and the Apollo Belvedere in 1767 by Tommaso Solari. From the standpoint of vegetation, over the fence entrance, the open space is characterized by thick sets of banana trees (belonging to the family Musaceae) that make up the composition of basement in the north, high and low palms Phoenix dactylifera Arecastrum romanzoffianum (Cocco feathery), Brahea roezlii (Braea), Black burniana (Sabal) as well as a splendid specimen of Eucalyptus (Eucalyptus). In the central hall, circular flower bed within seven Washigtonia filifera (California Palms) towering in height and providing a strong open space east of the Villa Comunale. At the center of the avenue stands the Fountain of the four lions surrounded by two low semicircular benches flanked by four sculptures symbolizing the four seasons, Spring, Summer, Fall, Winter, probably carved in the eighteenth century by an unknown author. The Fountain of the four lions, designed by Pietro Bianchi in 1826, is located in the place where the first, 1775-1791, was placed a large circular bath complete with statues of Sebeto and Sirena Partenope, by Giuseppe Sanmartino, and later, from 1791-1826, was placed the Toro Farnese from the Roman Baths of Caracalla currently housed in the Archaeological Museum of Naples.
Specifically, the Fountain of the four lions consists of a circular tank containing a quatrefoil base on which are placed four large stone shells and four marble lions holding up a big tub of Egyptian granite monolith from the excavations of Paestum. Symbolic theme, that of the lions, very dear to Pietro Bianchi that uses the same type of sculpture to define the end of the hemicycle colonnade in front of the Basilica of San Francesco di Paola in Piazza del Plebiscito designed by the architect Swiss in 1817. The area of the fountain of the Four lions is characterized by the presence of centuries-old Platanus orientalis (Platano) beading also, in some places, the fence on the northern Riviera di Chiaia.
On this side of the central avenue are placed, from east to west sculptures of the Faun with a Kid by Andrea Violani in 1759, the Gladiator fighter by Tommaso Solari in 1759, Bacco with a cornucopia of Andrea Violani in 1759, the Fountain of flora capitolina and the Fountain of flora farnese of Tommaso Solari (1760), the Rape of Proserpina by Andrea Violani carved in the second half of the eighteenth century, the Hercules wrestling with a the lion Nemeo by Andrea Violani (1767), the Fountain of the rat of the Sabine Women by Tommaso Solari (1762-68) both Marsia tied to a trunk of Andrea Violani (1760). Among these last three sculptures and fourth, or the Rape of Proserpine, the Casina Pompeian is located low neoclassical building built in 1870 and flanked on the west by a leafy Cupressus (Cypress). Conversely, on the southern side of the central avenue stands the Fountain of Lucio Papirio with a his mother, sculpted by Andrea Violani in the third quarter of the eighteenth century and surrounded by a thick grove of Quercus ilex (Ilex) and Pinus pinaster (Maritime Pine). In addition to the groups and sculptors at the Casina Pompeian a series of semi-elliptical volcanic stone benches are placed on both the northern and southern ends of the Vialone central, west, with a an open-air pavilion designed by Enrico Alvino in 1887. This element architectural design and located in the area bearing that divides the area of the implant abutments vanvitelliano original by successive enlargements of the Villa Comunale made in 1810 and in 1834, designed by architect Stefano Gasse with the help of the gardener and Federico Dehnardt subsequently, the botanist Giuseppe Antonio Pasquale.

7. The Villa Comunale: Stefano Gasse, "Grove" 1810 - 1834

The area in question corresponds to the first and second extension of the "Public Garden" designed in 1775 by Carlo Vanvitelli. Both extensions, made in 1810 and in 1834 by Stefano Gasse, propose a design based on the areas flowerbeds to "bean", irregular shapes and sizes and different, that is capable of interrupting the neoclassical symmetry present in the garden vanvitelliano. Made with the help of a gardener before, Federico Dehnardt, and a botanist, later, Giuseppe Antonio Pasquale, the "Grove" is today an enclave dense and shady vegetation punctuated by the abundance of statues and architectural pavilions. Among the latter, the Cassa Armonica by Enrico Alvino, built in 1887, is the most valuable architectural object within the enlargement designed by Gasse. In addition to Cassa Armonica, two other architectural objects, designed by Stefano Gasse in 1819 and in 1825, characterize the balanced relationship between nature and architecture within the scope of the "Grove" of the Temple of Tasso and the Temple of Virgil that is two small pavilions containing the bust of the playwright Sorrento and a sculpture of the head of the poet from Mantova. Both in shape and are characterized by the classical language circular the first and for the implant to the second rectangular base. The "Grove", from 1810 until the first decades of the twentieth century, has been enhanced by the placement of statues in marble and bronze - from clearing where is located the Cassa Armonica with the statue of Giambattista Vico, sculpted by Leopoldo di Borbone in 1862, up to Piazza della Repubblica, where in 1969 he was placed at the Monument to the four days of Marino Mazzacurati - characterized by points in the flower beds "bean".

Specifically, from east to west, as well as the imposing monument dedicated to Giambattista Vico, the sides of the winding paths of the "Grove" are placed the sculptures dedicated to Enrico Pessina by Luigi De Luca (1925), Enrico de Marinis by Gaetano Chiaromonte (1920), Luigi Settembrini by Domenico Pellegrino, Gioacchino Toma by Jerace Francesco (1922), Eduardo Scarfoglio by Giuseppe Renda (1923), Giorgio Arcoleo by Francesco Jerace (1918), Giuseppe Semmola by Leonardo de Candia (1923), Francesco de Sanctis by Achilles D'Orsi (1893), Virgilio of Tito Angelini (1826), Francesco Del Giudice of Torello Torelli (1923), Alfredo Cottrau by Francesco Jerace (1900), Pietro Colletta by Gennaro Cali (1866), the Fountain of the Rape of Europe by Angelo Viva (1798), Enrico Alvino by Giovanbattista Amendola (1884), Torquato Tasso by Angelo Solari (1819), Vito Fornari by Leonardo De Candia (1911) , the four talking heads symbolizing Bacchantes and satyrs dancing made at the end of the eighteenth century and, finally, the monument to Sigismund Thalberg by Giulio Monteverde (1879). These sculptures and sculptural groups are surrounded by woods vegetation of great interest that, in the area behind at the Press Club, a Quercus robur (Farnia) soaring between low and shady Quercus ilex (Ilex) and a rare Jubaea spectabilis (Palma de Chile) ; in the area of home gardeners, two high Pinus halepensis (Aleppo pine) flanked by several Cupressus (Cypress) and surrounded by the applicants Quercus ilex (Ilex) that constitute the spot predominant vegetation in the field. On the back of the Temple of Virgil a leafy Eucalyptus (Eucalyptus) defines the background vegetation of the small neoclassical pavilion designed by Stefano Gasse. Finally, in the terminal area, near the sculpture dedicated to Sigismund Thalberg, Pinus halepensis (Aleppo pines), Washingtonia filifera (Palma California) and a continuous row of seven Washingtonia robusta (Palme Mexico) characterize the consistency vegetation offshoot of the extreme west of the Villa Comunale of Naples.

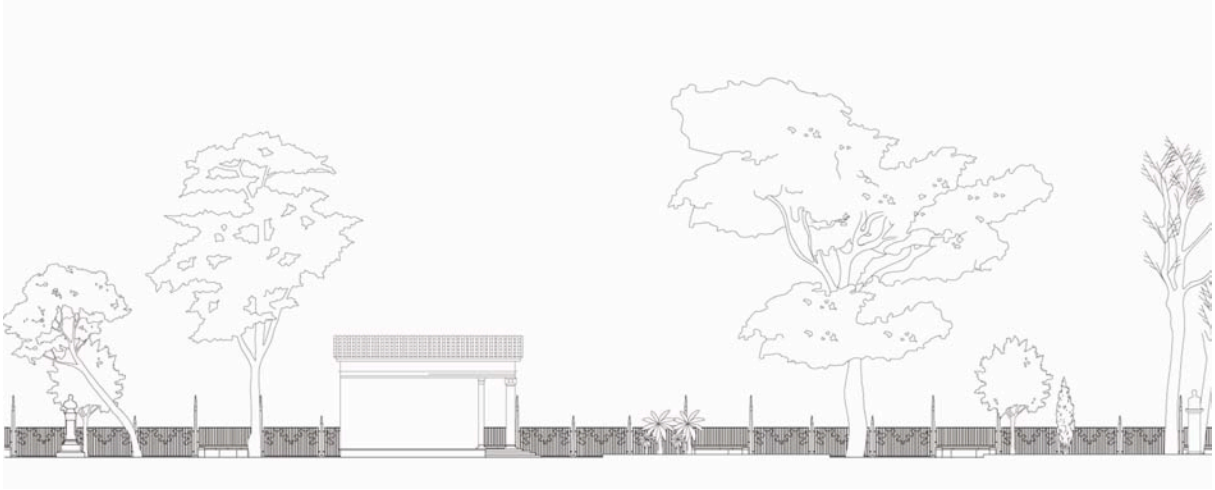

Fig. 6: The Villa Comunale of Naples, the Temple of Virgil in Grove of Stefano Gasse, the southern facade.

8. The Villa Comunale: Gillette Du Mensil, from Victoria Square to the Zoological Station

The area in question is the last expansion, built between 1782 and 1789, the Villa Comunale towards the front of the Gulf of Naples: an audience defined by paths in the land of tuff beat, dotted with flower beds to "bean" host trees various species such as Quercus ilex (ilex), Pinus pinaster (maritime Pine), Platanus orientalis (Platani), Phoenix canariensis (Canary Island Palm), as well as other species of wood. The profile of the Posillipo hill, the shape of the the eastern side of the Zoological Station by Anton Dohrn, the thick foliage of the fifth pre-existing tree on the northern side of the Villa, the presence of the Caracciolo seaside promenade characterized by the transparent railing waterfront overlooking the Gulf of Naples represent, as a whole the artificial and natural elements of an architectural and landscape of great environmental value. A value enhanced by the presence of fountains and sculptures of great artistic interest, that is, from east to west, the Fountain of Castore and Polluce by Tommaso Solari (1762-68) and that of Saint Lucia of Michelangelo Naccherino (1606),

the sculptural group of Pelican Francesco Jerace (1884), the bust of Giovanni Bovio made by Enrico Mossutti in 1915 as well as that of Giosuè Carducci sculpted by Saverio Gatto in 1913. Also this area is characterized by the presence of vegetation common trees such as Quercus ilex (Ilex), Pinus pinaster (Maritime Pine) and Olea europaea (Olive) as well as exotic species such as Erythtrina corallodendron (Coral Tree) located near the sculptural group of Pellicano and on the eastern front of the Dohrn Zoological Station, a beautifully Chorisia speciosa (silk Tree). Also in this area, on the southern side, were made in 1998, is the chalet Yellow, Blue one that both built and designed by Alessandro Mendini. Architectural Elements conclusive in that sector are represented, to the west, from the monumental dedicated Zoological Station to Anton Dohrn, created and designed by Oscar Capocci in 1870, and the modern Circolo della Stampa designed by Luigi Cosenza in 1948. Finally, the presence of the third and last chalet by Alessandro Mendini, the red represents the most western seafront entrance of the new fence designed by the Milan designer in 1998.



Fig. 7: The Villa Comunale of Naples, Via Chiaia statement of review (above). The Villa Comunale of Naples, the round Errico Alvino and cantonal corner of the Zoological Station (left) and the eastern side of the Casina Pompeiana (right).

9. The Villa Comunale: Gillette Du Mensil from the Tennis Club to the Piazza Repubblica

The sector is one of the latest expansion to the sea filled built between 1872 and 1889. Fronted by the the round to the sea more representative of the western waterfront, the latter is an area yield varied by location, in the twentieth century, of Tennis Club made for the area of land owned by an eclectic, but decent pavilion to house a thematic exhibition within the Esposizione d'Igiene of 1900. In the present state the true public space of this heterogeneous sector is represented by the presence of the large square dedicated in 1936, the Neapolitan General Armando Vittorio Diaz, Chief of Staff of the Army during the First World War and the War Minister and Marshal d 'Italy: a square characterized by the equestrian statue of the great leader of Naples that, over the roadway Via Caracciolo, full the architectural composition and scenic dell'antistante Rotonda Diaz enriched by three rows - respectively on the perimeter of the east, west and north - low palms Black family burniana (Sabal). Specifically, the equestrian statue dedicated to Armando Diaz, built by Francesco Nagni, stands on a tall rectangular stained both in high relief with scenes of battle and both with a long inscription carved on the southern facade. This sculpture group stands on a low base of square shape, also raised with respect to the floor of the Square through three continuous steps on all four sides, and is flanked on the west and east ends of two large circular tanks protected by a low parapet.



Fig. 8: The Villa Comunale of Naples, the Temple of Virgil in "Grove" of Stefano Gasse prospectus.



Fig. 9: The Villa Comunale of Naples, the Circolo della Stampa of Luigi Cosenza and the hedge by Alessandro Mendini.

Bibliographical References

[1] GAMBARDELLA C., 2001, Ecogeometria in Venafro. Identità e trasparenze, Napoli;

[2] GAMBARDELLA C., 2003, Le Vie dei Mulini. Territorio e impresa, Napoli;

[3] GAMBARDELLA C., 2012, Atlante di Pompei, Napoli;

[4] GIORDANO P., CORNIELLO L., 2012, Atlante Grafico e Teorico Amalfitano. La conoscenza e la modificazione del paesaggio costiero, La scuola di Pitagora editrice;

[5] GIORDANO P., 2012, L'Albergo dei Poveri a Napoli, La scuola di Pitagora editrice

[6] GIORDANO P., 2012, Il disegno dell'architettura costiera. La costiera amalfitana_ il territorio, le città e le architetture, La scuola di Pitagora editrice,

[7] GIORDANO P., 2006, Il disegno dell'architettura funebre. Napoli_Poggio Reale, il Cimitero delle 366 fosse, il Sepolcreto dei Colerici, Alinea Editrice

[8] GIORDANO P., Ferdinando Fuga a Napoli. L'Albergo dei Poveri, il Cimitero delle 366 Fosse, i Granili, Edizioni del Grifo, Lecce

[9] GIORDANO P., 1994, Napoli, Guida di Architettura Moderna, Officina Edizioni, Roma,

[10] GIORDANO P., 2011, Il disegno dei paesaggi pompeiani perduti, ritrovati e nuovamente smarriti, in "Spazi e culture del Mediterraneo 3, Programma di Ricerca di Interesse Nazionale_ PRIN", Centro Stampa di Ateneo

[11] GIORDANO P., 2011, The design of simplicity against the representation of artificiality or kósmos Vs cháos in "Le Vie dei Mercanti. Less More Architectural, Landscape, Design, Atti del Decimo Forum Internazionale di Studi, Aversa - Capri 31 maggio/ 1-2 giugno 2012", La scuola di Pitagora

[12] GIORDANO P., 2011, Il disegno del suolo, in "Le Vie dei Mercanti. S.A.V.E. Heritage. Safeguard of Architectural, Visual, Environmental Heritage, Atti del Nono Forum Internazionale di Studi, Aversa - Capri 9/11 giugno 2011", La scuola di Pitagora

XII International Forum Le Vie dei Mercanti

BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII

Aversa / Capri, 12,13,14 June 2014

The "*Agri+cultural*" Heritage of "Two Sicilies" Borbone House. The Vineyard of "San Silvestro" farm in San Leucio (Caserta, Italy).

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Abstract

We started an interdisciplinary study, involving pedology and architecture sciences, aimed at recognizing and reappraising those we call "***agri+cultural***" Borbone sites in Italy. This paper deals with the "San Silvestro vineyard", once cultivated within the homonymous farm in the San Leucio "Royal Site" in Caserta. Such a vineyard, whose original terracing structure is still perceptible, is a very valuable, but almost unknown record of Borbone farming. The vineyard overlooks the little court bounded by the buildings of the king's residence, and laterally by two symmetrical service bodies, built on the hill of Parito by the architect Francesco Collecini between 1797 and 1801, establishing a system conceptually similar to that of the royal palace of Carditello, but on a reduced scale. Through advanced GIS–based interpretation of original maps and bibliography sources, the "San Silvestro vineyard" has been redrawn in its initial topography, thanks to the comparison of historical and actual maps and through the identification of traces still visible in the present landscape design. Historical maps record the geographical information, that is fundamental to reconstructing past places, holding information retained by no other written source, such as place-names or boundaries. The fertile, volcanic soil of the vineyard, developed from the Phlegraean Campanian Ignimbrite, shows a 1st class suitability to vine cropping, thus testifying the pedo-agronomic expertise of Borbone House.

Keywords: "San Silvestro vineyard", Borbone House, agri+cultural heritage, applied pedology, LIS-GIS

1. Introduction

Borbone House ruled, with twists and turns, the Southern Italy, *i.e.* Naples and Sicily States, or "Two Sicilies", from 1734 to 1861, with an interruption between 1806 and 1816 due to domestic crises which favored a French interregnum. Aside from any political judgment and ideological feeling, it is undoubted that Borbone House pursued, with modern and innovative perspectives, the implementation of large-scale engineering, architectural and artistic projects, also promoting cultural and socio-economic development, of which the "San Leucio" community was an outstanding model. Worldwide scientists and experts well know and value the "Acquedotto Carolino", the waterworks built between 1753-1770 to bring water from the foot of Taburno mountain (38 km far) to the Royal Palace assembly in Caserta, also feeding other places; and it is just the case to recall the construction, in 1839, of the first Italian railway, from Naples to Portici, another royal residence. On the opposite, the various rural Borbone assets still are poorly investigated, and most of them languish in the neglect and degradation, notwithstanding they are formally protected by *ad hoc* local laws, as well as by the patronage of international Institutions. A patent epitome of such a paradoxical pattern is provided by

the old agricultural estates of San Leucio and San Silvestro, within Tifatini Hills (Fig. 1), annexed to the Royal Palace in Caserta City, which are considered as world heritage by UNESCO, but are substantially ignored. Indeed, the rural Borbone assets yet represent a priceless cultural heritage, definitely worthy to be restored also as an attraction for profitable and sustainable tourism. On these bases, we have started an interdisciplinary research among pedologists and architects, aiming at identifying, restoring and repaying dignity and value, in the present or in the memory, to those we have called "agri+cultural" Borbone sites. A previous investigation [1] has been focused on a very interesting record: the so-called "Fan vineyard", an exclusive, now lost, standard of the consideration of Borbone House for both productive and artistic management of soil resources and landscape features. This paper focuses on the vineyard once cultivated in the San Silvestro farm, on the homonymous peak within Tifatini massif.

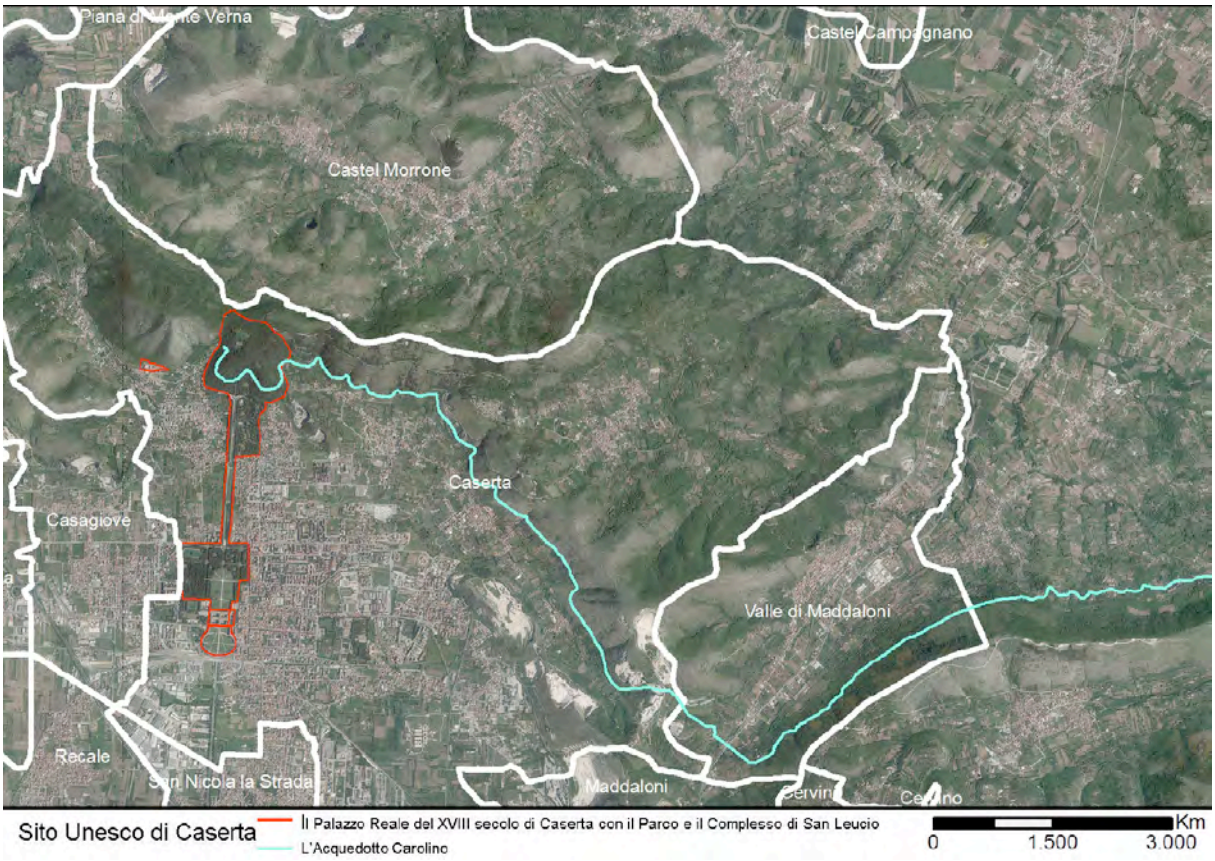

Fig. 1: The Unesco Site of Caserta

2. Study area: historical documentation and iconography, and present scenery

A wide and accurate overview about the onset and development of the "Royal Sites" of Borbone House, and on their role on the socio-economic progress and on the transformation of rural landscape is found in bibliography [1, 2, 3, 4, 5, 6]. The most important historical documentation and iconography is represented by a map painted during the first-half 19th C by D. Rossi [7] (Fig. 2a), and the "Platea", an index of royal goods compiled by A. Sancio (1826) [8] (Fig. 2b, c). The bailey and the major buildings, structures and facilities of the old "San Silvestro" farm are today well-preserved and, broadly, still in use. The farm is located on the top of San Silvestro hill, belonging to Tifatini massif, just behind the Vanvitelli's waterfall which feeds the Royal House beneath (Fig. 3) in Caserta. The most relevant building of the farm is the "Casino" (Fig. 4), which is taken as a reference structure. It lies at coordinates UTM 33 T 443721 m E, 4550487 m N.

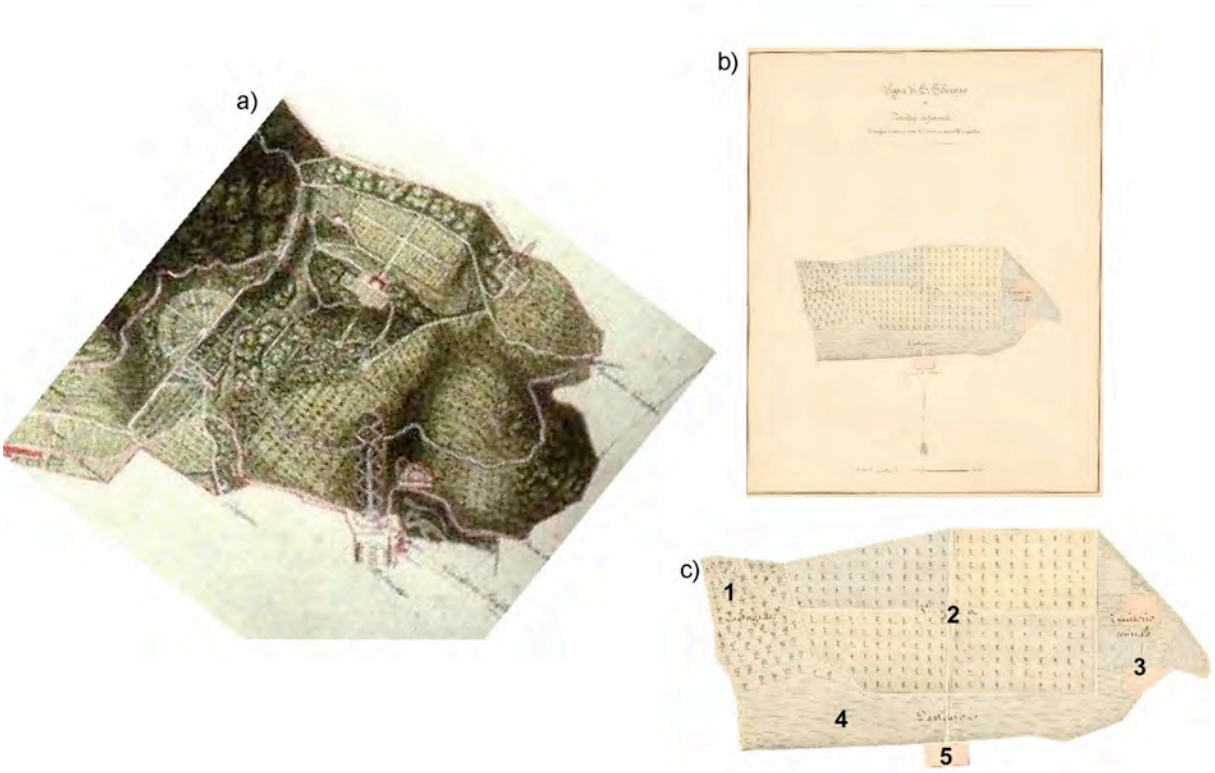

Fig. 2: a) The map of D. Rossi (first-half 19th C) "Pianta del recinto del Real bosco …" ; b) «San Silvestro vineyard and adjacent terriotories» from "Platea…" by A. Sancio (1826); c) a detail showing the chestnut grove (1), the actual vineyard (2), the "cesinale" grove (3), the parterre ("parterro" in original, 4) , the "Casino" (5)



Fig. 3: Location of «San Silvestro» farm and of Royal Palace assembly on the present satellite image.



Fig. 4: The boundaries of San Silvestro farm. The «Casino» (white circle) and the location of the lost vineyard (white rectangle) are highlighted.

3. Historical background

The Royal Site of San Leucio, purchased by the Borbone in 1750, and especially considered by researchers for the silk industry, was organized as an efficient farm, which consisted of arable land, orchards and gardens, stables and fences for the rearing of cattle, goat and sheep, reserves for the breeding of wild animals that were introduced in the hunting areas [9, 10]. Under this system, viticulture was a priority area for the personal interest of Ferdinand IV of Borbone. The same sovereign in the pages of the Statute of the Royal Colony recalls the presence, close to the Belvedere palace, of the ancient vineyards of the Acquaviva family, lords of Caserta in 1509-1634, probably planted in the early decades of the seventeenth century, in which were cultivated indigenous varieties of late-ripening white grapes called "*vernotiche*" grapes.

Beginning in 1786 until the mid-nineties of eighteenth century, the period in which the young King of Naples Ferdinando IV decided to reorganize the Royal Site, together the construction of the silk factories and residences for the workers, he did repair the old vines and planted new vineyards, in which were cultivated grape varieties mentioned for their high quality by Lorenzo Giustiniani in the "Dizionario geografico-ragionato del Regno di Napoli", 1797-1805 [11].

Around 1830, the administrator Antonio Sancio, in the "Platea" [8] of the Royal Site, described six different vineyards, located within the walls of the enclosure, built in 1773, or close to it: the Fan Vineyard, in which were cultivated grapes named "Delfino" (white), "Procopio", "Piedimonte" (white and red), "Lipari" (white and red), "Siracusa" (white and red), "Terranova" (red), "Corigliano" (red); the Vineyard named "Torretta", near the district of San Ferdinando, in which were cultivated varieties of "Lagrima" (red), "Aliatico" (red) and "Aglianica", interspersed with a few fruit trees; the Vineyards named "Pomarello" and "Arcone", at the sides of the Belvedere Palace, in which the ancient white grapes called "vernotiche", "Aglianica" (red) and "Lagrima" (red) were cultivated; the "Zibibbo" Vineyard, formed in 1790 by a division of the "Arcone" Vineyard, in which were planted vines from Calabria and Sicily; the Vineyard named "San Silvestro", rear the "Casino", the only one where the vinegrapes have Hedge Maple trees as training stakes, and in which wine of poor quality was produced (*vide infra*).

Among all, the most interesting is the Fan Vineyard, so named for its shape, that was located between the Belvedere Palace and the San Silvestro farm, and placed on a natural slope like an amphitheater, the subject of a careful study of a group of researchers led by Andrea Buondonno [1] presented last year at the 11th International Study Forum "Le Vie dei Mercanti" and published in the Proceedings of the Conference.

Another very interesting vineyard, located at the northeastern end of the fence of the Royal Site, is “San Silvestro”, in the homonymous area close to the waterfall of the “Acquedotto Carolino” and the Fan Vineyard. The site includes, in addition to the San Silvestro Vineyard, object of the present research, a farm house – the “Casino ” - surrounded by terraced gardens used to grow fruit and vegetables, and served by an irrigation system built using the waters of the direct conduit to the factory of the Belvedere. The building of the “Casino”, designed by the architect Francesco Collecini, likely with the contribution of his assistant Giovanni Patturelli in 1798, has obvious similarities with the Royal Palace of Carditello (Fig. 5) [12], as both buildings are composed of a central double height body and symmetrical pavilions of service to it grafted, while the decorative log repeats in a simplified form the solutions already adopted by Collecini in the Royal Palaces of San Leucio and Carditello. Differently from these, and also from the farm house built by Collecini on the promontory of Sarzano in 1773-74, commonly referred as the Casino Vecchio (Fig. 5) [12], in the San Silvestro Site the focus of the architectural composition is centered in the vineyard, exactly in the intersection of the avenues that cross it, but not in the building of the “Casino”, reversing the usual relationship between architecture and nature established in the buildings constructed by Borbone House in the territory of Caserta.



Fig. 5: Istituto Geografico Militare – IGM Archivio Cartografico. 1820. Carta Militare della Frontiera del Regno, F 3. Firenze.

4. “San Silvestro” vineyard and its relationships with the territory

Primary importance for studying “San Silvestro” vineyard is the comparison between the historical maps and current ones. The comparison of multi-temporal representations could help in the research of existing tracks and in the recovery of deleted ones. The techniques of land representation, supported by contemporary and innovative systems, are an additional input to the studies of modification of the territory. Specifically for this case study, the comparison is accomplished through the georefering of Rossi map through the identification of control points recognized both in aerial photo and in the historical map. In particular we considered the “Casino” of San Silvestro (*vide supra*) because it is really recognizable in both maps.



Fig. 6: Control points on aerial photo

We also noticed the shape and the structure of this building in the context: you can see, in fact, some references about the vineyard and the Casino.
In particular, there are some traces recognizable like the axis and the crux generated from the bow of the axis. (Fig. 6)

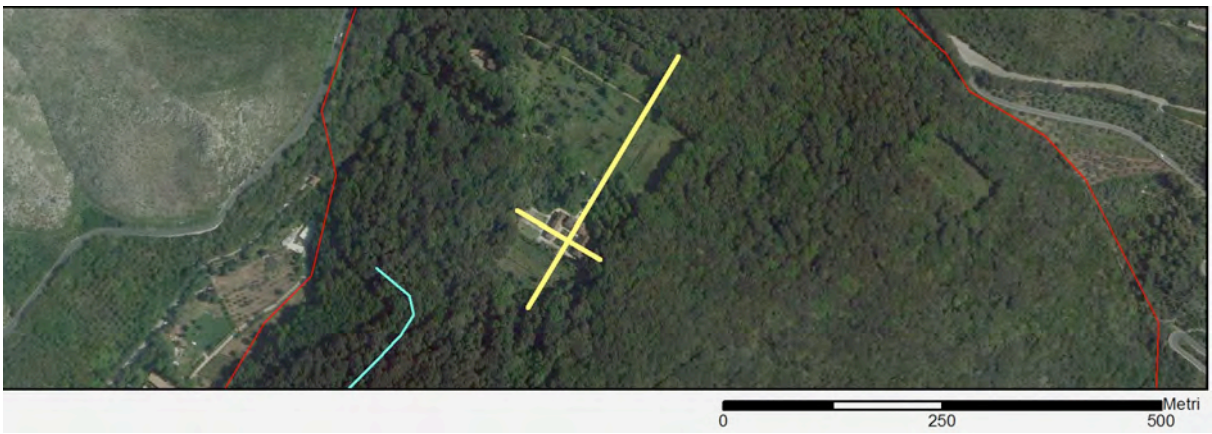

Fig. 7:The traces recognizable like the axis and the crux generated from the bow of the axis.

This operation between diachronic maps allowed a metric control on the extension of the vineyard and its productive potential. Georefering the map of the Rossi within a projection system and to a geographic coordinate system has allowed to operate on the historical map in a similar way that is possible on contemporary cartography [13].
The survey mapping, however, has been useful not only for a check of the quantity of land used for growing grapes but also for a qualitative verification of the positioning of the cultivated area in relation to the local context. In fact this kind of investigation cannot be separated from the geomorphological assessment of the area and its surroundings, as well as its variations in height. These considerations have supported, for example, evaluations related to the current climate and the sunshine affecting the area planted with vines (*vide infra*).
The most appropriate instrument to support such an investigation is a DTM (Digital Terrain Model), a 3D representation of the terrain surface characteristics from which derive all information of the elevations of the soil. Considering that the area covered by the vineyard has not undergone substantial changes from its plantation until now - with the noticeable exception of the invasion of Mediterranean shrub - we can conduct our analysis on a current DTM. Therefore, working on a georefered DTM of this area, we are able to draw vertical cross sections of the land on which operate qualitative assessments of territorial context.
Among the different sections carried out, those of most interest is that performed in NW-SE direction, thanks to which we can calculate the elevation of the vineyard and that of the hills immediately close to it. The vertical plane of section oriented according to the above arrangement has been conducted, in particular, along the axis that identifies the cross which divides the allotment of the vineyard. The section of the DEM (Fig. 7) show us that the vineyard located at an average altitude of 230 meters above sea level is dominated at NW by the presence of a hill of over 320 meters and at SE with a hill of about 275 meters. Therefore the vineyard was in a depressed position with obvious climatic problems that will be discussed below.

5. Pedo-agronomic features of “San Silvestro” vineyard

5.1 Geo-pedological setting

The geological substrate below “San Silvestro” farm is formed, deep, by calcareous-dolomitic successions, mainly belonging to Trias-Early Cretaceous, mantled by the Campanian Ignimbrite, the so-called “(Campanian) Gray Tuff”, a sturdy pyroclastic fall (cinder, pumices, and scoriae) erupted during the 1st Phlegraean Period about 39 ky b.p. Taking into account its geographical location, geomorphology, and geo-lithology, the study-site is ascribed to the Great Land System “Calcareous Mountain”, System “ Calcareous pre-Apennines reliefs with pyroclastic cover”, sub-System “Low slopes of pre-Apennines reliefs on “Campanian Gray Tuff” and deposits [14]. Soils in such sub-System belong to the Order of Andisols. Andisols [15] are soils developed in volcanic ejecta (such as volcanic ash, pumice, cinders, and lava) and/or in volcaniclastic materials, the colloidal fraction of which is dominated by short-range order minerals or Al-humus complexes. One of the outstanding features of Andisols is their high natural productivity. There are exceptions to this very general statement, but the dominance of physical properties that favor the growth of most plants, allied to the most common occurrence of the soils in areas of considerable rainfall, has resulted in volcanic soils being generally regarded as highly fertile soils.

5.2 The vineyard: a “married grapevine”

The vineyard as such is lost, and the remnant of the old terraces (Fig. 4) are now invaded by Mediterranean maquis shrubland, with prevailing Holly Oaks (*Quercus Ilex L.)*. However, the principal directrixes of terracing are reported on a 1:25000 topographic map (Fig. 8). Figure 2 shows the location of the old vineyard overlooking the “parterro” and the “Casino” to its south-west, with the chestnut grove to its north-west, and the “cesinale” grove to its south-east. The chestnut grove provided valuable poles, widely utilized as main beams in buildings. The “cesinale” (from Latin *caedo*, I cut) was a coppice with a particular rotation with an alternate bearing of hay, thus allowing to graze the goats bred within the farm with fresh pasture grass.

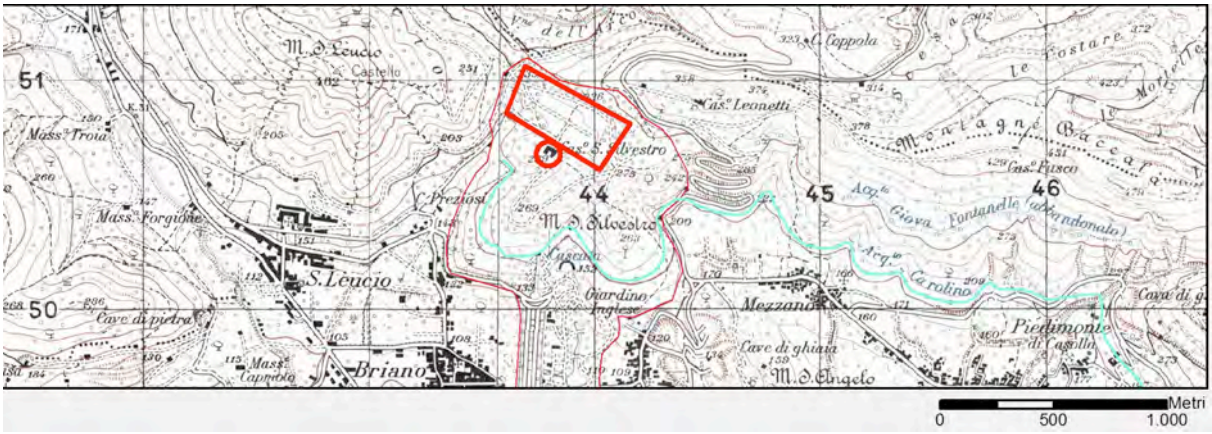

Fig. 8: The «Casino» (red circle) and the principal directrixes of the vineyard terracing in San Silvestro farm. From the original 1:25000 map by the Geographic Military Institute.

In its “Platea” [8], Sancio describes the management of the vineyard. In particular, he states that the “temperament” (“*indole*” in the original text) of the soil does not allow crop grapevines pruned “Italian-style”, i.e., short, as a small tree, as instead it was possible in the nearby “Fan vineyard” [1]. On the contrary, the grapevines of San Silvestro were cropped as “married”, i.e., staked to trees named “oppi”, the old name of the Hedge Maple (*Acer Campestre L.*). As a matter of fact, the total of grapevines and trees was 6300 and 1023, respectively, with a mean ratio grapevine-to-tree of about 6 to 1. Such a cropping system deserves a closer examination. Indeed, the so-called “vite maritata”, viz. “married grapevine”, where the “husband” is a tree which acts as a training stake, likely is the first grapevine cropping system [16] spread in the world. The ancient agronomist Tanara, in 1644, discriminates two main “grapevine-marriage” systems: the so-called “arborata” or “alberata”, viz., a grove of trees, and the “piantata”, viz., a planting, a row of plant [16]. The former is the typical trees grove system, where trees to which grapevines are staked are arranged either with a regular spacing or random, the latter is a trees row along the boundaries of an allotment, with the grapevines between trees along the same row, the vine-shoots held by ropes tied between two successive trees (Fig. 9).



Fig. 9: «Piantata». «Asprinio» vineyards managed by «Piantata» system. Left: vegetative stage. Rigth: state of repose.

Sancio does not clarify whether the “grapevine-marriage” system was the “alberata” or the “piantata”. We are strongly inclined towards the latter. A first reason arises from the ratio grapevine-to-tree of about 6 to 1. The Hedge Maple is a small tree, with a trunk diameter usually less than 1 meter, too small to host 6 grapevines around together. A second motivation is that the “piantata” is presently widely adopted in Naples, Caserta and Benevento provinces, and it represents the distinctive features of the “Asprinio” vineyards cropping systems in Aversa, Caserta province. Indeed, the “piantata” is not only a grapevine cropping system, but also a crops association, especially when the stakes are fruit trees, and the open fields among stake trees are tilled with other crops. However, we also believe that the “piantata” system had another functions. In the “piantata” system the vine-shoots can reach 15-20 meters height; it implies to control the microclimate, by gaining much more insolation and, on the other hand, avoiding stagnant humidity, a mortal enemy to grapevine. Finally, a “piantata” is aesthetically very appealing, and provide natural wings or curtains to host shows and entertainments. Finally, a puzzlement seems to persist: why Sancio did assert that the “temperament” of the soil was not suitable for grapevine cropping? If truth be told, such a statement appears inconsistent with the fertile nature of Andisols which mantle the Tifatini chain. Furthermore, the same Sancio also emphasizes that the wine produced in San Silvestro was “mediocre”. Taking into account that, within same pedological features, the quality of wine is strongly affected by the inclemency of weather conditions [17], we can actually infer that the poor quality of wine was likely depending on the cold-humid climate at that time, under the so-called Little Ice Age (about 1350-1850). Furthermore, we can also assume the negative contribution of geomorphology. In effect, a cross-section along the NE-SW directrix (Fig. 10) clearly shows that the vineyard is located in a depressed site behind a relief, so that the air circulation is constrained and fog and humidity can persist.

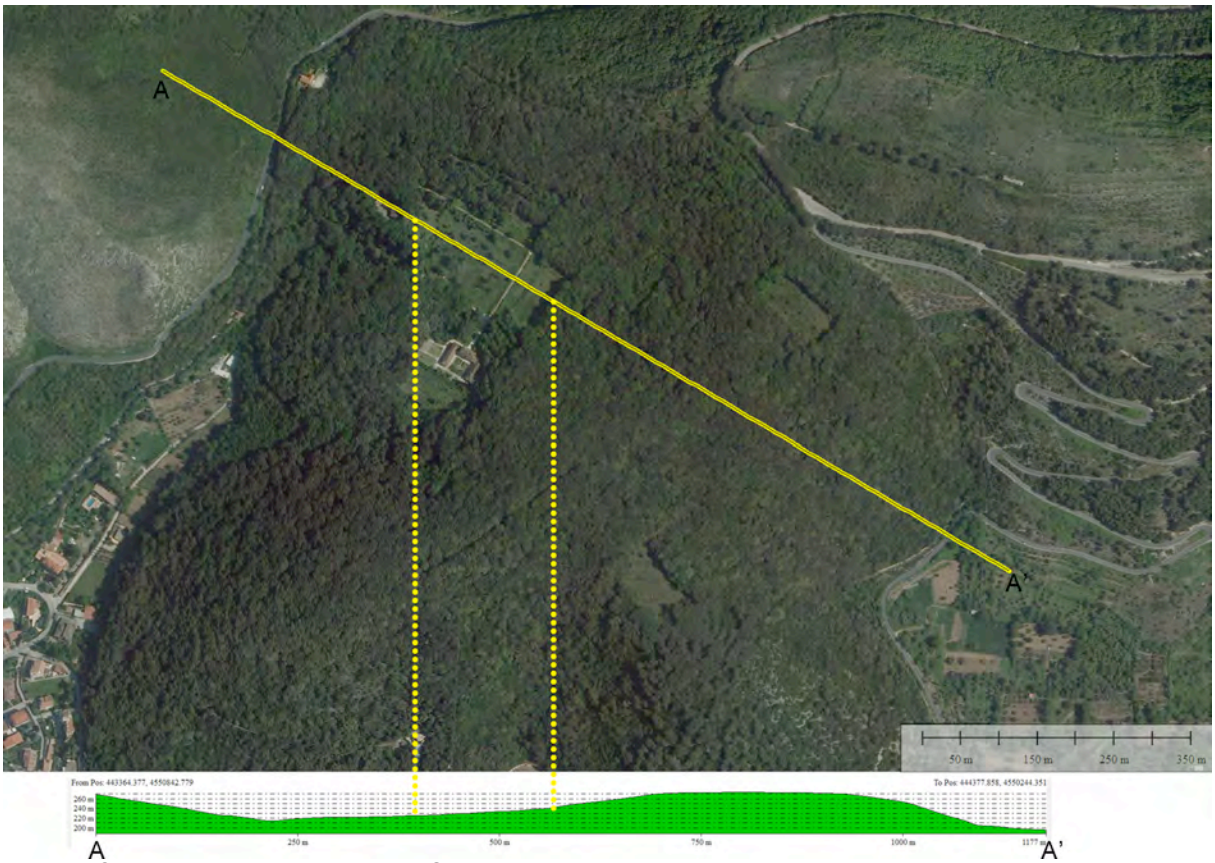

Fig. 10: Cross-section along the NE-SW directrix.

6. Conclusions

San Silvestro farm was one of the numerous rural assets of Borbone House which still today enriches the land of Caserta province, and of Campania region on the whole. Indeed, San Silvestro farm also testifies that the knowledge of rural lands was already spread during the previous Acquaviva seigniory. The re-allocation of the historical map by georefering procedure allows to appraise the skill of Borbone drawers in land representation. It is noteworthy that the option of “piantata” as vineyard cropping system most probably arises by a landscape architecture design, rather than from an agronomic plan. In fact, as also clearly showed by the digital geomorphological analysis, the position of the vineyard was unfavorable for a satisfying wine production.

Once again, people is astounded for the neglecting of such heritage, and we strongly expect that the appropriate authorities and the local government act to restore the ancient functions, dignity and pride of the "***agri+cultural***" Borbone sites.

Bibliographical References

On the Borbone House Royal Sites

[1] BUONDONNO A, CAPRA G.F., GRILLI E., PARENTE R., PISACANE N., ODIERNA P., VACCA S. 2013. The missing "Fan vineyard" in San Leucio (Caserta, Italy). An "agri+cultural" heritage of "Two Sicilies" Borbone House. In: Carmine Gambardella (Ed.) Heritage Architecture Landesign focus on Conservation Regeneration Innovation, 11th International Study Forum on Life of Traders, Fabbrica della Conoscenza n. 39. La Scuola di Pitagora Editrice, Napoli, ID 177: 529-537.

[2] CIOFFI R. and PETRENGA G. (Eds). La Reggia di Caserta fra storia e tutela, Catalogo della Mostra Casa di Re. Un secolo di storia alla Reggia di Caserta 1752-1860, a cura di R. Cioffi e G. Petrenga, (Reggia di Caserta, 8 dic. 2004 -13 marzo 2005), Skira Editore, Milano 2005.

[3] SOPRINTENDENZA BAAAS PER LE PROVINCE DI CASERTA E BENEVENTO. "Lo Bello Vedere" di San Leucio e le Manifatture Reali. Napoli, E.S.I., 1998.

[4] VARIOUS AUTHORS. San Leucio: Archeologia, Storia, Progetto. Milano, Il Formichiere, 1977.

[5] ALISIO G. Siti reali borbonici. Roma 1976

[6] CILENTO G. La metropoli agraria napoletana nel secolo XVIII. Napoli 1983

Historical-iconographic Sources

[7] ROSSI D. Pianta del recinto del Real bosco e delizie di S. Leucio. B.N.NA, Sez. Manoscritti, B 26/10, First-half C19th

[8] SANCIO A. Platea de' fondi, beni, e rendite che costituiscono l'Amministrazione del Real Sito di San Leucio, formata per ordine di S. M. Francesco I, Re del Regno delle Due Sicilie dall'Amministratore Commendatore Cavaliere Antonio Sancio. A. R. C., 1826.

[9] SERRAGLIO R. Architettura e ambiente nel Real Sito di San Leucio. In GAMBARDELLA A. (a cura di). *Luigi Vanvitelli 1700-2000*. Edizioni Saccone, Caserta 2005, pp. 565-576

[10] SERRAGLIO R. Architetture e territorio per sperimentazioni agrarie, botaniche e zootecniche dal Settecento all'Ottocento. In SERRAGLIO R. (a cura di). *Ricerche sull'architettura rurale in terra di lavoro*. Edizioni Scientifiche Italiane, Napoli 2007, pp. 47-74.

[11] Lorenzo Giustiniani in the "Dizionario geografico-ragionato del Regno di Napoli", 1797-1805.

[12] Istituto Geografico Militare – IGM Archivio Cartografico. 1820. Carta Militare della Frontiera del Regno, F 3. Firenze

Scientific Papers and Technical Handbooks

[13] RUMSEY D., WILLIAM M. *Past time, past place. GIS for History.* ESRI Press, 2002.

[14] RISORSA S.R.L. 2002. I Sistemi di Terre della Campania. Carta e legenda 1:250.000. Regione Campania, Assessorato all'Università e Ricerca Scientifica, Innovazione Tecnologica e Nuova Economia, Sistemi Informativi e Statistica, Musei e Biblioteche. Firenze: S.EL.CA., 64 pp.+

[15] USDA-NRCS Soil Survey Staff – United States Department of Agriculture. 1999. Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys, 2nd Ed., Agriculture Handbook n. 436, U.S.D.A., Natural Resources Conservation Service, NY, 870 pp.

[16] BUONO R., VALLARIELLO G. 2002. La "vite maritata" in Campania. Delpinoa, 44:53-63.

[17] LEONE A.P., AMENTA P., CALABRÒ G., COPPOLA E., BUONDONNO A, MORLAT R. 2010. The disjointed influence of soil and climate on grape productivity and quality. An assessment by OMCIA-PLSR statistics on a case study in southern Italy. Agrochimica 5:257-278. ISSN: 0002-1857.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Durability of reinforced concrete and cultural heritage: the pompeian *domus* as emblematic cases

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Abstract
Interventions on cultural heritage have always involved the technological expertise of the time. Applications in historical monuments have in fact been prolific stage exhibition and case studies for the sponsorship of productors and technicians to improve commercial use in the more diffused ordinary buildings.
The technology of reinforced concrete, since the early decades of the twentieth century has been widely used in the restoration of historic monuments and archaeological ruins. The reinforced concrete interventions have been used and abused for over 50 years starting in 1930. There are several examples of concrete as the favorite solution to repair important monuments.
The first structural interventions in many Pompeian *domus* involved the replacement of old wooden or collapsed roofs with concrete structures similar to the old ones. Several of these roofs (realized in particular on the atriums) are nowadays visible. In some cases the heavy structure on the top of ancient masonry walls, not designed for similar loads, combined with the effects of weather (rain, change of temperature, pollution) and low -quality materials, has created the damages actually present in the fragile structure of Pompeii *domus*. Emblematic cases are the Vettii *Domus*, the Julia Felix *Domus*, and the Nozze d'Argento *Domus*. Actually several studies aimed at assessing the state of degradation and evaluating the vulnerability of the structures are in progress. In all the case-studies here presented the structural durability of reinforced concrete is a key point in the safeguard of a fragile and precious cultural heritage. This paper presents an analysis of these cases, discussing the role of reinforced concrete durability in the protection of monuments.

Keywords: cultural heritage, durability, reinforced concrete, Pompeian *domus*

1. Introduction
In recent years almost all the developed countries have created free electronic archives and have made relevant attempts to portray their Cultural Heritage. The representation of this artifacts becomes dynamic and interactive: it is the user himself who can directly choose the dimension, the level of detail and also the viewpoint to access each single artifact [Guttentag, 2010].
In this technological landscape fit interventions in reinforced concrete that since the beginning of the 30's for about 50 years have represented privileged expedient in the consolidation of historic monuments.
Once the concept of a monument as a document forming part of the archive of a civilization's material history has been accepted, we are faced with the problem of conserving the monument in its material integrity in the interests of future historical research. This problem affects the whole of our historical building heritage, but is particularly crucial for archaeological remains, which owe their existence and conservation entirely to their documentary value. The archaeological heritage is subjected to a number of natural and man-made hazards inducing continuous degradation. As time goes by, measures have to be taken more and more often to ensure conservation, and this tends to modify the status quo and

compromise the artefact's integrity. Hence the methodological requirement for the durability of any conservation measure. Unfortunately however, even when durability finds consensus in methodological terms, it comes up against resistance both at the planning stage and on site, so that in reality most of the interventions carried out today are not lasting.
In past centuries, as we said above, ancient ruins were often reused in new constructions, or else subjected to major operations of reconstruction. More recently they have undergone wholesale interventions of consolidation which have altered their rationale and static behaviour.
It is rare for archaeological constructions to have come down to us in their original configuration: they have almost always been profoundly altered by successive mutilations and transformations, giving them a new configuration and state of equilibrium as ruins. It is this characteristic which makes archaeological remains the object of complex, interdisciplinary studies involving archaeologists and applied scientists. What is more, in previous centuries characterized by a different, more limited view of history, ancient ruins were frequently incorporated into new constructions, making their anamnesis even more complex. In the light of our scientific understanding of history, we view a ruin as a multi-faceted document, and its integrity and conservation take on crucial importance.
Unfortunately archaeological sites have been subjected to far too many ill-considered, invasive interventions in the name of conservation in flagrant contrast with the ancients' construction culture. This was especially the case during the second half of the 20th century when, thanks to post-war reconstruction and the boom in house building, a shamefully cavalier approach to building prevailed. Moreover, some restoration projects have been closer to an architectonic reinterpretation of the ruins than a scientifically grounded reconstruction [Modena and Valluzzi, 2001].
From this an abuse of the use of reinforced concrete was born in these archaeological ruins and beyond. Several interventions were made by reinforced concrete which covered not only the archaeological ruins, but the cultural heritage in general that, unfortunately, by the time revealed somewhat precarious.
There are several examples of concrete as the favorite solution to repair important monuments that we will discuss in more details later.
If the prime objective is to safeguard the historic monuments and archaeological ruins, it is obvious that the concept of durability plays an integral part in achieving this objective, and must inform both the restoration project and the process of programmed maintenance.
There are two criteria for ensuring that principle:

- safeguarding the construction rationale of the archaeological artifact;
- employing materials and techniques compatible with durability.

These criteria must be adopted as methodological tenets, even though their application in practice can come up against a lot of difficulties.
The brutal insertion of new structural elements in an ancient building context has frequently occurred over the last century. In such cases these should be eliminated whenever this can be done without seriously affecting the archaeological fabric.
Some recent theories of restoration highlight the importance of tracing a historical profile of the successive interventions, in the interests of the building's value as a historical document, and go on to insist on the over-riding importance of the current status quo. Many interventions, and not only in the past, have in fact been highly prejudicial to an objective reading of the original document [ott and Pozzi, 2011].
An anamnesis of the alterations and adaptations carried out should be performed, including any previous evidence of restoration or conservation and the discernible episodes of degradation, whether due to natural or human causes. In addition it is important to determine the material composition of the ruins by establishing the quality of used stones and their provenance, the nature and quality of mortar or other adhesive agents, the stratigraphy of the walls, the way in which they were laid down, the successive alterations and the conditions of degradation.
Finally developments in the realm of technology may require the elimination of unsuitable materials; or again, as we have begun to see recently, progress in elaborating complex virtual reconstructions can lead to the dismantling of ill-conceived restorations in the interests of a scientific conservation of the archaeological monument.

2. Durability of reinforced concrete

The advent of reinforced concrete since the beginning of the 30's for about 50 years urges the massive construction of reinforced concrete structures, that replaces the previous masonry and timber structures. The advance in production of construction materials and architectural concepts cause more reinforced concrete structures to be built in this era. As the passage of time shows, this reinforced concrete material once believed to be eternal shows durability problems due to deterioration/distress of the structure on the long term. Some of these reinforced concrete structures built at that time are nowadays considered to be heritage structures by organizations like UNESCO. Over the past decades, there has been a growing awareness in the world of the importance of preserving our

heritage structures. In turn, this has caused more reinforced concrete structures to fall within the classifications of the heritage sector [David and Gizzi, 1993].
Due to the decay of these reinforced concrete heritage structures, their repair and maintenance is becoming indispensable to prolong the service life of the structures. The repair and strengthening of these reinforced concrete heritage structures are challenges to conservation professionals/restorers these days. It is a common practice to repair these structures based on past experience, and with the new materials and techniques available today.
The performance of a building component in concrete can be deduced from the knowledge of its nominal life, the class of use to which it refers, and the reliability of the component.
A structural element to vary the time undergoes a natural fall of performance, in relation to the useful life of the materials employed to achieve strength and to their implementation. Beyond a certain threshold limit, the performance of the component reaches values below which it is no longer able to ensure an effective response, depending on the required function, which indicates that it has reached the end of its useful life [Glasser et al., 2008].
To ensure that this limit is reached in a time sufficiently higher than the nominal life provided by the designer, it is necessary to adequately protect the concrete used for each different component of the work concerned.
There are many causes of degradation and we have tried to summarize them in the table below. It can be said, as of now, the possibility of the occurrence of a change are proportional to the permeability of the concrete. A waterproof concrete does not allow the penetration of any chemical element. In contrast, a very permeable concrete may be subject to any attack brought from the surrounding environment.

Problems	Causes	Laboratory Analysis	Symptoms	Prevention
Accidental loading	Impact, explosion, Earthquakes	No	Spalling or cracking of concrete	The event can't be prevented, but the effect on the structure can be reduced
Acid attack	Highly concentrated acids nearby the concrete structures	Identification of the specific acid present	Loss of cement paste and aggregate from the matrix and attack to the reinforcing bars causing corrosion, spalling and cracking	Concrete with a low water/cement ratio or appropriate surface coating or treatment
Aggressive water attack	Water with low concentration of dissolved salts	Measure of the aggressiveness of the water	Leaching of surface and consequent rough concrete surface	Coating susceptible areas with non-portland cement based coating
Alkali-silika reaction	A solid that expands in the presence of water, due to reaction of aggregates containing silica with highly alkaline solution	Petrographic examination	Random cracking. Map or pattern of cracking and swelling of concrete	Removal or replacement of damaged concrete and/or protective waterproofing render
Sulfate attack	Attack of concrete by naturally occurring sulfates found in soil or in solution in ground water adjacent to concrete structures	Determination of occurrence of reactions	Softening and loss of surface layers. Map or pattern of cracking and disintegration of concrete	Removal of all suspect and degraded concrete, and patch or full repair using a polymer mortar
Construction errors	Poor workmanship and carelessness	No	Enhance the adverse impacts of other mechanisms or accelerate the penetration of aggressive agents (CO_2, Cl_2) into the concrete	Knowledge of the construction errors and following aggressive inspection program
Corrosion of reinforcement	Differences in moisture content, chloride content, oxygen content and electric potential difference	Determination of chloride content in the concrete, to determine the amount of concrete to be removed during repair	Rust staining concrete followed by cracking (following the reinforcement) and spalling	Use of concrete with low permeability, providing adequate cover to reinforcement

Table. 1: Common problems and causes of reinforced concrete heritage structures

It is therefore of considerable importance the evaluation of the effectiveness of specific treatments against degradation recurring, such as the attack by carbonation, chloride attack and attack by sulphates.
This assessment assumes even greater importance in the event that the component in concrete takes part in the consolidation of a monumental opera.
The good durability of reinforced cement compositions in normal service environments has long been studied in the scientific literature. However, cements and concretes made with cement binders can be attacked and, as a result, exhibit a reduced service life. Most of the adverse conditions are recognized from experience and have been the subject of numerous examinations of field concretes as well as laboratory studies. Not surprisingly, research and testing have focused on the areas of underperformance [Gizzi, 1993].
The concept of “service life” is not new. The ancient world used stone, brick, tile and, from Roman times onwards, concrete, because of their permanence. The reinforced concrete has been used and abused for over 50 years starting in 1930 in the consolidations of many structures and also today it is widely used and comprised in the world's major structures.[Modena and Valluzzi, 2001]
The prediction of the "service lifetime" of structures in reinforced concrete is a global challenge. In literature precisely mathematical models have been developed in order to allow a reliable prediction of the behavior of these structures during their lifetime. Among these is the French APPLET project undertaken to improve these models and improve their robustness [At Mokhtar, 2013]. The main objectives of this project was to quantify the various sources of variability (material and structure) and to take these into account in probabilistic approaches, to include and to understand in a better manner the corrosion process, in particular by studying its influence on the steel behavior, to integrate knowledge assets on the evolution of concrete and steel properties in order to include interface models between the two materials, and propose relevant numerical models, to develop robust predictive tools to model the long term behavior of degraded structural elements, and to integrate the data obtained from monitoring or inspection. It is useful to underline that the loss of compressive strength of concrete due to chemical attack can reach very high values as it is visible from the diagram below [Collepardi et al., 2006b].

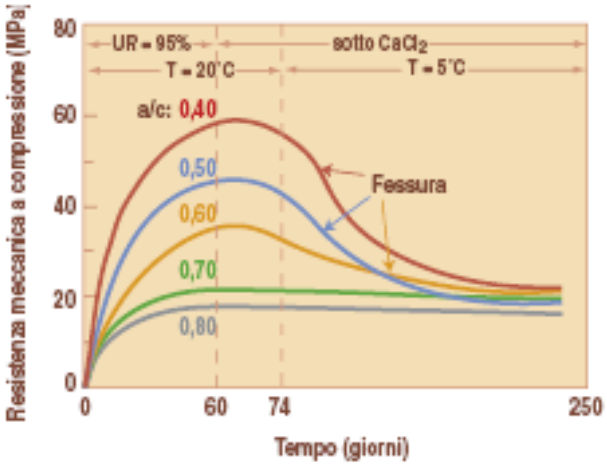

Fig. 1: Compressive strength of the specimens stored in water (20 °C) or in solutions of 30% $CaCl_2$ at 5 °C, 20 °C and 30 °C. [Collepardi et al., 2006b]

Among the various causes of corrosion there is the carbonation that is one of the most important factors that contributes for the corrosion of reinforcing steel, thereby reducing the strength and durability of load carrying reinforced concrete elements as shown in figure below [Collepardi et al., 2006a].
The requirement of durability is exquisitely type design and, therefore, must be addressed by introducing the stresses between the aggressive environmental parameters that contribute, together with the static and dynamic loads acting on the structure, the dimensioning of the sections of the structural elements, the identification of the percentages of reinforcement and their disposal. For a long time the problem of minimizing the costs of the interventions, the definition of life and nominal indices of reliability has been largely overlooked (if not completely rejected) and, consequently, the durability of concrete also has been relegated to a secondary role compared to the attention paid to the elasto-mechanical properties of the concrete and, in particular, to the compressive strength.
The result of this bad practice is represented by the numerous reinforced concrete structures that have suffered severe degradation in the form of corrosion of reinforcement bars. Out of significant parts of the concrete cover, deterioration of the aesthetic and functional qualities that forced it to

anticipate maintenance of 15-20 years compared to the canonical time that, for obvious economic reasons, is found in about 30 years after their completion.

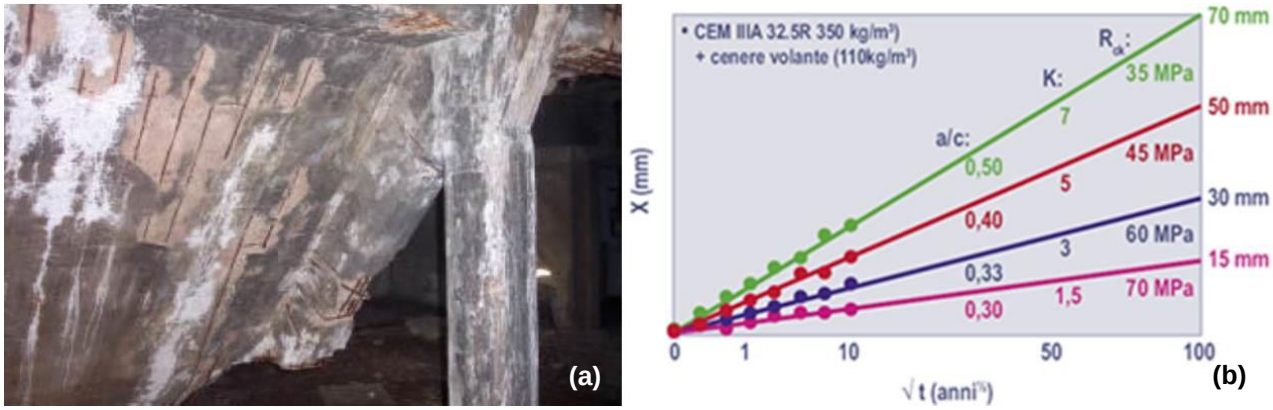

Fig. 2: Reinforcement corrosion caused by carbonation of concrete (a) and carbonation versus the w/c ratio of the concrete (b) [Collepardi et al., 2006b];

To ensure the durability of reinforced concrete structures exposed to the environment, we must take measures to limit the effects of degradation induced from the chemical, physical, and resulting from the corrosion of the reinforcement and the cycles of freezing and thawing.
When operating a restoration project, especially in the case of historic monuments, the environmental conditions of the site where the surgery will be included should be properly evaluated. They must first be established defining the characteristics of the concrete to be used (composition and mechanical resistance), the values of the cover and the rules of curing.
For the assessment of the durability, in the formulation of requirements on the concrete, tests to check the penetration resistance to aggressive agents should be prescribed. The degree of impermeability of concrete should be taken into account too. To this end, the value of the depth of penetration of water under pressure in mm, as indicated in the UNI EN 12390-8:2002 [Roziere et al., 2009], should be evaluated.
Although the statistics show that the poor quality of the concrete is the main responsible for the processes of instability/degradation of the structures, however, it should be noted that the problem of durability of the same needs to be addressed with an engineering approach that takes into account not only the deterioration mechanisms of the material, but also the inevitable implications of a structural type of equipment resulting from the construction. The deviations between the theoretical models and actual behaviors of artifacts, the errors inherent in the difficulty of carrying out the construction details, the distortions produced by thermo-hygrometric variations of the environment are to be taken into consideration. These problems are amplified in the case in which the concrete element goes to integrate ancient structures constructed with materials having different mechanical characteristics.
The engineering approach to the problem of durability cannot be reduced to a mere analysis of the mechanisms of degradation of the material alone, but must take into account that in real structures degradation processes studied in the laboratory using a reductionist approach (analyzing, that is, the various factors acting individually) are not simplistically extensible to real structures where several factors acting simultaneously and together contribute to define the phenomenon as a whole.
The mechanisms of deterioration of concrete shall be construed as one of the anchors that helps to define the general problem of the deterioration of the structures.

3. Some of the most emblematic cases

We shall now look at some practices of consolidation in reinforced concrete which frequently recur in the structural restoration of cultural heritage.
The first structural interventions in many Pompeian domus involved the replacement of old wooden roofs with concrete structures similar to the old ones. Several of these roofs (realized in particular on the atriums) are nowadays visible. In some cases the heavy structure on the top of ancient masonry walls, not designed for similar loads, combined with the effects of weather (rain, change of temperature, pollutants principles) and low-quality materials, has created the damages actually present in the fragile brittle structure of Pompeii domus. Emblematic cases are Vettii Domus, the Julia Felix Domus, and the Nozze d'Argento Domus [D'Amico and Flamini, 2000].
A collaborative effort of the Packard Humanities Institute and the Soprintendenza Archeologica di Pompei (SAP) was launched not only to safeguard and conserve the ancient site but to enhance and advance knowledge, understanding, and public appreciation of Pompeii and its artifacts. One of the

main tasks of the project is a site-wide campaign to address the most pressing conservation problems as collapsing roofs.
As an example the atrium of the Vettii *Domus* in Pompeii has been considered [Altieri, 2006; Di Filippo, 2001]. In the immediate post-war years a wooden roof erected in the late 1800s was replaced with a structure of the same dimensions in reinforced concrete. This intervention was badly flawed structurally and done using an inferior cement, so that it is now in very bad repair: the corrosion of the metal framework is in fact a common problem of interventions using reinforced concrete on archaeological sites. In this case the correct solution would be to replace the roofing, which exerts considerable pressure on the house walls, by a new wooden structure modeled on the 19" century construction, much more in keeping with both the ancient context and the rationale behind the house's construction [Capanna et al., 2000; Sogliano, 1898].



Fig. 3: (a) Poeta Tragico domus' roof, Pompeii, (b) Fabio Rufo domus' roof, Pompeii (photo by the authors, with permission of Ministry for Cultural Heritage and Activities – Special Superintendency for the Archaeological Heritage of Naples and Pompeii. All rights reserved).

The Nozze d'Argento *Domus* is a significant example of an extended atrium house, or urbanized villa, from Pompeii's pre-Roman period. The house was first excavated in 1883–1884 and restored immediately thereafter, with the first roof erected between 1906 and 1909. The house was maintained with periodic cleaning and conservation through the 1960s; its current roof was installed in 1979, after which great intervention on the site ceased. Being made of concrete material, the 1979 roof presents the main aspects of structural degradation of the site. In May 1998, the Kress Pompeii Conservation Project was launched by WMF to establish new standards in site conservation and presentation. Several buildings within Insula V2 -an area the Soprintendenza Archeologica di Pompeii had hoped to one day open to the public -were chosen for demonstration projects. Among them the Nozze d'Argento *Domu*. Methods developed in the course of these projects would be used to formulate a conservation strategy for the whole of the insula. For its part, WMF agreed to provide funding and technical assistance to carry out feasibility studies for the house restoration, enlisting the help of the ace conservators Paolo Marconi and Antonio Pugliano [Marconi, 2007; Pugliano, 2001]. They would develop a structural stabilization plan for the Nozze d'Argento *Domus* that included among other things a plan to replace the roof, the current one some five times heavier than the original. The result was the development of a laminated wood structure that was in keeping, both visually and architecturally, with the original building construction.


Fig. 4: The House of the Silver Wedding Anniversary [Guttentag, 2010]

While all of the conservation research to restore the house has been carried out, plans to construct the new roof have been drafted, and an imaginative method for presenting the site to the public has been developed, the project is currently on hold due to internal management issues within the SAP.
First, the sites require a multidisciplinary team of conservator-restorers, archaeologists, structural engineers, experimental scientists, and surveyors, to analyze the problems, learn from past mistakes and successes, try out and subsequently monitor new solutions. Such a team is beyond the resources and capacity of the heritage agency as presently constituted. Secondly, the rulebook as derived from their work has to be translated into intelligent bureaucratic practice, so that limited resources are not squandered on ill-conceived and expensive projects.
Another case in point is the Roman colonnade in front of the basilica of S. Lorenzo in Milan: during the 1950s the colonnade was dismantled, the segments were hollowed out or drilled through and filled with reinforced concrete, and the ancient crossbeams received the same treatment. This intervention, which is to all intents and purposes irreversibile, has destroyed the integrity of the monument, making it impossible to reconstruct its history.
Among other examples that can be cited are those performed in Turin for the Mole Antonelliana where massive reinforcements made of reinforced concrete have been placed since 1931 [Carpinteri et al., 2013]. Engineers Pozzo, Gilberti and Albenga planned to erect a frame reinforcement throughout the building, i.e. structural frame of reinforced concrete pillars composed of independent and isolated element with respect to the Antonelli's masterpiece. Professor Albenga consolidated the foundations considered overloaded and completed his project consolidating the cusp covering the old walls with thin jets of reinforced concrete. In 1953 a hurricane struck 47 m of the cusp and foresaw the construction of a steel structure connected to the old structures with a new reinforced concrete drum. The actual conditions of the r.c. structure is somewhat good, due to the fact that the major part of it is placed inside the Mole, differently from the following exempla, in which the environmental conditions have played a significant role on their durability.

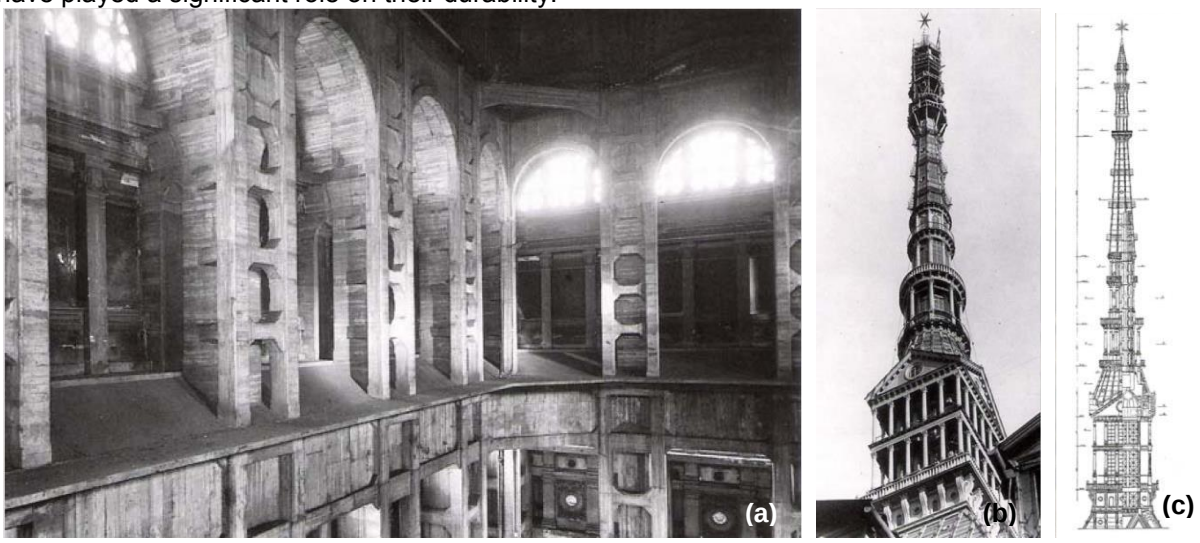

Fig. 5 (a) Great Hall of the Mole at completion of the work of consolidation implemented structural in the '30s. (b) Reconstruction's works of the end the spire after reversal of statue of the Genius winged (c) Half of the prospectus and mid-section of the project spire of 1953 [Gritella, 1999]

The interventions on the floor mosaics of the Roman Villa of Silin, built about 15 km away from Leptis Magna, site of primary importance for the archaeological, historical and cultural heritage of Libya, in view of the uniqueness of the complex are the object of the last considerations. The mosaic floor of the peristyle was at risk because during the 70's it was removed and repositioned on a reinforced concrete slab. Recent interventions have planned, in particular for the most deteriorated part, the removal and replacement of the layer of cement mortar with a new specially formulated and tested by ICR in collaboration with the CISTeC - Center for Research in Science and Technology for Conservation the Historical and Architectural Heritage (University of Rome La Sapienza).



Fig. 11: The interventions on the floor mosaics of the Roman Villa of Silin, Libya

4. Conclusions

The state of conservation of archaeological materials preserved on site depends on many different and changing factors. This significantly influences the effects of restoration actions and makes difficult to predict aspects such as durability or effectiveness of those treatments. However there are still many gaps in our knowledge about the effects of these interventions in the long term. Often, the masonry structures (especially buildings like the Pompeii *Domus*) are consolidated through techniques that provide the using of reinforced concrete, via curbs or beams, to ensure box-like behavior under seismic actions. The effectiveness of these intervention is now widely discussed i.e. after recent earthquakes. The desired box-behavior sometimes was provided, whereas some other times concrete beams caused the collapse of whole masonry walls between the upper and lower curbs.

In many cases, as shown, previous treatments and interventions have become sources of degradation. Moreover, at sites where several interventions have been carried out there could be an overlapping of treatments over the same surface, which can lead to unpredictable and unknown damages.

In these case analytical studies will be essential in order to determine an appropriate solution, as well as knowing mechanisms of deterioration and the validation, or definitive dismiss, of treatments and products. These analyses would be more realistic and practical if carried out in situ, considering their actual exposure conditions.

The conservation principles of heritage structures from recommendations are difficult to attain in reinforced concrete heritages structures. This means that some flexibilities on the principles should be made and it should be combined with the repair principles of reinforced concrete structures to get conducive principles for future interventions.

Durability problems of reinforced concrete have shown that this material does not sustain for long time like masonry heritage structures, and thus repair can't be delayed. The causes of deterioration as the damage or deterioration or distress will propagate easily and reach the reinforcement level, leading to corrosion of the reinforcement and further damages.

For any reinforced concrete structure, and mainly for the r.c. elements placed in cultural heritage structures, preventive maintenance is preferable to repair or replacements of part or all of the structure should taken into account.

Architects and engineers should work together to preserve heritage structures without compromising their identity to pass the heritage structures for the coming generations. In this view the presence of reinforced concrete elements in the framework of masonry structures like those the past generations have left to us should be carefully evaluated in the light of the developments provided by scientific and technological advances.

References

[1] AÏT MOKHTAR, A., BELARBI, R., BENBOUDJEMA, A.F., BURLION, N., CAPRA, B., CARCASSÈS, M., COLLIAT, J. B., CUSSIGH, F., DEBY, F., JACQUEMOT, F., DE LARRARD, T., LATASTE, J. F., LE BESCOP, P., PIERRE, P., POYET, S., ROUGEAU, P., ROUGELOT, T., SELLIER, A., SÉMÉNADISSE, J., TORRENTI, J. M., TRABELSI, A., TURCRY, P., YANEZ GODOY, H. Experimental investigation of the variability of concrete durability properties, *Cement and Concrete Research* 45, 2013, pp. 21–36.

[2] ALTIERI, A., FLAMINI, M.G., PRISCO, G. Cronologia di un giardino attraverso le immagini, cronologia delle immagini attraverso un giardino: la domus dei Vettii, un case-study. *The archaeology of crop fields and gardens*, 2006, pp. 271-281 (in italian).

[3] CAPANNA, M.G., FLAMINI, A., GUGLIEMI, M., OZINO CALIGARIS, G., PRISCO, S. L'Istituto Centrale per il Restauro a Pompei: interventi nella casa dei Vettii e nella casa VI, *Rivista di Studi Pompeiani, XI*, 2000, pp. 252-262 (in italian).

[4] CARPINTERI, A., LACIDOGNA, G., CAMMARANO, S. Structural analysis of high-rise buildings under horizontal loads: A study on the Intesa Sanpaolo Tower in Turin, *Engineering Structures* 56, 2013, pp. 1362–1371.

[5] COLLEPARDI, M., COLLEPARDI, S., TROLI, R. Calcestruzzi a durabilità secolare – Parte 1: strutture esposte all'aria, *Enco Journal* 34, 2006/a, Ponzano Veneto (TV) (in italian).

[6] COLLEPARDI, M., OGOUMAH OLAGOT, J.J., SIMONELLI, F., TROLI, R. Attacco dei cloruri sulle strutture in c.a., *Enco Journal* 35, 2006/B, Ponzano Veneto (TV) (in italian).

[7] D'AMICO, M.G., FLAMINI, A. La Casa dei Vettii e la casa VI, 15,2: proposte per nuove coperture, Atti della Giornata di studi "Le coperture di aree e strutture archeologiche", Bologna 20 ottobre 2000 (in italian).

[8] DAVID, P.R., GIZZI, S. Restauro, cemento e reversibilità, Calcestruzzi antichi e moderni: storia, cultura e tecnologia, Atti del convegno di studi "Scienza e Beni Culturali", Bressanone, 6-9 Luglio 1993 (in italian).

[9] DI FILIPPO, M., PRISCO, G., TORO, B. Indagini non distruttive sul sottosuolo della casa dei Vettii a Pompei, BOLLETTINO ICR – NUOVA SERIE 2, 2001, pp. 68-83 (in italian).

[10] GIZZI, S. Reintegrazioni in cemento nel restauro archeologico: aspetti descrittivi e riscontro di dannosità, Calcestruzzi antichi e moderni: storia, cultura e tecnologia. Atti del convegno di studi "Scienza e Beni Culturali", Bressanone, 6-9 Luglio 1993(in italian).

[11] GLASSER, F.P., MARCHAND, J., SAMSON, E. Durability of concrete — Degradation phenomena involving detrimental chemical reactions, *Cement and Concrete Research* 38, 2008, pp. 226–246.

[12] GRITELLA, La mole Antonelliana; storia di un edificio simbolo dal progetto al restauro, UTET, Milano, 1999

[13] GUTTENTAG, D. A. Virtual reality: Applications and implications for tourism. *Tourism Management* 31, 2010, pp. 637-651.

[14] [13] MARCONI, P. The Casa delle Nozze díArgento: A Preliminary, Definitive and Executive Project for Restoration, Proceedings of the Symposium Conservation in the Shadow of Vesuvius: a Review of Best Practices, WMF 2007.

[15] MODENA, C., VALLUZZI, M.R. Repair and upgrading techniques of historic masonry buildings: researches and applications, *7th Int. Conf. on 'Inspection, appraisal, repairs and maintenance of buildings and structures '*, Nottingham-Trent University Campus, UK, 1 1 - 13 September 2001, pp. 93-106.

[16] OTT, M., POZZI, F. Towards a new era for Cultural Heritage Education: Discussing the role of ICT, *Computers in Human Behavior* 27, 2011, pp. 1365-1371.

[17] PUGLIANO, A. La conservazione attiva dell'edilizia pompeiana e il progetto di restauro architettonico della Casa delle Nozze d'Argento, Ricerche di Storia dell'arte, n. 74-75, 2001.

[18] ROZIERE, E., LOUKILI, A., CUSSIGH, F. A performance based approach for durability of concrete exposed to carbonation, *Construction and Building Materials* 23, Issue 1, 2009, pp. 190–199

[19] SOGLIANO, A. La casa dei Vettii in Pompei, Monumenti Antichi, VIII, Accademia Reale dei Lincei, 1898.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII
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Designing the country in infrastructure areas. Area highway exit Candela, Foggia

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Abstract
The current scenery near the highway exit Candela imposes a series of interventions to modify the area in the interchange between infrastructure and services.
The lack of space to devote to parking and bus stations has been the driving force of the Municipal Plan of Tratturi. The proposed intervention on the one hand tends to safeguard the property of the herd and on the other hand proposes strategic interventions to change the area into an interregional bus station between Foggia, the Melfi industrial area and the areas "pedeappeniniche daune".

Keywords: Infrastructures, Safeguard, Services

1. Historical background
The "Dizionario geografico ragionato del Regno di Napoli", of Lorenzo Giustiniani, describes the possessory condition of Candela's land in the late XVIII century. From the description were evident two realities: on the one hand there was a privately owned, limited to specialized cultivation; on the other hand, the open fields of the territories under the control of the "Dogana delle pecore di Puglia" of universal and feudal demesne. In the earliest times, it is certainly easier to focus on other forms of ownership in the area. Tracks of the castrum of Candela was in a donation act quoted by Di Meo, with which in 1107, Count Guglielmo granted to the Benedictine monastery of the church of Cava S. Angelo, located outside of its walls, the appliances of the same and the "power to keep the market in May, with exemption stallage."
Apart from the explicit declaration of the existence of the castrum in the early XII century, the exemption from stallage and the ability to hold an annual market at the church of S. Angelo, are indications of extreme vitality of the community, whose territory was to be a sort of focal point for the exchange of the surrounding area.
Unfortunately, even in the case of Candela, the documentation is very incomplete, as to make difficult the identification of the feudal lords of the same place at least until the age of Aragon. In october of 1279 the inhabitants of the "Casale" of Candela are obliged to participate in the maintenance of the "castrum S. Agathes "along with those of the hamlets of St. Antonio of Ascoli, "St. Petrus de Olibula "and the monastery of St. Stefano "in luncarico". In 1496, Troiano Caracciolo, Grand Seneschal of the Kingdom, became feudal lord. The Caracciolo leaked early the feudal benefit. In 1487 Ferrante deprived, in fact, the feud owned by Sergianni Caracciolo, accused of felony for having participated in the conspiracy of the barons. Candela was given to the Prince of Oranges "in renumbering of its services." Devolved to the Crown at his death, in 1531, the fielf of Candela was given to Andrea Doria together with the fiefs of Melfi, Forenza and Lagopesole.With them he formed what was known as the state of Melfi remained until the abolition of feudalism to the Doria. As often happened, in Candela principles of Melfi had feudal property. Of these, certainly the more important was the farm of Canestrello, whose territory is crossed by the Ofanto, bordered on the estates of the Bishop of Ascoli and was partially subject to the jurisdiction of the "Dogana delle pecore di Puglia ".

The Principles possessed almost all the municipalities from which tithes a fee, the “terraggio”, in case they were planted. This also applied to the territories granted to the University of Serra rented for planting. As already underlined the Giustiniani, from the half of XV century Candela was in part subject to the jurisdiction of a magistracy state: the “Dogana delle pecore di Puglia”. This, of course, managed the state-owned large pastures, intended for transhumant herds coming mainly from the Abruzzi and Molise. Mostly located in the Tavoliere area, the duties locations occupied large areas close to the territories of local communities. This it also happened in Candela. In its territory fell one of the “steps” of access to the the Tavoliere’s “tax area” , also known as the “Scaricaturo” of Candela. Here came also the Pescasseroli-Candela, one of the main “tratturi” used by the people to transfer their flocks from summer pastures in the Apennines to the winter pastures of the plains of Puglia and vice versa. Candela was not, however, affected only the passage of transhumant herds. Large part of it was, in fact, used for the pastures of the “locations” duties. In particular, in the containment of the community fell the territories belonging to the Tufara owned by Feud of Ascoli, the “Correa of Candela” that of this was “rental addition”, the territories of “Canestrello”.

1.2 The Project

Area. The area is located near the town of Candela (Foggia, Italy). Acting on the recommendations regulations at all levels of planning the project intervention is the architectural and landscape design of a complex system comprising a botanical garden, which will be connected and integrated a village tourist accommodation (hotel diffuse) and attached services including a station intermodal exchange. All this taking into account sustainability and eco-friendliness of the intervention.

Masterplan. The concept that defines the structure of the masterplan is born from the encounter and confrontation with the Arch. Carlos Ferrater. The idea is that of a triangular structure that puts in communication the various areas of the intervention, leaving isolated in the center, a pre-existing tower, as if to signify a neuron that part of a structure isolated and then branch out and develop in a series of filaments which in this case become bicycle and pedestrian paths, greenhouses, building hotel and botanical areas.

The entrance building. The building consists of a series of blocks, with sloping roofs that create a bridge that leads to the botanical system. It contains all the activities of first asylum for the services present in the area, a bar area, a bookshop, and a rental bike for bicycle routes through the system.

Albergo diffuso. The hotel consists of housing units in formala two and three, it has a low visual impact and leads to the definition of hidden architecture. It ‘also characterized by reversibility, being built on adjustable jacks. Everything is designed to ensure non-introspection and sustainability of the intervention, with particular attention to the mitigation of energy consumption and the use of environmentally friendly materials. In addition, the connecting paths are made of clay and planks of wood embedded in it. The following tables will be useful to illustrate the operation of the entire system.

Botanical greenhouses. They grow to be also integrated into the whole master plan, the logic can occupy less land. It is divided into hanging terraces that make possible the use of tree species present.

This work is the degree thesis of the candidate Paolo Gordon inside of my course and the subsequent contribution of Luisa Costanza.

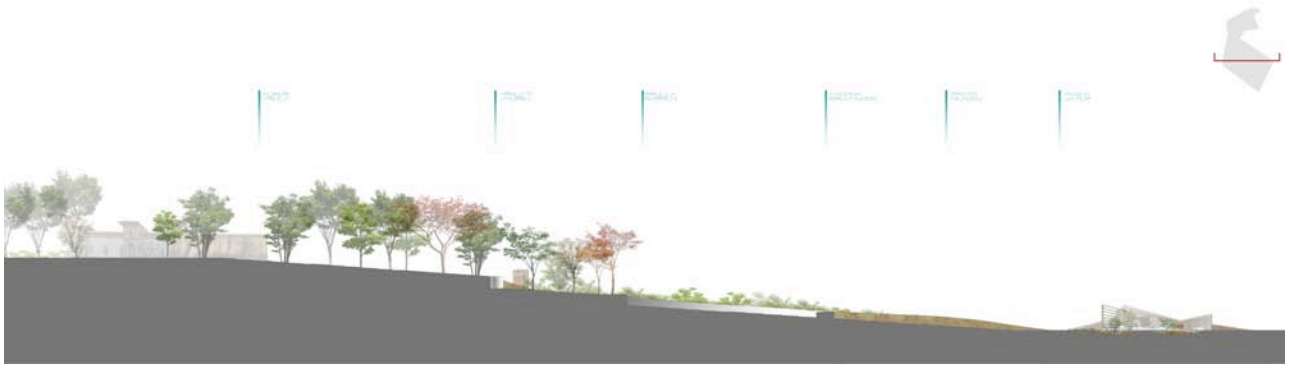

Fig. 1: **General Section**



Fig. 2: **Masterplan**



Fig. 3: **Entrance building – Cross-section**



Fig. 4: **Entrance building – Plan**

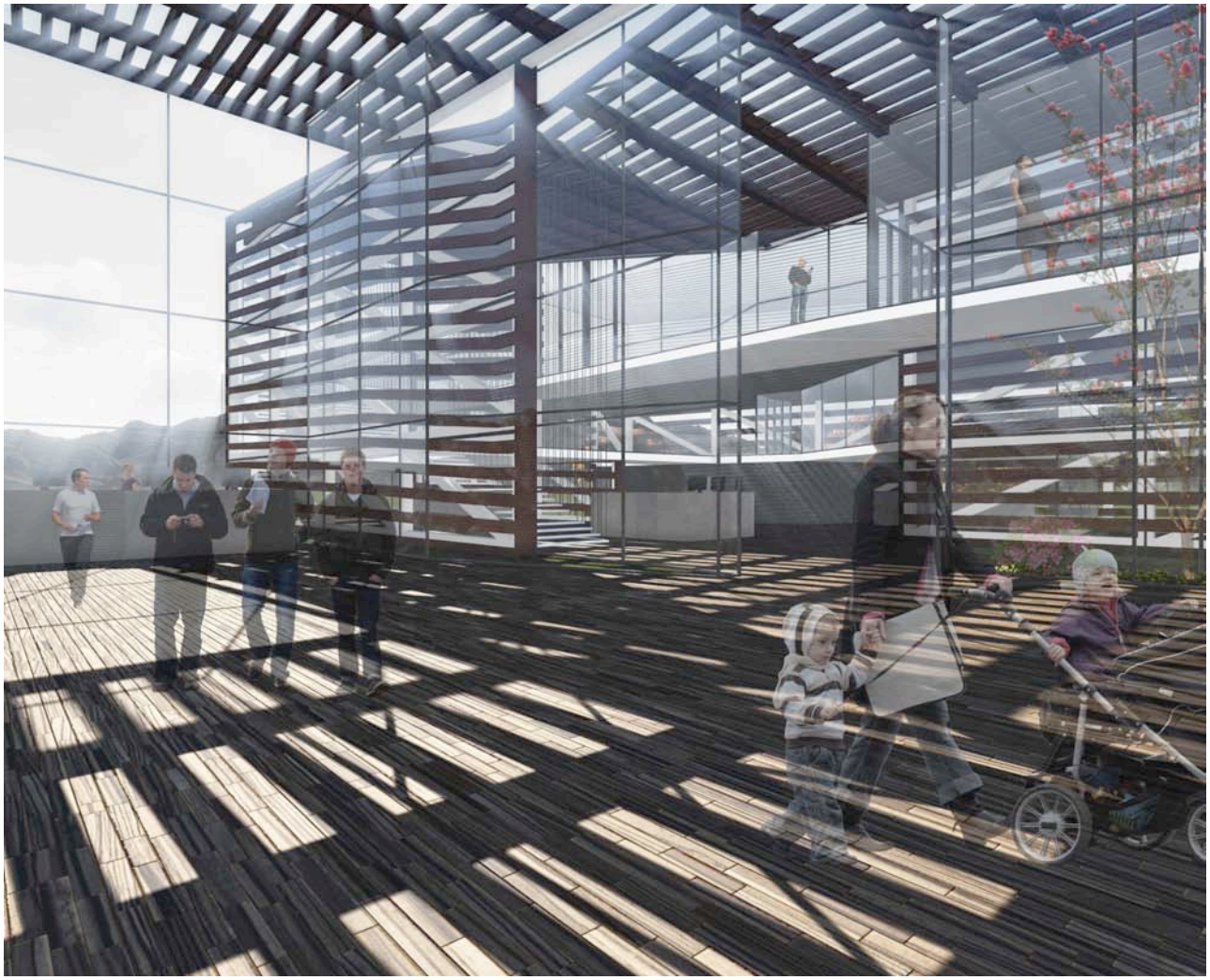

Fig. 5: **Entrance building – View 1**

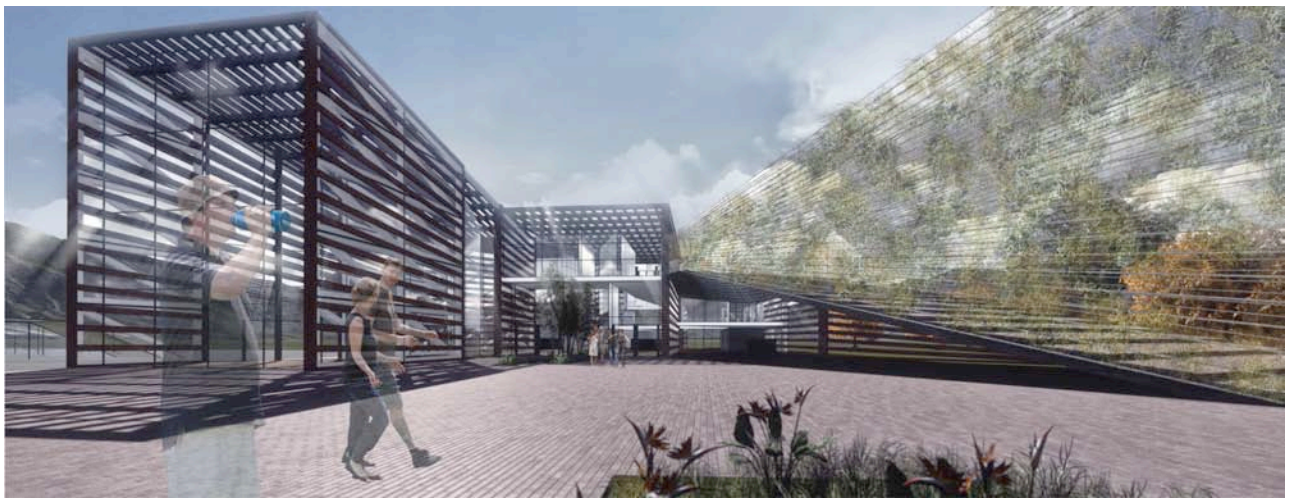

Fig. 6: **Entrance building – View 2**

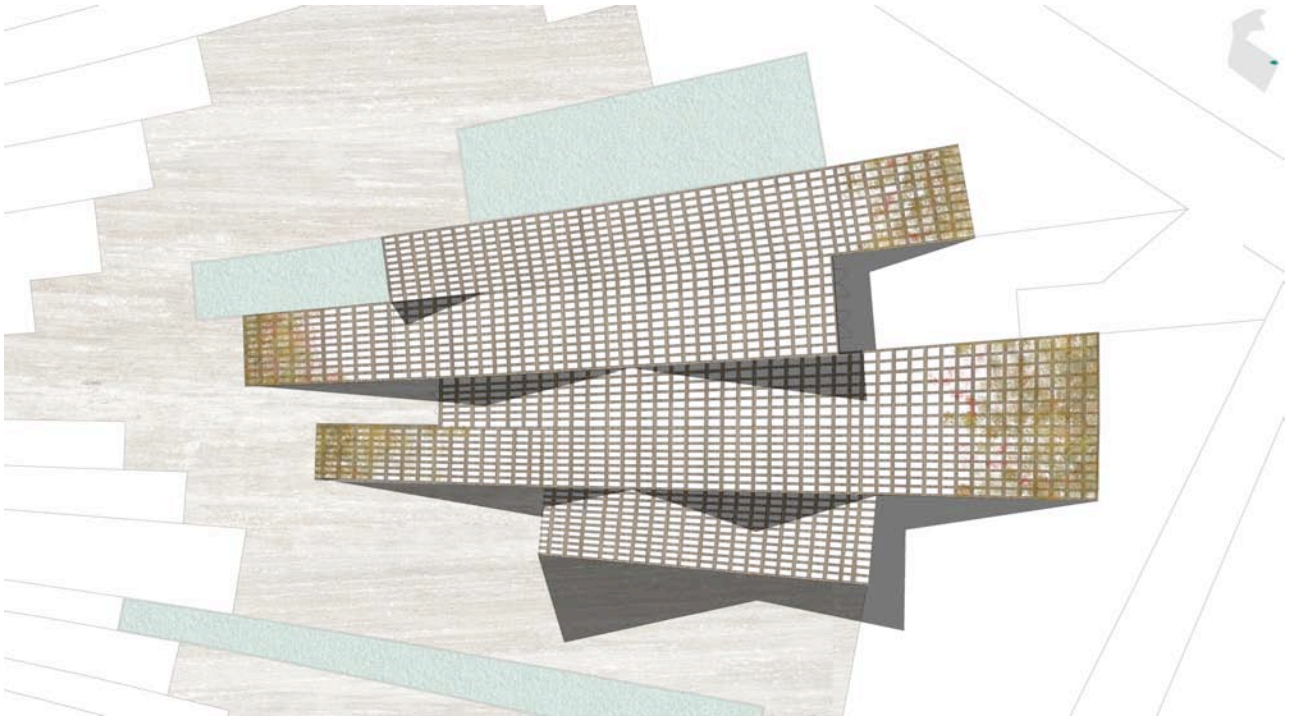

Fig. 7: **Botanical greenhouses – Roof Plan**



Fig. 8: **Botanical greenhouses – Longitudinal Section**

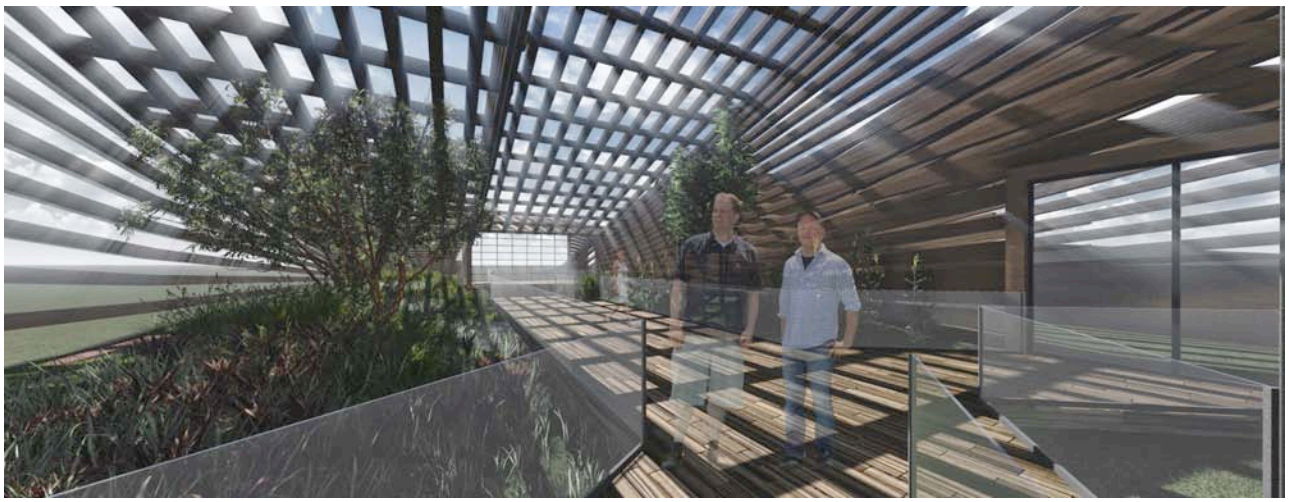

Fig. 9: **Botanical greenhouses – View 1**

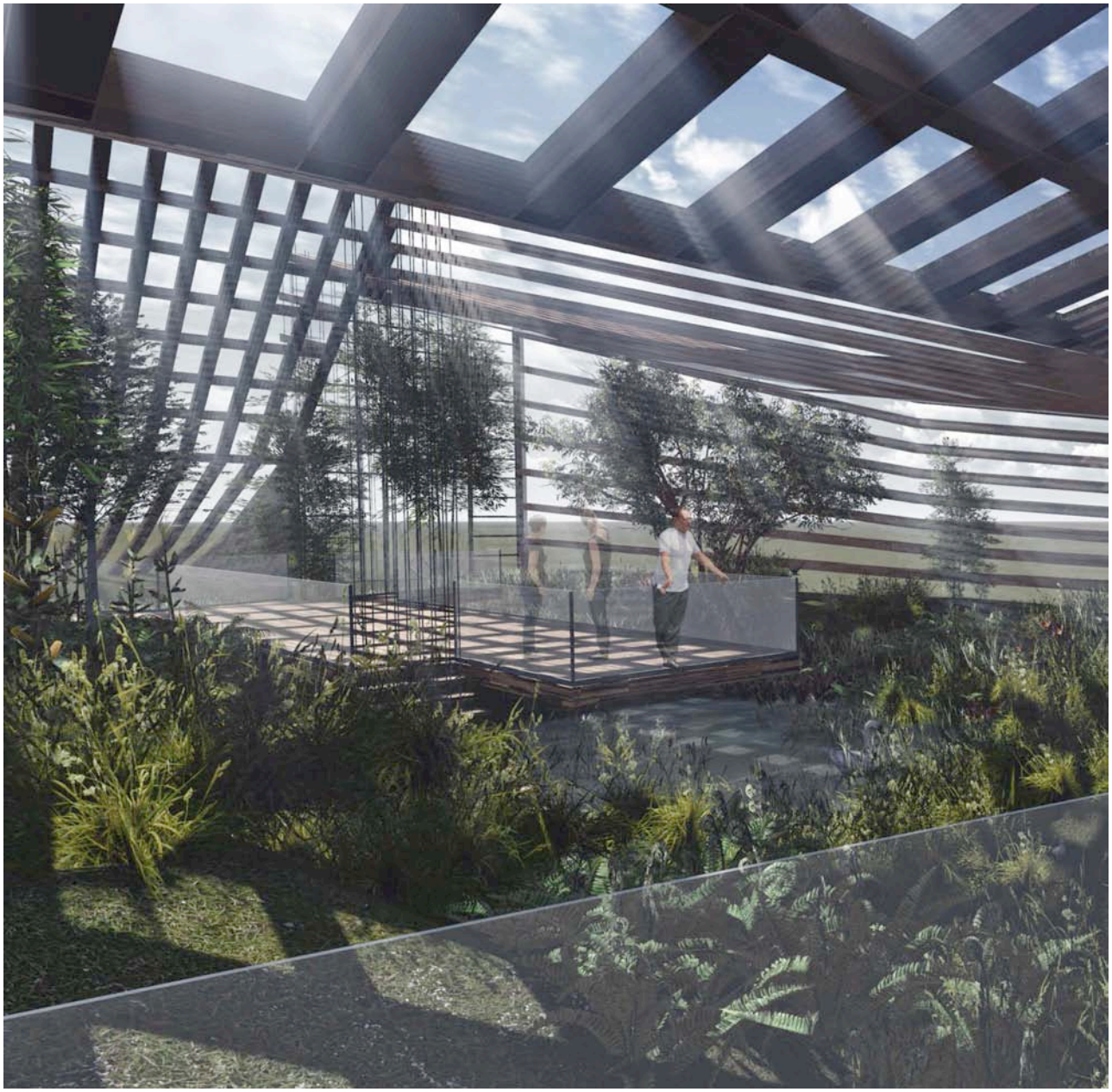

Fig. 10: **Botanical greenhouses – View 2**

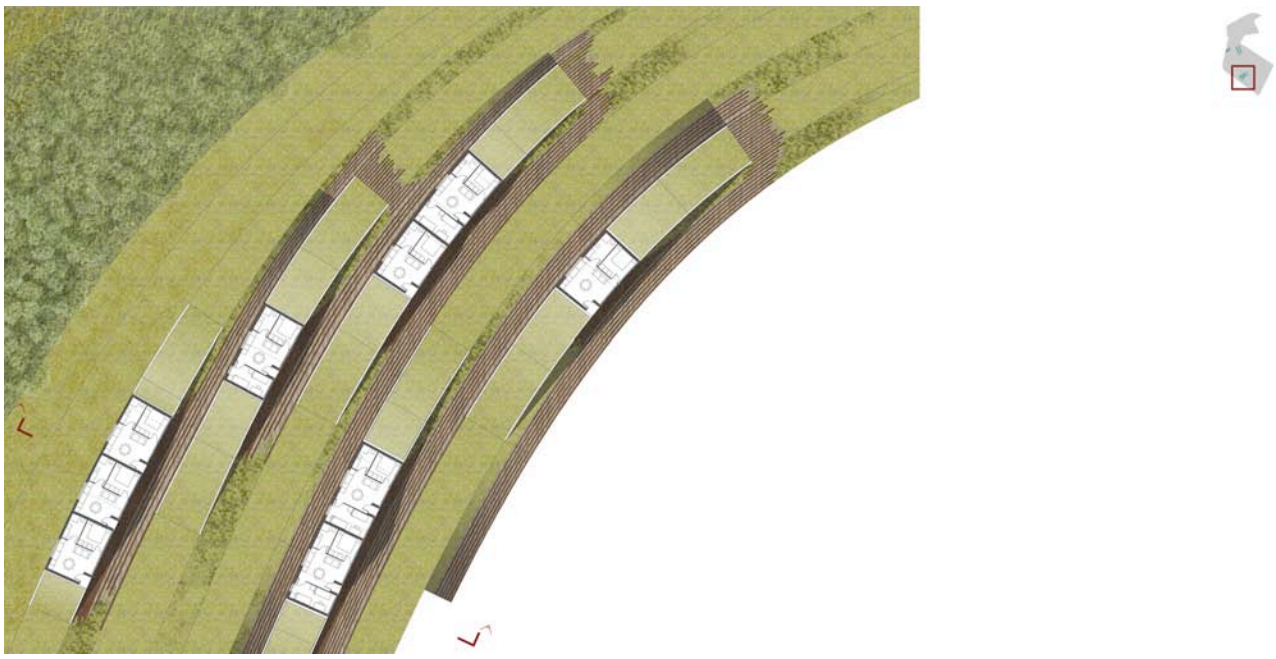

Fig. 11: **Albergo diffuso – Plan**

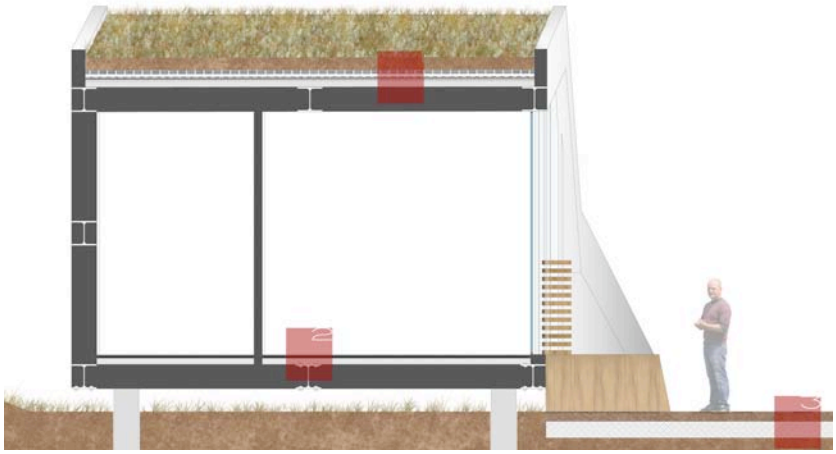

Fig. 12: **Albergo diffuso – Cellular Section**



Fig. 13: **Albergo diffuso – View**

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Davide Pacanowski a significant interpreter of modern architecture in the twentieth century

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Abstract
The methodological assumption of this research is the recognition of the importance of many architects exclusively engaged in the profession, but unrelated to the theoretical debate and the academic studies, because they certainly had a significant impact on the environment of the Italian cities during the twentieth century by constructing a number of very interesting buildings. In particular, this paper deals with the long professional experience of the architect Davide Pacanowski I considered one of the most significant among those who have been active in Naples from the thirties to the sixties of the last century. In his long career he worked in Naples and Rome for private clients, companies and public bodies. The numerous buildings designed by Pacanowski are distinguished in the urban environment of such important Italian cities thanks to the simplicity and the quality of their architectural patterns, where the architect finds the right balance with the adjacent monumental and natural presences. For this reason, they can be considered an adequate solution to the difficult dialectic between the speciality of the historical context and the rationality of the modern architecture. Now, the investigation of Pacanowski's private archive, allows us to study his drawings and his plans, so that we can have a better understanding of his works.

Keywords: modern architecture, built environment, private archives.

1. The professional training and beginnings
After years of research dedicated to the paradigmatic expressions of Italian architecture in the twentieth century, it seems that is the right time to investigate the ordinary buildings in the urban centers, in the suburbs and in the provinces, because they give back the true identity of any context. At the same time, it recognizes the importance of architects exclusively engaged in the profession, but unrelated to the theoretical debate and academic studies. Many of these – like Vittorio Amicarelli, Franz Di Salvo, Sirio Giametta and the same Davide Pacanowski – had a significant impact in the environment of the Italian cities by constructing very interesting buildings [16]. What we are now proposing is to operate the historical recovery of some of these through the acquisition of a documentation supporting the critical analysis in their private archives. In the case of Davide Pacanowski (Lodz, December 29, 1904 - Rome, August 4, 1998), the study of his work has been possible thanks to Mrs. Lydia Sterle, the widow of the architect, who allowed me to investigate his archive [1].
Pacanowski was born in Poland in a Jewish family of artists, naturally projected in an international cultural environment, and led his university studies at the Polytechnic of Milan from 1923 to 1928. During these years, he worked with some of the best architects in the city - Giovanni Muzio, Giuseppe De Finetti, Alberto Alpago Novello, Ottavio Cabiati, Guido Ferrazza, Alessandro Minali – getting by them the interest in the most up-to-date expressions of European architecture dating back to that period [1, 14]. In the twenties, in fact, the professional environment in Milan was characterized by a propensity to the renewal more than in any other Italian city, and in the twentieth century, between 1926 and 1929, the most of the best Italian architects graduated at the Polytechnic [14].

After graduating in architecture and participating in the specialization course on reinforced concrete structures, the young architect settled in England (1929-30), where he treated the accommodation of some shops in Leeds and Leicester [1, 18]. Later he settled in France (1930-1935), where he worked in Paris for the engineering study-office Baffrey-Hennebique and then for a firm engaged in the construction of hotel and sports facilities in Monte Carlo. During his French period, he had a direct contact with Le Corbusier, subsequently in his career the references to the Swiss architect, as regards spatial solutions and architectural details, were so evident to constitute a stretch of continuity [14,15].
Back to Italy, in 1935, the architect designed an innovative residential building in Campobasso, characterized by an early modern language for an Italian southern small city. The building, known as "the Ship", was distinguished for the use of innovative technologies and materials, such as the reinforced concrete in the structures, glass-bricks in the separating walls, linoleum floors, a central radio system (one of the first in Italy), common supply of electricity and water [1, 2, 3, 18]. In the years before the second world war he conducted many significant professional experiences. In 1937 he participated with Domenico Filippone in the competition for the Palazzo della Civilità in the EUR42 planning, presenting a project that was rejected because of its too modern materials and techniques [1, 18]. In 1938 he designed some residential buildings for the Italian overseas colonies, which show significant similarities with the famous Le Corbusier's Maison Monol of [14, 18]. In 1938-39 he directed the construction of the Banco di Napoli headquarters in Via Toledo, designed by the famous architect Marcello Piacentini. At the end of the work, Pacanowki presented a plan to restore the area opposite the Piacentini's palace, where he arranged a central plaza under the street level, surrounded by symmetrical buildings for offices and residences on the lateral sides and by a building that included a theater and a hotel on the opposite side [1, 18]. This project, however, would have required the dejection of a significant sector of the historical Spanish Quarter. In 1939 he designed the headquarter of the Gioventù Italiana del Littorio and the Casa dello Studente in Acqui, where he arranged the buildings around a high flagpole, that determined the nodal element of the composition [1, 18].
The promising professional beginnings of the architect were interrupted in 1940, when, pursuant to the racial laws of 1938, first he was imprisoned in the Jail of Arezzo, then he was transferred to the Jail of Poggioreale, finally he was sent to internal exile in Sepino, a small town in the province of Campobasso [1, 14, 18]. During the four years of confinement in Sepino, perhaps thanks to the protection of the family Di Penta, the architect was able to enjoy a degree of autonomy. In those years, in fact, he carried out some professional assignment, for example the setting up of the socks shop PRM (Pietro Ruffini Milano) in Naples, where he showed the accuracy in the furnishing design and



Fig. 1: Vintage photo of the residential building named "The Ship" in Campobasso.

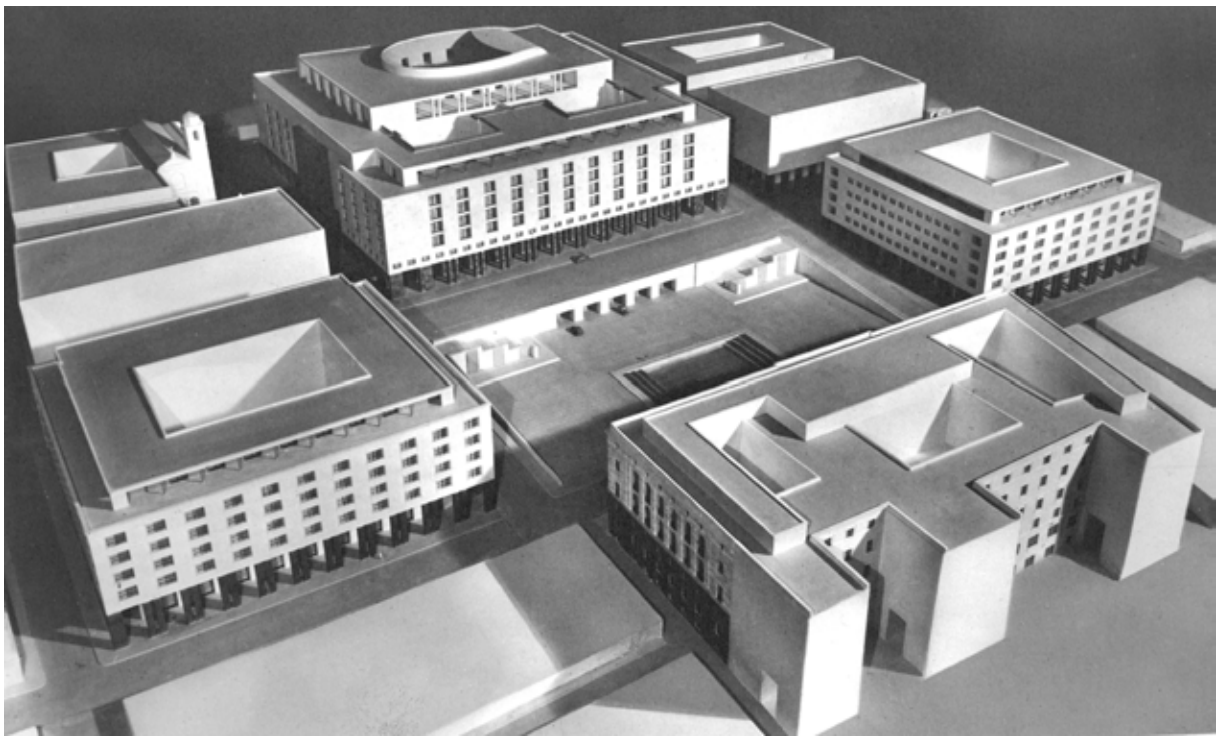


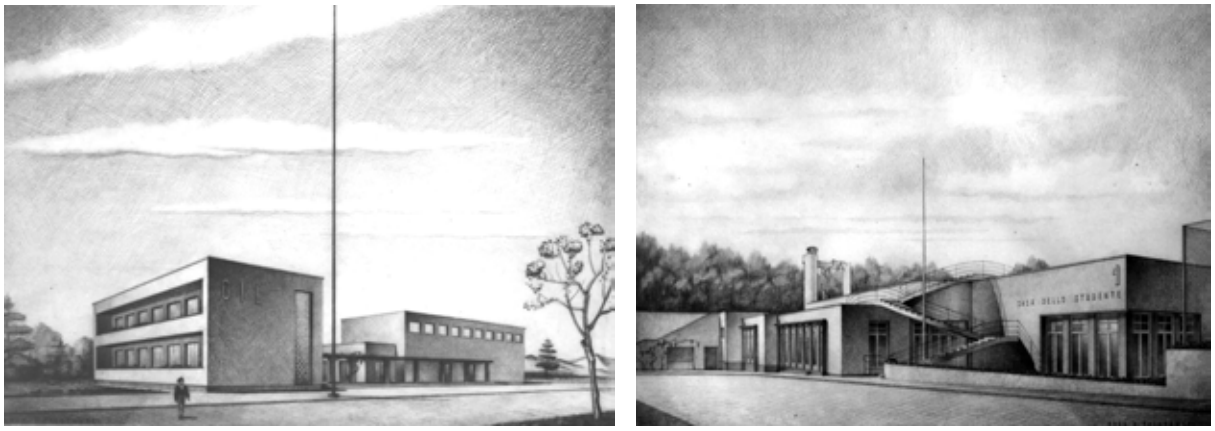
Fig. 2: The model of the urban renewal project in the front of the Banco di Napoli headquarter.

architectural details that would be a hallmark of his mature output [1, 18]. In Sepino he gained the confidence of the mayor Alberto Peluso, who gave him the run of the archaeological excavations of "Saepinum", the ancient Roman city, under the direction of Amedeo Maiuri, the famous director of the Archaeological Museum of Naples. The meritorious archaeologist activities earned him the esteem of the population and local authorities, which in 1950 conferred upon him and Maiuri the honorary citizenship [1, 18].

2. The professional activity from the postwar to the end of his life

After the second world war, he resumed his professional activity working for private clients, companies and public bodies. In 1945 he drew up the plans for a twenty-two storey skyscraper, to be built on the ruins of the port of Naples, damaged by bombing [1, 14, 18]. The building was characterized by balustrades of the terraces oriented diagonally and by plants that would have decorated his surface. In fact, in the early postwar years the idea of skyscrapers in the Porto neighborhood was considered as a possible solution to urban development and the Pacanowski's project significantly anticipated the plan for the reconstruction designed by Luigi Cosenza in 1946, which arranged a series of residential towers on the east coast road of Naples.

From 1946 to 1948 he read, with engineers Carlo Cestelli Guidi and Adriano Galli, the technical drawings for the construction of bridges and viaducts in Rome and Florence [1, 18]. Then in the fifties, he devoted mainly to the construction of residential buildings in Naples and Rome.



Figg. 3-4: Views of the Gioventù Italiana del Littorio headquarter and the Casa dello Studente in Acqui.

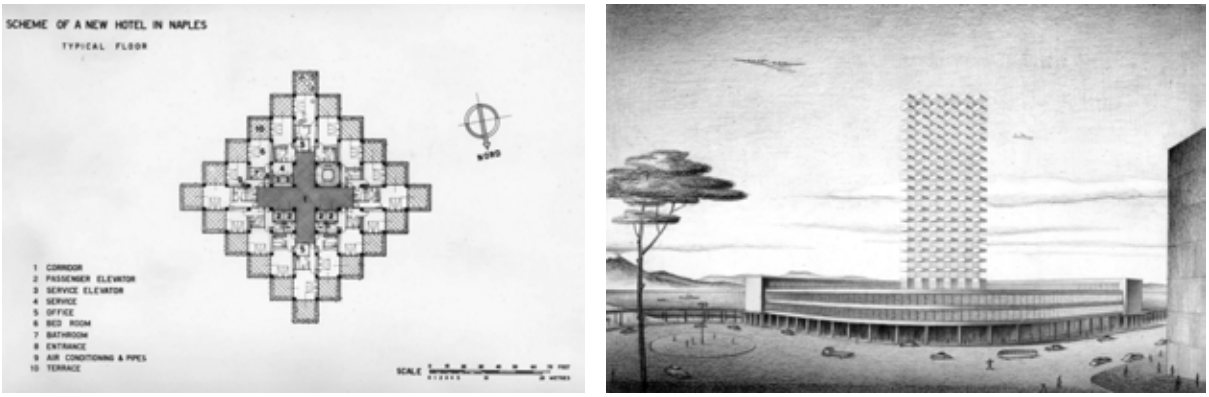


Fig. 5-6: Plan and view of the skyscraper in the Porto neighborhood of Naples.

The three villas built by Pacanowski on the hill of Posillipo - Villa Crespi (1952) , Villa Bruni (1957) and Villa Maderna (1957) - picked up the legacy of the rationalist buildings made in Naples by Luigi Cosenza in the thirties-forties, such as Villa Oro (1934-37), Villa Savarese (936-42) and Villa Ferri (1943-49). Villa Crespi, built on a tufa rock between two pine trees at 31 meters above the sea level, was considered at the time of the construction one of the most beautiful villas in the world [1, 7, 11, 12, 13, 14, 18]. The body of the house was supported by a single circular concrete pillar embedded in the tufa rock, designed by the engineer Adriano Galli. The most characteristic element of the building was the roof-garden, that according to the architect constituted the real facade of the villa, which can be seen from the overlying via Orazio. The interior of this house, as the others of the residential buildings designed by Pacanowski in Naples, establishes a special relationship with the surrounding environment through the large scenically windows open on the Gulf, framed by flowers and plants [8].
Villa Bruni, located on the top of the hill of Posillipo, was distinguished by the curved shape, dictated by the form of the road. The contrast between the convexity of the building on the road and the linearity of the parts in the interior side, led to an architecture characterized by the alternation of full light and shadow, that articulated the prospects [1, 10, 12, 13, 14, 18]. The construction of Villa Maderna, located inside the Parco Carelli, was entrusted to Pacanowski after that an interesting project by the famous architect Michele Capobianco, characterized by the transparency of the rooms facing the sea, was rejected by the customers [1, 9, 12, 13, 14, 18]. The building designed by Pacanowski ordered two bodies, joined at the right angles, differentiated from changes in altitude of the site, which determined the different levels of the interior spaces. The garden was divided into various areas, each characterized by different species of trees, while the roof-garden was arranged to camouflage the building from via Petrarca.
In the same period, Pacanowski designed a number of residential buildings in Posillipo, commissioned by Companies Di Penta and Laudiero. The construction of such buildings charged up debates about the morality of the planning architects who were accused of violent alterations of such an astonishing area. As a matter of the fact, the buildings designed by Pacanowski were certainly less aggressive to the surrounding environment than many others, because he integrated the volumes to the morphology of the site, including gardens in roofs and terraces, to preserve, as much as possible, a sufficient amount of vegetation in the new quarters [1, 5, 18].
Stimulants architectural motifs are also identified in other residential buildings in Naples. For example, in the Palace "la Fontana", in the corner between Via Mattia Preti and Via Domenico Cimarosa [1, 18].



Figg. 7-8: Vintage photos of the Villa Crespi in Naples.

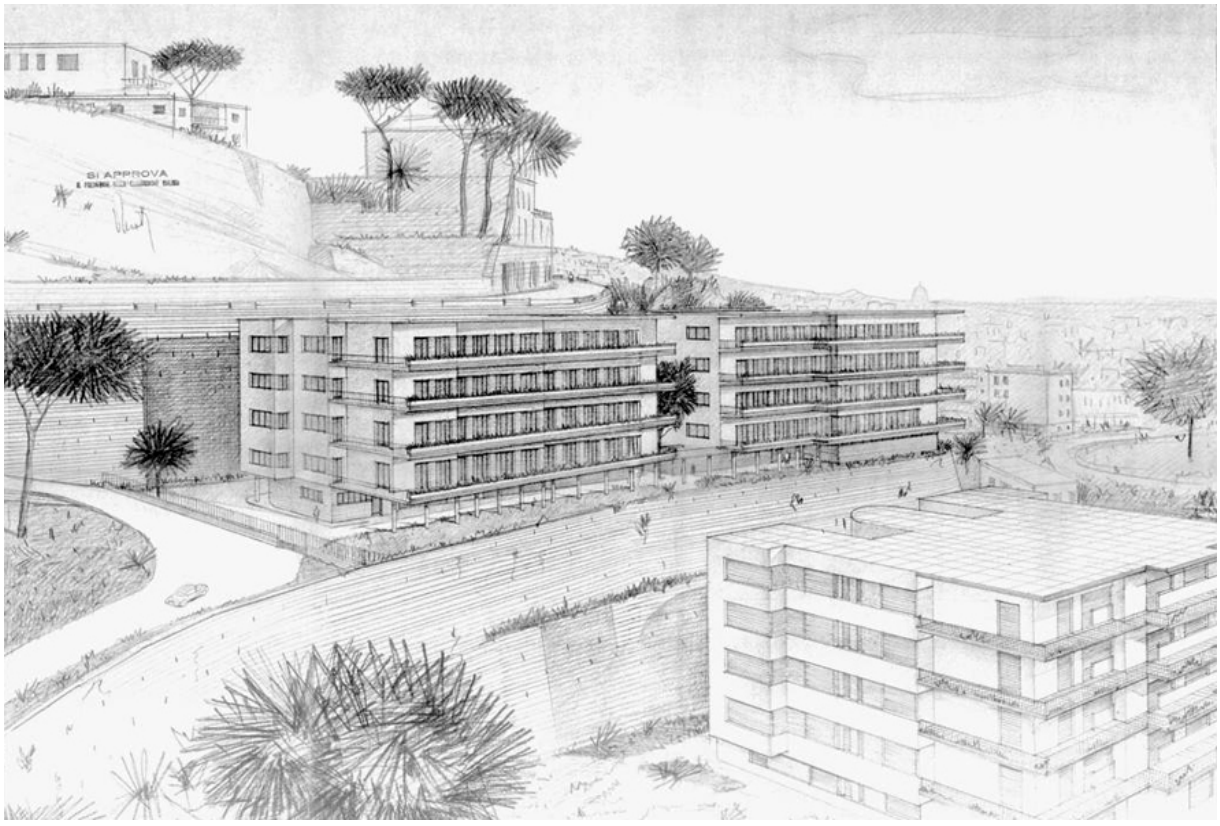


Fig. 9: A view of the residential buildings in Posillipo.

The unusual T-shaped form of the Fontana Palace, was probably conceived by the architect to separate some parts of the building from the street fronts, so he could insert small gardens and plants in the free areas.
The Palace of the Società Esercizi Telefonici (S.E.T.), that the architect designed in 1959 and the Di Penta Company built from 1960 to 1966 on the Pizzofalcone Hill, was the last, but not least, work of Pacanowski in Naples [1, 14, 15, 18]. The great concrete volume of the building was constructed partially underground and partially above ground, to allow an optimal use of the morphology of the site, and its C-shaped form was studied to the retention of existing ancient trees, located in manicured gardens in the free areas. In the interior spaces the architect replaced the traditional partition walls, usually used in buildings of similar destination, with modular removable furniture, realized on commission. The building has been recently restored to be adapted to the new destination of the seat of "Parthenope" University and now titled “Pacanowski Palace”.
In addition to Naples, Pacanowski has worked in Rome since 1950 for Construction Companies such as Di Penta and SCIE, planning some infrastructures and a number of residential buildings. Also these buildings, such as those of Naples, were characterized by the successful integration of the new constructions to the surrounding environment [1, 14, 18]. An important witness of the architect's ability to report its buildings to the local context, is given by the artist Enrico Prampolini in the architectural review "Edilizia Moderna" in 1954, where, talking about a house built by Pacanowski on Parioli Hill, he pointed out how the architectural solutions adopted in the curvilinear facades and in elements of interior decoration were inspired by the traditional forms of the Roman Baroque [4].
A significant experience in Pacanowski’s career, was the task of head-designer for the I.N.A. Casa from 1956 to 1963. In this period he designed a number of cheap dwelling buildings on the outskirt of Campobasso, Agnone, Casacalenda, Termoli, Boiano, Benevento and Secondigliano [1, 18]. The numerous projects of social housing that he prepared for the INA-Casa, although limited by dimensional and economic requirements, carried out logical constructions in the formal and functional aspects. Other interpretations of minimal houses are documented by the residential unit in Casoria for employees of Rhodiatoce, which consists of eight terraced houses (1953); by the houses for Sicilian fishermen (1959); by the houses for single family in Sernobi (1972-75); by the residential district for the earthquake victims in Castello di Cisterna (1983-87); by the prototype in fiberglass of transportable homes, reducible to the telescope, usable in case of earthquake emergency (1979) [1, 14, 18].
In addition to the social housing, Pacanowski designed on behalf of the Istituto Nazionale delle Assicurazioni (I.N.A.) two representative buildings in Caserta and Benevento, where they placed shops on the ground floor, offices on the first floor and residences on the upper floors.



Fig. 10: The model of the S.E.T. Palace in Naples.

Unlimited by the constraints imposed for the cheap dwelling houses, these buildings represent the average solution between the essentiality of public housing and the opulence of the residences in Naples.
In the I.N.A. building in Via Roma (Caserta, 1959) the architect designed a plan similar to that for the palace "La Fontana" in Naples, diagonally joining two rectangular shaped bodies, the first aligned to the street and the other inside to the built-up area [1, 18]. The architectural quality of the main front made the building different from the others of the same urban environment. The rational facade was characterized by the chain-shaped development of external walls, by the small circular columns passing through the terraces, by the terminal canopy crossed by a strip of glass blocks. In the I.N.A. building in Benevento (1966-1973), overlooking the Calore River and next to the archaeological site, the architect designed an L-shaped building developed on five levels, characterizing the main front with horizontal cuts of the long terraces [1, 18]. The simplicity of the architectural patterns found the right balance with the adjacent monumental presences, so that this building can be considered an adequate solution to the difficult dialectic between the speciality of the historical context and the rationality of the modern architecture.





Figg. 11-12: Views of interior spaces in the S.E.T. Palace in Naples.



Fig. 13: Vintage photo of the Istituto Nazionale delle Assicurazioni Palace in Caserta.

Many other achievements and projects of Pacanowski are interesting for different aspects: the high number of interior design interventions in apartments, shops and boats, show a meticulous attention to architectural detail; the plans of the green areas close to the Fiumicino Airport (1958) and to the underground stations in Rome (1960-63) affirmed his intention to surround and cover of vegetation the buildings, in order to lighten their impact in the surrounding environment; the Church of Sant'Antonio di Padova in Foggia (1966-67), characterized by the sinuous forms and the skillful use of the "beton brut", can be compared to the churches built in the same period by famous architects, such as Giovanni Michelucci, Luigi Moretti and Paolo Portoghesi [1, 14, 18]. Finally, the plans of a communal garden close to the waterfront in Fregene (1988-89) and of the underground car park in via Agrigento (Rome,1990) denote the truly extraordinary intellectual activity of the architect in the last years of his long life [1, 18].







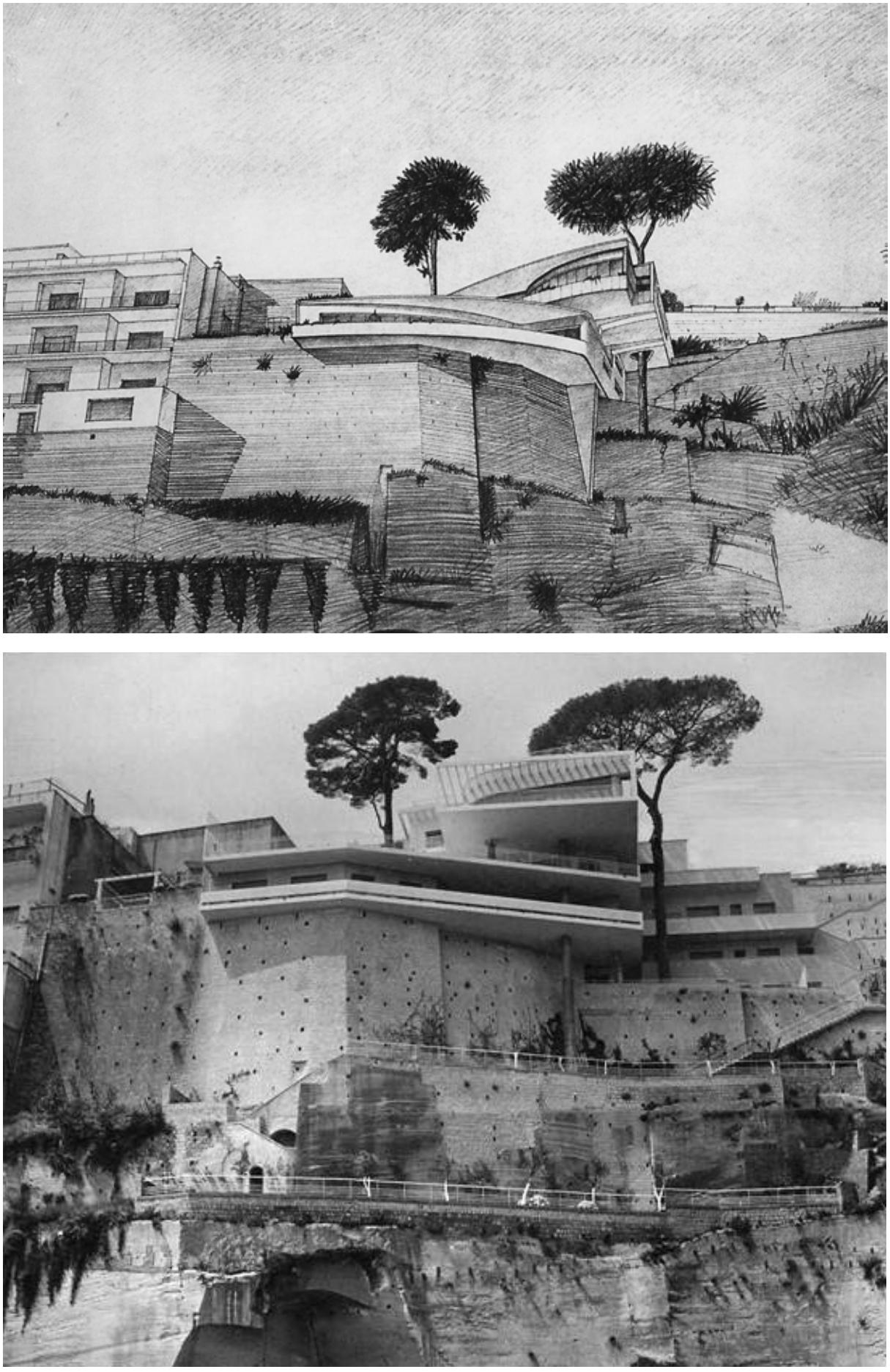
Figg. 14-16: Vintage photos of Social Housing in Benevento, Secondigliano and Casoria.

3. Conclusions

In the end, the research on Pacanowski wants to assign to him a role as protagonist of Italian architecture in the twentieth century. The recognition of his value should cause appropriate instruments for the preservation of his works. In fact, we can think that the tampering found on many of his buildings, emerged by the comparison between their current state and their projects and vintages photos, derive from unconsciousness of their importance. New studies dedicated to not well-known architects, despite their numerous interesting buildings in the urban centers, in the suburbs and in the provinces, can significantly enrich the Italian architectural heritage of the twentieth century. This will be possible if the historians of modern architecture dedicates their researches to the investigation of public and private archives, to discover unknown architects and buildings. Similarly, it is crucial the direct knowledge of the territory, to recognize the many buildings worthy of protection. After this challenging preliminary work, we strongly expect that the appropriate authorities will take concrete actions to recover the functional and aesthetic qualities of many architectural complexes built in the twentieth century.



Figg. 17-22: Views of residential buildings in Milan, Naples and Rome.



Figg. 23-24: Study drawing and vintage photo of Villa Crespi in Naples.

Archival References

[1] Private Archive of the Architect Davide Pacanowski.

Bibliographical References

[2] *Casa d'abitazione a Campobasso*. «Edilizia Moderna», n. 23, 1936. P. 46-49.

[3] MORETTI, Bruno, *Case d'abitazione in Italia*, Milano: Hoepli, 1939. P. 75-77.

[4] PRAMPOLINI, Enrico*. Palazzina ai Parioli*. «Edilizia Moderna», n. 52, 1954. P. 87.

[5] PACANOWSKI, Davide. *Tre palazzine panoramiche*. «Edilizia Moderna», n. 55, 1955. P. 39-44.

[6] *Casette unifamiliari a tipo economico a Casoria*. «Eraclit», n. 52, 1956. P. 5.

[7] *Le più belle ville del mondo*. «Epoca», n. 324, 1956. P. 60-62.

[8] PACANOWSKI, Davide. *Terrazze sistemate a giardino.* «Fiori», n.1, 1958. P. 8.

[9] *Villa a Napoli*. «Vitrum». n. 130, 1962. P. 46-50.

[10] *Villa sulla collina di Posillipo.* «Vitrum», n. 132, 1962. P. 10-13.

[11] *Due moderni edifici a Napoli*. «Documenti di Architettura», n. 1, 1969. P. 116-118.

[12] BIZZOTTO, Renata. CHIUMENTI, Luisa. MUNTONI, Alessandra. *50 anni di professione*. Roma: Edizioni Kappa, 1983. P. 101-104, 167-168.

[13] LATOUR, Giovanna. *Architectonicum. Vite professionali parallele 1920-1980*, Roma: Dipartimento per l'informazione e l'editoria della Presidenza del Consiglio dei Ministri, 1992, pp. 218-219.

[14] LATOUR, Giovanna. NERI, Maria Luisa. *Davide Pacanowski decano 1995*. Roma: Edizioni Kappa, 1995.

[15] AMIRANTE, Giosi. *Il palazzo Pacanowsky a Monte Echia*. EADEM. *L'Università 'Parthenope'. Le risorse storico-artistiche*. Napoli: Denarolibri, 2003. P. 84-95.

[16] GRAVAGNUOLO, Benedetto. *L'architettura della ricostruzione tra continuità e sperimentazione*. In AA.VV. *Architetture dal 1945 a oggi a Napoli e provincia*. Direzione Generale per l'Architettura e l'arte Contemporanee, 2005.

[17] LAMA, Diego. *L'allievo di Le Corbusier che firmò case da sogno*. «Il Corriere del Mezzogiorno», n. 8, febbraio 2008. P. 17.

[18] SERRAGLIO, Riccardo. *Continuità individuale e crisi locale: Davide Pacanowski nella Napoli degli anni cinquanta*. GIANNETTI, Anna. MOLINARI, Luca. *Continuità e Crisi. Ernesto Nathan Rogers e la cultura architettonica italiana del secondo dopoguerra*. Firenze: Alinea Editrice, 2010. P. 198-207.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Around the Royal Place of Caserta. The school building "Edmondo De Amicis".

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Abstract
The primary school Edmondo De Amicis, situated in Pietro Gannone street, close to Vanvitelli square, was designed in the 1922 by the engineer Luigi Fabricat, a professional expert, really active during the end of the 1800s and the first years of the 1900s. It took a really long time to build it, because the Public Administration had to face many problems to find the proper land in the middle of the city. Therefore the building was completed only in 1923 after Fabricat's death. The new institute was opened april the 27st , 1937 by the prince Umberto of Savoia. After the war, the school was named after the writer Edmondo De Amicis. The whole school structure is composed by a main part divided in two floors and another one at the back that has only one floor and where the school's gym is placed. The whole surface of the structure measures 8000mq and it takes off part of the reggia's garden. The building on the side that faces Pietro Giannone Street, has some really interesting decorative elements. Those elements are renaissancial and are elegantly integrated into the surrounding enviroinment.

Keywords: Pietro Giannone Street, Edmondo De Amicis School, Luigi Fabricat.

1. Caserta: The link between the urban area with the agricultural area, through Course Pietro Giannone.

At the beginning of the 19th century, the ruling class of Caserta planned a series of works destined to the urban renovation. This plan was carried out by Vincenzo Memma and was included in the *Piano Regolatore della Città di Caserta*, published in 1924, which presented a new road layout together with the construction of social and residential buildings to be realized in a few years[2].
Among the initiatives destined to the general improvement of the urban structure, it was expected a significant reorganization of the roads which connected the city centre to the northern farmhouses of Aldifreda and Puccianiello. It was composed by Sant'Antonio road (the current Pietro Giannone street) and by the road to San Leucio (the current Gennaro Tescione street)[10]. In particular, along this route, which starts from the end of Vanvitelli square until the Aldifreda village, there is a sequence of very important buildings, which are very esteemed for their architectural value: The Edmondo De Amicis school, the Sant'Antonio church and convent, the Sant'Antonio Casino and the Vaccheria of Aldifreda.
The "Casamento della Marchesa" located between the Vanvitelli square and Pietro Giannone street, was described by the administrator Antonio Sancio in the Platea del Real Sito di Caserta, written in 1826[1]. Firstly, this building was occupied by the military troops because of its strategic position, near Palazzo Vecchio; secondly, it was restored and became the residency of the Marquise of San Marco, assuming the name of "Casamento della Marchesa". Currently, this building is occupied by the Croce Rossa offices. The small building inside the court, between the Acquaviva Palace (more commonly

called Palazzo vecchio) and the De Amicis School, consists of two floors and presents a simplified decorative register.
The Edmondo De Amicis School, situated near the previous “Casamento della Marchesa”, was projected in 1922 by the engineer Luigi Fabricat, who was considered an important professional both at the end of the 19th century and at the beginning of the 20th century in several building sites of Caserta. The public elementary school, whose realization was included in the application of Gentile's reform, took a very long period to be completed. This delay was mainly due to the difficulties met by the Public Administration in the process of finding possible building areas near the city centre. This construction was finally ultimated in 1935, after Fabricate died in 1927. The inaugural ceremony took place on the 21st of April 1937, in occasion of the anniversary of the foundation of Rome, by the Prince Umberto of Savoia, to whom the institution was initially dedicated [6].
In the post-war period, after the referendum decision of establishing a republican government and the exile of the Savoia family, the school took the name of the famous writer Edmondo De Amicis. The entire built-up area consists, in total, of 8.000 mq, which are subtracted to the Reggia's park. The architectural organism presents a planimetric U-shaped layout with a central garden and a shed to be used as a gym placed at its back. The configuration of the decorative register was inspired to the neorinascimental style personalized by evident references to the solutions already presented in the near Vanvitelli buildings, the Royal Palace and the prefecture.
Straight on Pietro Giannone road towards Aldifreda, on the right side, there is the Sant'Antonio church and convent. The architechtural complex of Sant'Antonio was realized on the already exisisting, and historically stratified, Santa Caterina of Alessandria church, to which it was annexed the Friar Minor Conventuals convent, founded by the count Giulio Antonio Acquaviva in 1575 [7]. It is actually a common belief that the Conventuals created a first enlargement in the XVII century, after which followed a complete trasformation in 1783, while the Convent was ran by the Carmelite friars. Firstly, after the French suppression decree, the Convent and the Curch's custody came back under the control of few friars of the Carmelite order. Secondly, the administration of the complex passed in the hands of the Royal Administration of Caserta, which reinstituted the builduing to the Liguori friars for a royal decision in 1823. The early restoration works of the complex, that did not change its dedication to Sant'Antonio, were carried out under the direction of the architect Giovanni Giuseppe del Gaiso, who was chosen by the friars themselves. However, the rapid growth of the community pushed for new interventions in order to enhance the accomodation capability. A further renovation of the complex could date back to 1843; de facto, it was precisely when the dean of the Sant'Antonio church asked for a licence in order to employ some areas of the church as workshops. The church presents a latin cross plant that represents an original interpretation of the congretionalist type adopted also in the other Liguorini Friars ecclesiastical buildings. The altimetric and planimetric dilatation of the transept and of the broad aisle creates a sort of enlargement of the central node towards the altar. This configuration results into a complex space, which is dense and rigorously controlled at the same time; it is based on the differences among the architectural elements. Outside, the prospectus situated along the axis of the current Giannone road is characterized by the external bell towers, defined by an elegant and measured decorative register, articulated in such a way that it reinstitutes the organization of the internal architectural spaces [4].
Still proceeding on Giannone street, there is the Sant'Antonio Casino. The building was projected around the 1795-98 by Pietro Bernasconi, inside an area called Starza Grande, and was commissioned by the Prince Francis of Bourbon. The Bernasconi planimetries reinstitute the building's original articulation, divided into three different structures. The first building, recognized as the Prince's Casino, delimits a small court through two lateral bodies; throughout geometric and orthogonal alleys it was possible to access to a second building that was destined to the processing of agricultural products, situated around a bigger rectangular courtyard[8]. Finally, the third building, which has a smaller dimension and which is placed at the corner, allows the access to an alley to cross the cultivated lands. Actually, what is left from the ancient rural building is just the articulation of the facade, characterized by the false ashlar of the basement and by lessens that decomposes the prospectus with symmetrical and repeated patterns around the entrance portal, constituted by binate pilasters. Unfortunately, nothing remains of the 17th century garden, that presented a spacious parterre which follows a geometric scheme based on a road intersection.
At the end of the Giannone Street, there is the Vaccheria of Aldifreda, projected by Luigi Vanvitelli in 1753, inside a fraction of the agricultural area called Starza Grande [3]. The early testimoniances prove the existence of a building that was a vaccheria in Rifreda in 1751, whose pre-existing features were included in the Vanvitelli buildings[5]. During the French period, the entire building was transformed into a factory to work cotton threads and then was enlarged adding a new structure destined to the clothes cleaning. Around the 1820, the semicircular part was used again as a Vaccheria, limiting the space of the factory. In 1950 the building was transformed into a barracks and the hemicycle was used as a little military hospital, while waiting for the contruction of a bigger hospital which is adjacent the San Francesco di Paola church.

On the basis of its new function and use, and in order to allow sick people to listen to the mass from their beds, the king Ferdinando II commissioned to the architect Francesco Gavaduan the small octagonal temple called the Blessed Sacrament, placed at the centre of the half-circumference. In the nineteenth century, the building became a military district and then, in 1930, it was a Police School. The most interesting element of the Vanvitelli building can be identified in the planimetrical articulation, consisting of a rectangular body with two levels, parallel to the road, and by the hemicycle of the stables, originally characterized by an uninterrupted sequence of narrow arches sustained by pillars [9].
It can be defined, through the sequence of the above mentioned builduings, which are interspersed with more recent constructions but not always of a very good quality, a valuable architectural itinerary, especially considering that it represents a repertory of the different building seasons, through which the current urban planning has actually been configurated.

1.2 Subsection

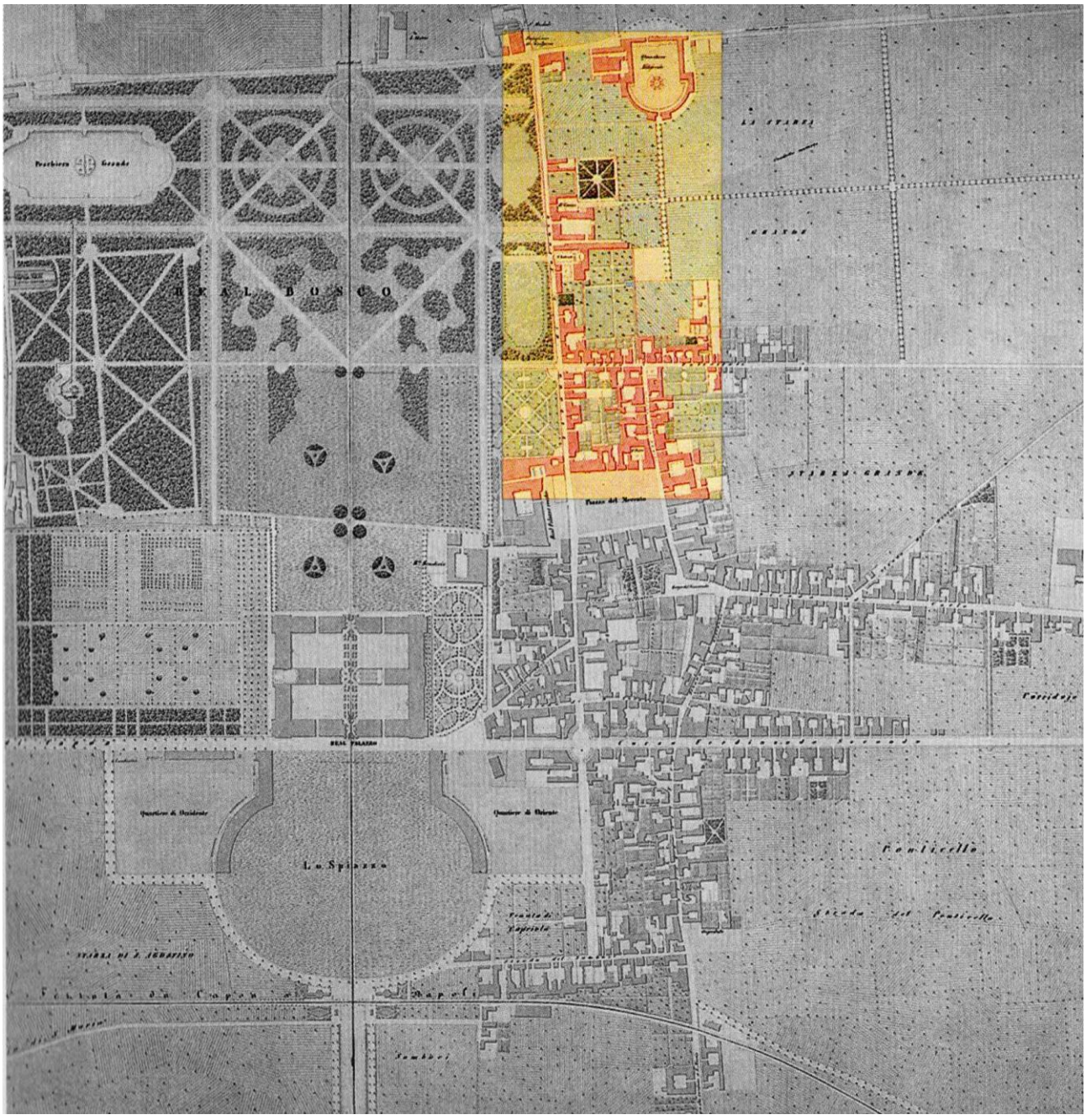

Fig. 1: V. Di Carlo, *Pianta della città di Caserta,* 1857.

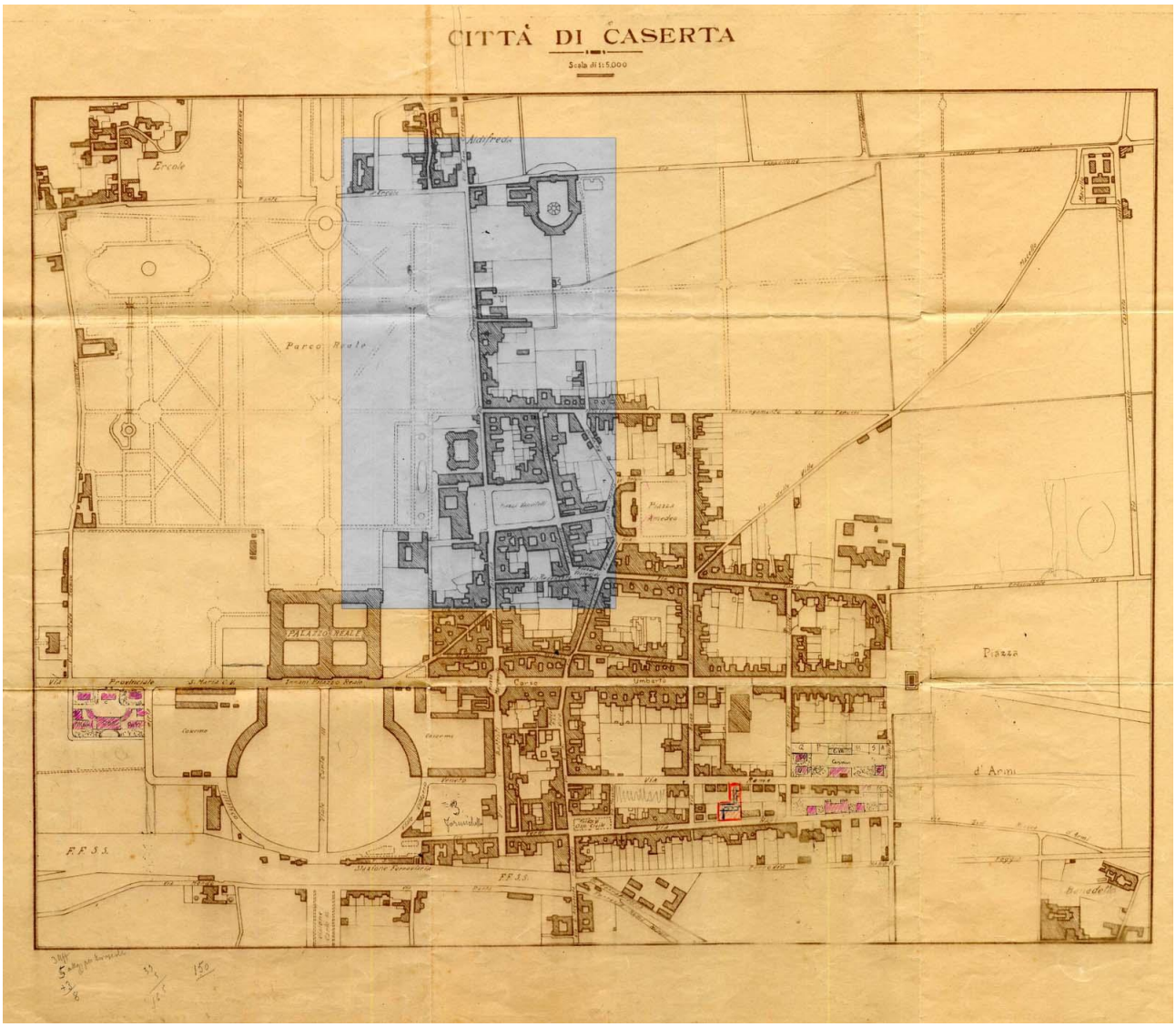

Fig. 2: *Città di Caserta,* 1935 ca.



Fig. 3: *Ex Casamento della Marchesa,* Caserta, 2014.



Fig. 4: *Scuola Edmondo De Amicis,* Caserta, 2014.



Fig. 5: *Scuola Edmondo De Amicis dettagli interni,* Caserta, 2014.



Fig. 6: *Scuola Edmondo De Amicis,* Caserta, 2014.



Fig. 7: *Scuola Edmondo De Amicis,* Caserta, 2014.

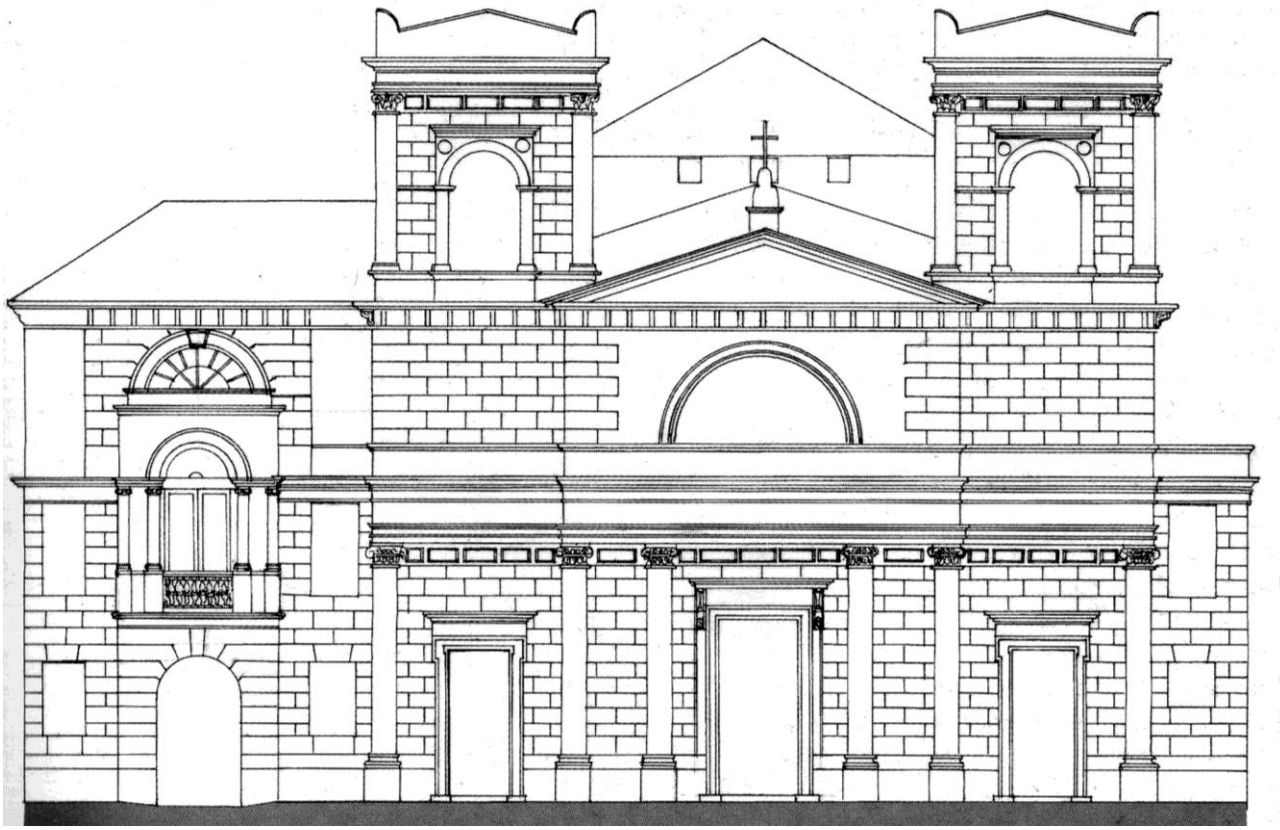

Fig. 8: C. Lenza, La *'rinnovazione della Chiesa di Sant'Antonio dei Padri Redentoristi*, in Monumento e Tipo nell'Architettura Neoclassica, L'opera di Pietro Valente nella cultura Napoletana dell'800, Napoli, 1997.



Fig. 9: *Chiesa e Convento di Sant'Antonio,* Caserta, 2014.



Fig. 10: *Casino di Sant'Antonio,* Caserta, 2014.

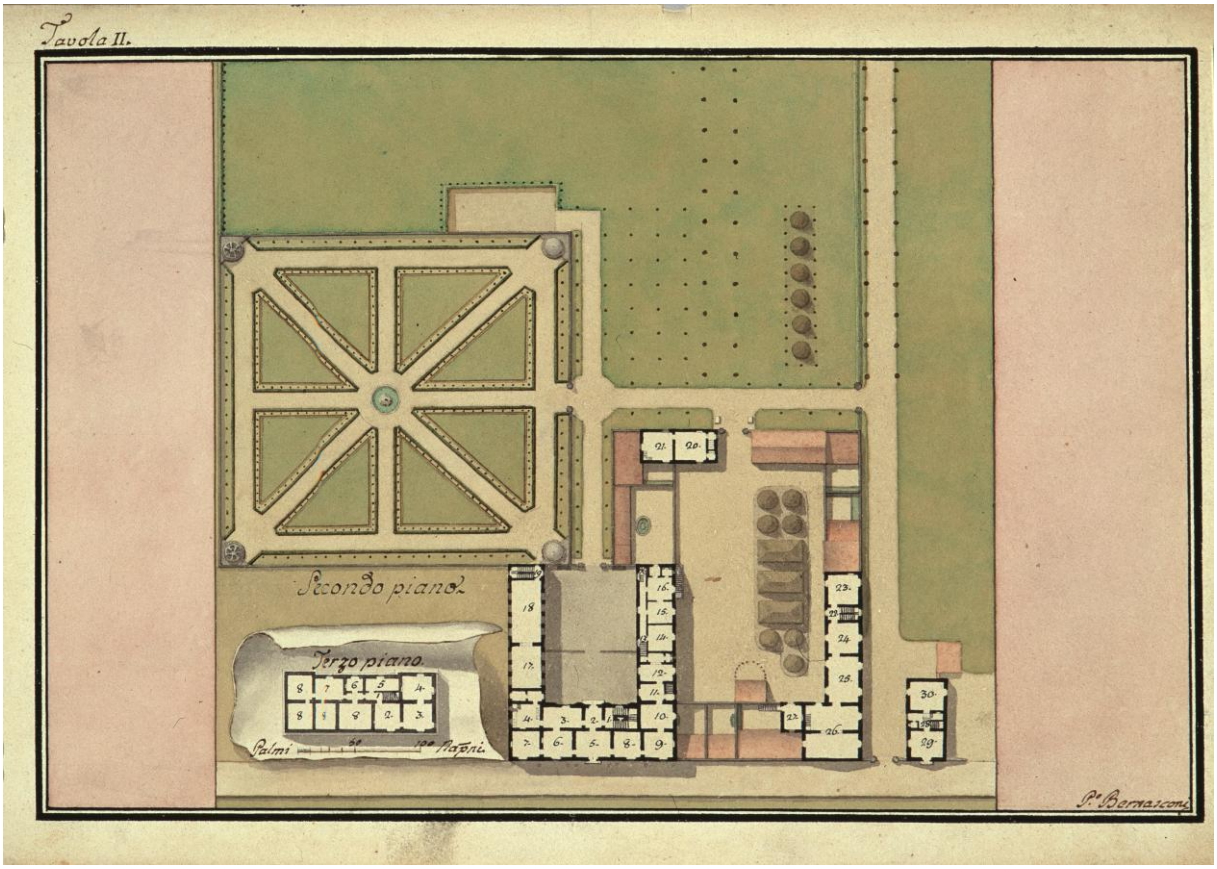

Fig. 11: A.S.N., Casa Reale Amministrativa, Archivio Amministrativo, IV inv, b. 1177, tav. II, *Secondo piano/ Terzo piano,* 1795-98.

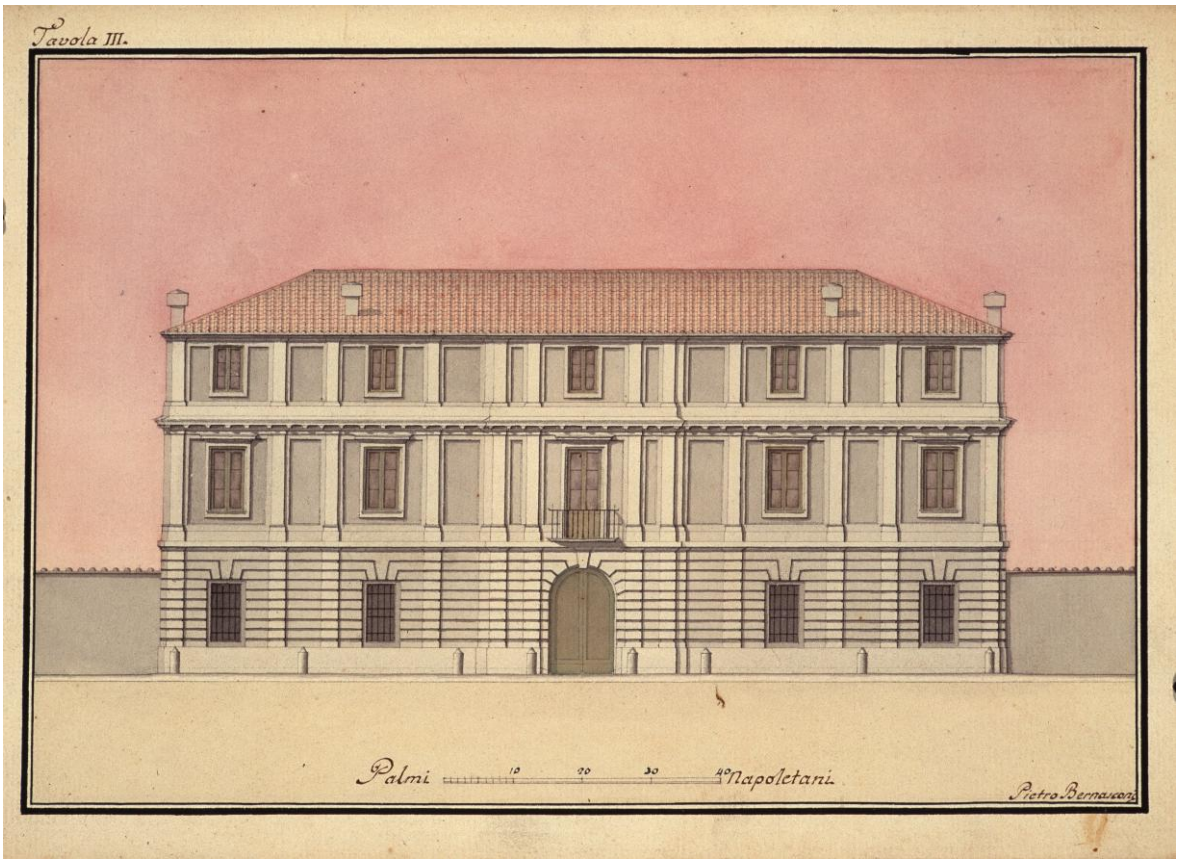

Fig. 12: A.S.N., Casa Reale Amministrativa, Archivio Amministrativo, IV inv, b. 1177, tav. III, *Facciata di detto Casino di maggior proporzione, che guarda occidente sulla strada di S. Antonio,* 1795-98.

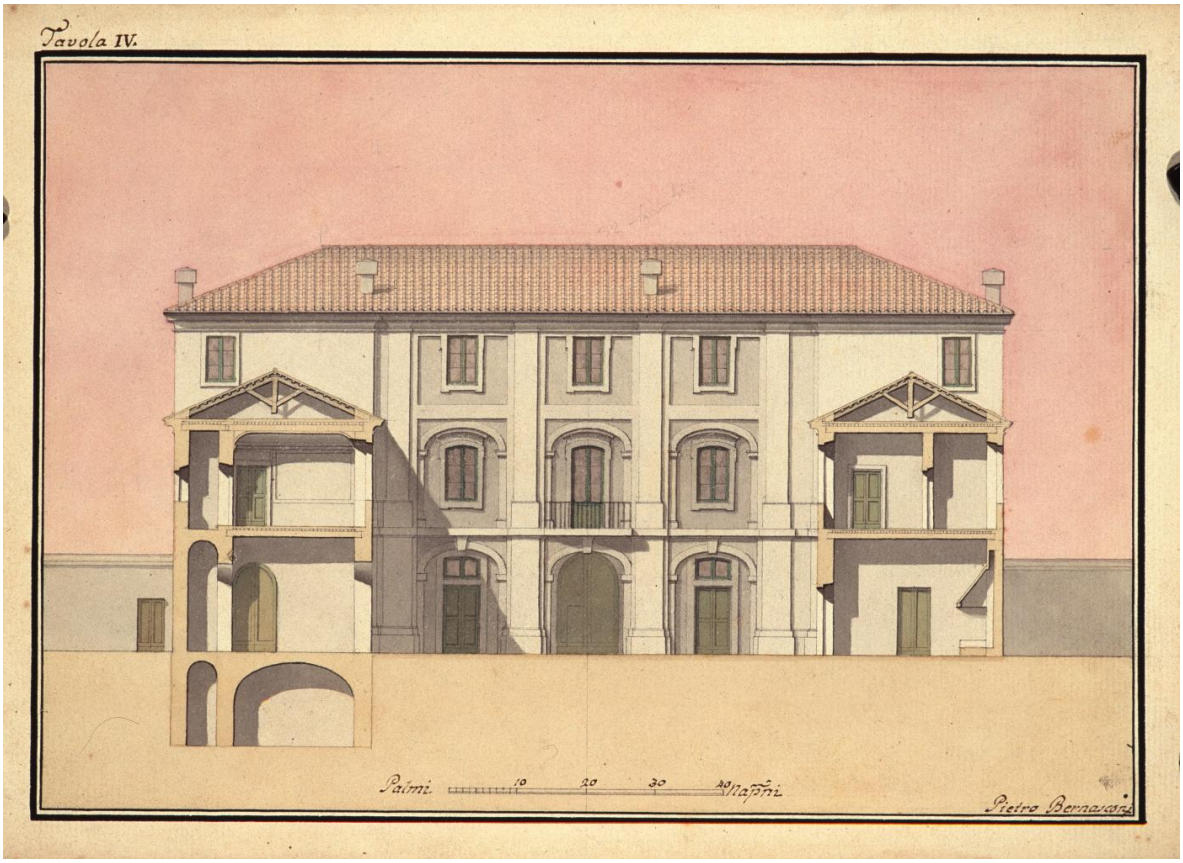

Fig. 13: A.S.N., Casa Reale Amministrativa, Archivio Amministrativo, IV inv, b. 1177, tav. IV, *Facciata verso il Cortile, che guarda oriente, coi tagli dei due bracci laterali,* 1795-98.



Fig. 14: *Scuola di Polizia ex Vaccheria di Aldifreda,* Caserta, 2014.



Fig. 15: *Scuola di Polizia ex Vaccheria di Aldifreda,* Caserta, 2014.

Bibliographical References

[2] Cfr. MEMMA, Vincenzo. *Il Piano Regolatore della Città di Caserta*, tipografia Salvatore Marino, Caserta 1924.

[3] STRAZZULLO, Franco. *Le lettere di Luigi Vanvitelli della Biblioteca Palatina di Caserta*, vol. I, 1976, p. 275. (Lettera n. 176 datata Caserta 30 Ottobre 1753): (...) Questa mattina il Re è andato in giro per tutto il giardino, del quale se n'è compiaciuto; mi ha dato ordine di fare il disegno della Vaccaria e un Caffeaus per bevere il latte in essa (...); A. Gianfrotta, 1992, p. 25.

[4] LENZA, Cettina. La 'rinnovazione della Chiesa di Sant'Antonio dei Padri Redentoristi, in *Monumento e Tipo nell'Architettura Neoclassica, L'opera di Pietro Valente nella cultura Napoletana dell'800*, Napoli, 1997, pp.270 -280.

[5] JACAZZI, Danila. *La città borbonica nell'800: Caserta, l'"altra capitale",* in *Tra il Mediterraneo e L'Europa, Radici e prospettive della cultura architettonica,* a cura di A. Gambardella, Edizioni Scientifiche Italiane, Napoli 2000, pp. 165-177.

[6] *Caserta oltre la Reggia*, a cura dell'Associazione Biblioteca del Seminario Civitas Casertana, Depiograf, Casolla 2001, scheda *Edificio scolastico E. De Amicis*.

[7] GIORGI, Lucia. *Caserta e gli Acquaviva*. *Storia di una corte dal 1509 al 1634*, Spring edizioni, Caserta 2004, pp.160-165.

[8] JACAZZI, Danila. *La sperimentazione agricola in Terra di Lavoro: i Casini del Principe ereditario a Caserta,* in *Casa di Re. La Reggia di Caserta fra storia e tutela,* a cura di R. Cioffi, G. Petrenga, Skira, Milano 2005.

[9] SARNELLA, Giovanna. *La Vaccheria di Aldifreda di Caserta,* in *Luigi Vanvitelli a Caserta. Società e cultura prima e dopo Vanvitelli nel terzo centenario della nascita*, Quaderni della Biblioteca del Seminario di Caserta*,* vol. VI, Caserta , 2005, p. 18.

[10] SERRAGLIO, Riccardo. *Social Housing a Caserta negli anni Venti del Novecento*, Laboratorio Interdisciplinare di Documentazione dell' Architettura n. 01, la Scuola di Pitagora editrice, Napoli 2013, pp. 64-74.

Many thanks to Dott. VARONE Michele, for the photos buildings in Corsurse Pietro Giannone.

Archival References

[1] SANCIO, Antonio. *Platea dei fondi, beni e rendite che costituiscono l'Amministrazione del Real Sito di Caserta*, 1826, pp.93-94.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

The practice of cult inside the Royal Palace of Caserta: the Palatine Chapel, the Santa Maria dei Sette Angeli Chapel in the Schiavi Battezzati district, the Santa Filomena Chapel in the Flora garden.

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Abstract

In the documentation about the building of the Reggia of Caserta, it's possible to find some references to slaves. Muslim slaves who were converted to christianism were placed in a proper dedicated neighborhood that was more comfortable and had a chapel inside it. The new building was placed inside the Reggia's park, not really far from the royal lakes and close to the village of Ercole. Once the Royal Palace was completed, in 1773 Ferdinando IV ordered to set up a unit of volunteers were all from Lipari's Island and therefore they were also known as Liparoti. The volunteer's unit responded directly to the king and it used to assist him during some hunting and fishing activities, as well as looked after the royal goods. During that period, the houses and the chapel were probability restored under the direction of the architect Francesco Collecini. After the volunteer's unit was discharged, in 1786, some rooms of the buildings were used to train peasants, and some others as doghouses. The neighborhood remains abandoned till 1853, when Ferdinando II wants it to be restored to give it the "passionisti" priest. The restoration was directed by Giuseppe Garzìa, the lieutenant of the Genio Militare, who also disposed all the changes to turn it into a Convent. Therefore, the church was restored, and two altars wew added on the sides. The convent was opened on the 21st of February 1856, and on the 22nd of May in 1866 the government ordered its suppression. After a further restoration a few years later by the Caserta and Benevento's historical heritage superintendence, the building is actually the society of Storia Patria di Terra di Lavoro.

Keywords: Reggia di Caserta, baptizet slaves, village of Ercole.

The churches of the Bourbon in Caserta.

The Palatine chapel of the Royal Palace represents the most famous among the Vanvitelli churches in Caserta[1,3]. Located at the noble floor of the Royal Palace, at the end of the honor grand staircase, and due to the willing of Charles of Bourbon, it is inspired to the similar ambiance of the Versailles Royal Palace. The comparison between the two churches results in favor of the Palatine Chapel of Caserta, which is coherent with the entire architectural organism; the Versailles church was instead added to the Palace many years after its construction and for this reason it appears disjointed with the rest of the construction. In reality, the similarities between the two buildings are limited to the generic analogy in the longitudinal, planimetric layouts and in the narrow perimetral ambulatories. Needless to say, considering autonomously the ecclesiastic room would be a methodological error; for instance, Vanvitelli projected this unit together with the other elements that constitute the Palace. The simple spatiality of the Vanvitelli chapel is enlivened by the articulation of the architectural elements and, in particular, by the rhythm of the binate columns that delimit the ecclesiastic room; by the emergence of the elevated apsidal hemicycle; by the prominence given to the gallery reserved for the royal family

overlying the entrance and opposite the altar; by the opulence of the decorative elements, such as the polychromatic marble floor in which the yellow tonalities prevail; by the refined Corinthian order of the columns, by the dense and geometric design of the intrados of the roofing underlined by an abundance of platings; by the wise of the natural light, introduced in the rectangular compartment by the ample perimeter windows situated behind the columns and by the buttonholes inserted in the vault on axis with the underlying spans.

The construction of the chapel, started in 1757, took a very long time to be realized and the inaugural ceremony took finally place at the presence of Ferdinando IV on Christmas in 1784. The definition of the decorative register is attributed to Carlo Vanvitelli, who ran the execution since 1777 reducing, probably for economic reasons, the pompous decorative apparatus firstly projected by his father.

Nevertheless, the current ecclesiastic area, completed in the XIX century, reinstitutes accurately the spatiality conceived by Luigi Vanvitelli. Finally, what deserves mentioning are the significant damages caused by the November 1943 bombings, when the sacred furniture and very precious paintings were destroyed. This destruction is documented by the marks in some columns, which remained visible also after the following restorations.

Another important building for worship, in particular for its architectural value, realized during the construction of the Royal Palace, is Santa Maria dei Sette Angeli chapel, erected on the side of the Royal Garden inside the Schiavi Battezzati district [2, 3, 5]. In many documents related to construction of the Royal Palace of Caserta, the presence of an important amount of slaves is attested, who were used for their workmanship. They were mainly Maghrebi pirates caught by the Bourbon Marin, lodged together with the convicts inside the Ercole district, where they were constantly controlled by the armed forces. Many of them converted to Christianity, baptizing themselves through a solemn ceremony during which they acquired their godfather's surnames, who usually were important personalities of the Bourbon court. Generally, they were forced to carry out the hardest jobs (hewers of wood, stone carvers, diggers, cleaners etc.); however, some of them were at the service of the supervisors. For instance, Luigi Vanvitelli himself choosed one slave who took his surname and became his personal servant.

Undoubtedly, if we apply our contemporary evaluation criteria, such a condition would appear unacceptable; by the way, taking into account that in the middle of the eighteenth century the slavery was common and diffused, it can be said that the slaves destined to the Bourbon building sites received more acceptable living conditions: they were sufficiently nourished, they received a modest daily wage, and if they decided to convert to Christianity, they could move to a more comfortable quarter, reserved for them and provided with a chapel.

This quarter was located inside the park of the Royal Palace, not so far from the royal fishery and next the Ercole edifice. Once the Royal Palace was ultimated and the slaves returned home, in 1773 Ferdinando IV ordered to place inside the building a department of volunteers from the Marin Unit coming from Lipari island, and for this reason called Liparoti, that was at the service of the King in order to assist him during his activities of hunting and fishing, and to control his Royal Delights.

Probably, in that period the terraced buildings and the chapel were restored under the direction of the architect Francesco Collecini. After the dissolution of the Liparoti corps, in 1786, some of the building rooms were reduced to cellars while other rooms were used as pheasants breedings[3, 5].

After the Bourbon restoration, the area was left abandoned until 1853, when Ferdinando II ordered a restoration in order to offer this location to the Passionist friars. The restoration works were directed by the lieutenant of the Military Genius Giuseppe Garzia, who adapted the building in order to respond to the needs of the Convent. On this occasion, the church was restored and other two lateral altars were added. After the work, the convent was opened on 21 February 1856 but a few years later, in 1866, the Savoy government decreed his suppression. Currently the old eighteenth-century building, restored a few years ago by the Heritage Office of Caserta and Benevento, houses the headquarters of the Society of National History of Terra di Lavoro [3].

The most interesting aspect of the whole complex is represented by the chapel, dedicated to Santa Maria of the Seven Angels for a decision taken by Ferdinando II of Bourbons. The planimetric layout consists of a unique room that presents a longitudinal development. The facade, overlooking the inner courtyard, is decorated with paired Tuscanic pilasters and with a final triangular tympanum. At the centre, there is a simple gate, decorated with stucco moldings and with an ample arched window on the top. This decorative register is repeated, with some variations, in other churches of Caserta built or renovated during the Bourbon period, in particular in the chapel of Santa Filomena alla Flora (currently known as the Aeronautics Sacrarium), in the Sant'Elena church and in the Sant'Agostino church.

The interiors are decorated by Ionic reliefs, attributable to the architect Francesco Francesco Collecini, and articulated by three marble altars. The main altar was adorned with a picture portraying the Virgin Mary surrounded by seven angels that are no longer present. The floor paved in painted tiles of terracotta present an exquisite craftsmanship and was produced in the Santa Maria's furnaces. The area in front of the church is bounded by the low districts that were used to accommodate the slaves, while on the side of the road it is located a unit with two levels, that corresponded to the nineteenth

century convent. Next to the building, near the San Vito Martire church inside Ercole hamlet there was another building to accommodate the slaves, which no longer exists.
The chapel of Santa Filomena alla Flora, that was originally dedicated to Our Lady of Mount Carmel, was built in line with a project by Carlo Vanvitelli short after the construction of the Reggia in the early nineteenth century [4]. In 1806, the architect gave the opportunity to work on the surrounding area in order to improve the traffic flows and the road system towards the city centre; however, the renovation of the area was realized only in 1828, with the opening of the Royal Riders road [4]. In 1806, Carlo Vanvitelli ordered reliefs and site surveys to examine the ground upon which building the Chapel and, after then, carried out a project which involved a trafficable area with a widening in front of the church connected to the urban road network. This urban planning scheme was implemented only in 1828, with the opening of the Royal Riders road. The availability of an undeveloped area allowed the architect Carlo Vanvitelli to adopt the Reggia layout of the Round, not very common in Vanvitelli ecclesiastic works but already used by Luigi Vanvitelli in the chapel realized in the barracks yard near the Maddalena Bridge in Naples. A particular introduction to the main decorations used in the ecclesiastic building with central layout has been also founded in a drawing attributed to Luigi Vanvitelli depicting the allegory of the Religion, represented by a female figure that sustains a small centric temple with an extrados dome, assisted by the dove of the Holy Spirit, wrapped with a cope while she stepping on two books named "Luther" and "Calvin".
The church was completed by the end of the first decade of the XIX century and, in order to limit the costs, during its realization were used some ornamental elements coming from near buildings that were no longer used: the marble altar and the bell were dismantled in 1810, under the direction of the architect Bernasconi, from a small church located in the Royal Grove used by the workers encharged for the maintenance of the Royal Peschiera; the Majolica tiles of the floor, instead, were taken from the Royal Palace rooms in 1814, under the direction of the architect De Lillo. As already said, Carlo Vanvitelli adopted for the small church, originally destined to the religious instruction of the children, the layout Round. From the outside, it was articulated by a plain Tuscanic order and by the bell tower, over the fencing wall; while from the inside it was articulated by three altars delimited by cabling semi-columns and by a continuous entablature that supports the small cover divided into geometric mouldings and decorated by six pointed stars surrounded by a crown of leaves. Inside the chapel, four small compartments are taken from the ring-shaped masonry o contain three altars and an entrance. A sober cornice transforms into units the portions of the curved wall and link the niches with the altars. The coverage, realized with a sail vault and sustained by four pairs of Tuscanic columns placed against the wall, it is adorned with arching lines and geometric panels, with the six pointed star and surrounded by the crown of leaves, a solution which is similar to the one used in the SS. Trinità dei Pellegrini church in Naples.
Beyond the cornice, there are two windowed lunettes, decorated with the usual pattern of the Vanvitelli "shell", while the triangular tympanum at the main bottom supports two winged angels.
The position and the shape of the building underline its "linking" function between the Reggia and the city, while a simple interplay of colors highlights the rectangular panels that constitute the whole external building surface.



Fig. 1: The Cappella Palatina in the Royal Palace of Caserta.

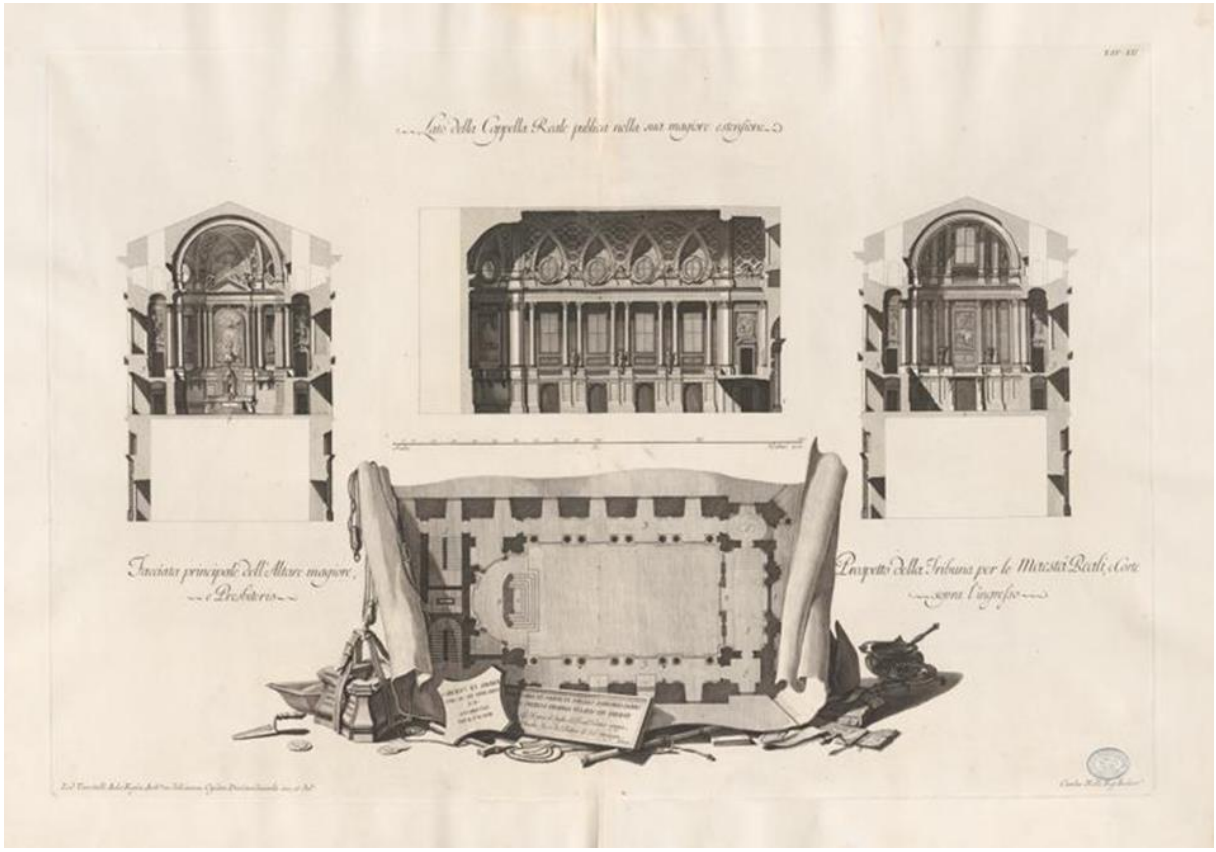

Fig. 2: L. VANVITELLI, *Dichiarazione dei disegni del reale palazzo di Caserta*, Tav. III, Napoli 1756.



Fig. 3: The Cappella di Santa Filomena in the Flora garden.

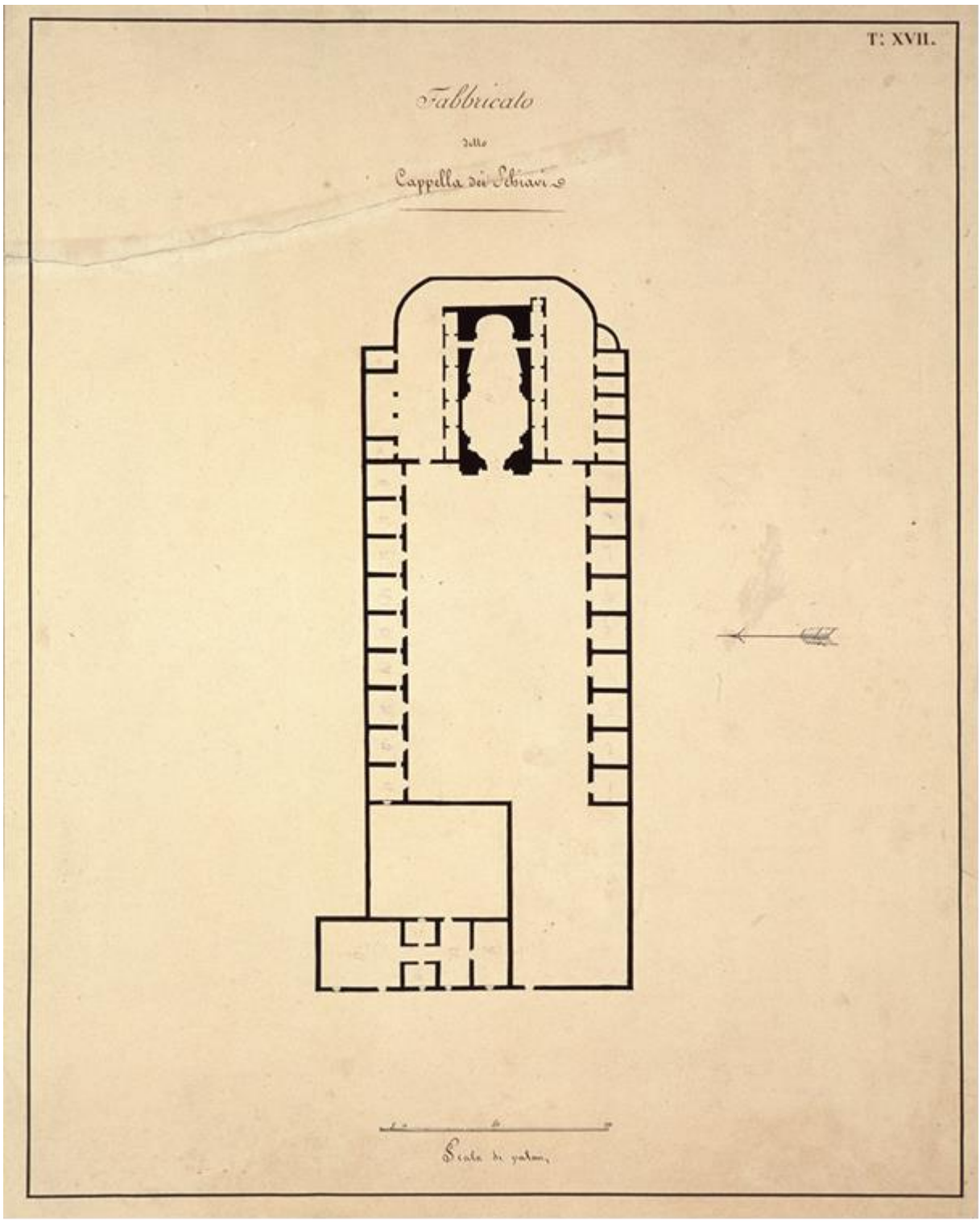

Fig. 4: Archivio Storico della Reggia di Caserta, *Fabbricato detto Cappella degli Schiavi*, cat. 11/D.

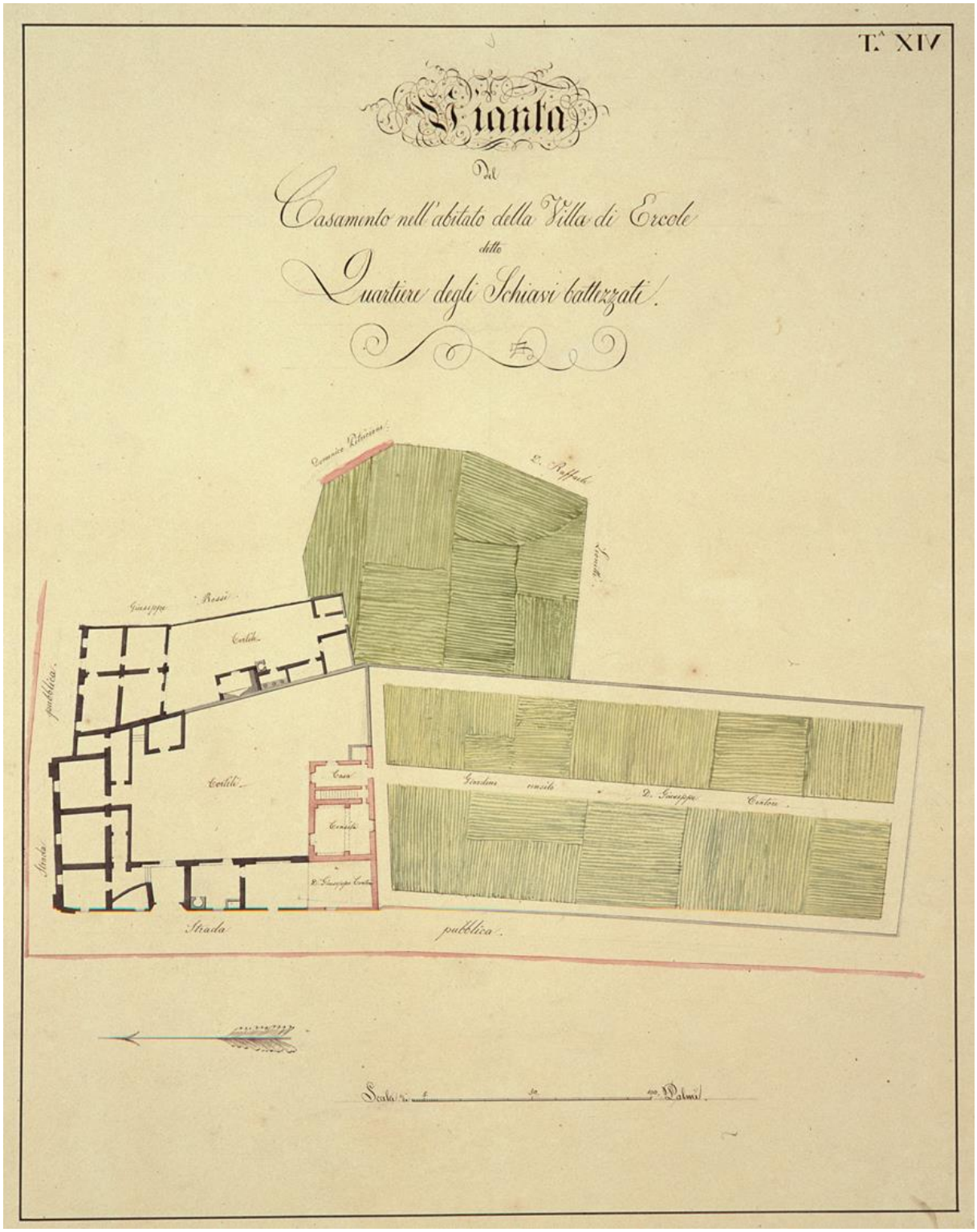

Fig. 5: Archivio Storico della Reggia di Caserta, *Casamento nell'abitato della Villa di Ercole dello Quartiere degli Schiavi battezzati*, cat. 9/D.



Fig. 6: The Cappella di Santa Maria dei Sette Angeli in the district of Ercole.

Bibliographical References

[1] VENDITTI, Arnaldo. *La Reggia di Caserta*. Edizioni Scientifiche Italiane. Napoli 1973, p. 120-123.

[2] SERRAGLIO, Riccardo. Le chiese dei Borbone. In CAIAZZA D., DI LORENZO P. Bulla Sennetis Episcopo Casertano, n. XI, Caserta: Quaderni Campani Sannitici. 2013, pp.155-163.

[3] DEL PRETE, Riccardo – JAULAIN Natalie. Schiavi a Caserta. La vita, i lavori, il contributo delle schiere di lavoratori musulmani, Coop. Sociale Villa Maraini, Roma 1999, pp.15-24.

[4] CIRILLO, Ornella. Carlo Vanvitelli. *Architettura e città nella seconda metà del Settecento*. Firenze: Alinea. 2008. Pp.178-181.

Archival References

[5] SANCIO, Antonio. *Platea dei fondi, beni, rendite, che costituiscono l'Amministrazione del Real Sito di Caserta,* 1826, pp.108-109.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Around the Royal Palace of Caserta: the new market square

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Abstract
The actual Matteotti Square was realized in postunification period with the construction of the foodstuffs market and is situated on the northern part of the urban area built in the nineteenth century. The new headquarters for fair activities replaced the, previously one held in the square in front of the old palace of the Acquaviva, which was transformed in 1879 into the main square of the city dedicated to Luigi Vanvitelli. This new market involved the construction of an intriguing masonry building used for the daily sale of foodstuffs. On the opposite site of the shops, the large quadrangular space of Amedeo Square (now Piazza Matteotti) was intended to accommodate the weekly fair. At the beginning of the twentieth century, the new market's area established the urban sector placed to the north of Ferdinando avenue (then named Umberto I). During the 1920's, new residences for ICP (Istituto Case Popolari) were built over the market stalls. In 1937, the Casa del Fascio, designed by engineer Giovanni Campopiano, was built on the northern side of the new During the Fascist period and in the years following the square experienced radical changes in relation to the various functions performed. In the second half of the twentieth century the central area of Matteotti square has hosted a fair twice a week until it was replaced by a new foodstuffs market opened in 2008.

Keywords: foodstuffs market, urban planning, Caserta, casa del Fascio, weekly fair.

1. The market square
The market held in the city since the time of the "Villaggio della Torre", has played a key role in the urban development of Caserta, occupying the central areas of the buildings [1,5,6,8,10]. The market square was born following the decree of King Ladislao of Durazzo issued on 9 February 1407 [2]. Since that period and until the late nineteenth century the area in front of the count's palace hosted the local weekly fair. For about a Century preceding that time, the sellers of fresh edible farm produce had not been able to find a stable place in which to hold a regular market, in fact previously they were sold along the roads leading to the market square, at the "Trivio" and in a provisional square built in the garden of a building in Mazzini street. Due to the decision to devote the market square to Luigi Vanvitelli in occasion of the centenary of his death, a permanent home for the daily market in what is today's Piazza Matteotti was created. In 1894 a building designed by the Casertan engineer Arrigo Veccia was constructed of masonry for the use as a Market hall [6]. The need to find an appropriate place for the markets (both daily and weekly) held within the city using permanent structures is documented by numerous incomplete projects, produced from 1765 to 1890. The first project for a building to be used as a market was raised by the Royal architect Luigi Vanvitelli, who in 1765 decided to eliminate «[…] the previous wooden structures, due to their inaccuracy and indecency spoiling the aesthetics of the Royal Palace» and built in their place «[…] solidly constructed shops (starting from the top of the square along the road that leads to Carmine, with an open semicircular form with a view to the Royal Palace. In order to build a more comfortable covered area the inner part of the semicircle building was dedicated for public use whilst the outer circumference of the semicircle small shops where designed to store the merchandise». A letter sent by Vanvitelli to Lorenzo Maria Neroni (land agent of Caserta) refers to two drawings prepared by the architect, a "small one" with the



Fig. 1: Giovanni Battista Patturelli project for the new covered market.

representation of the workshops and related measures (12 spans in height and 20 spans in width corresponding to 3.1 x 5.2 meters) and another drawing “a larger one” «[...] which relates to the building with its elevation» [18,19]. Unfortunately, these drawings have not been found, however, from the brief description of it, we can see similarities with the design of the Mercatello square in Naples, formed by a semicircle of twenty-two brick built shops with apartments above, made by Vanvitelli in 1761 [12]. The Architect drew up the computation of the Casertan buildings, stating that they could be amortized in a short time from the rental income created by the shops situated within the building. However, this was not implemented because at that time there wasn’t the available funds [9]. The missed execution of Vanvitelli’s project transferred the problem to the successive City administrators. Between 1820 and 1825 the Caserta Mayor Vitelli, appointed Giovanni Patturelli as the architect of the royal buildings and he was appointed for the preparation of the project to adorn the square and streets around the Market Hall, whilst he had already been previously engaged in the design of the new cathedral [3].

The architect drew up the design of the square by arranging to level the area and created a working wooden model of the fountain which was to be built in the center [20,21,22]. In 1825 the Decurionate commissioned the royal architect Teodoro Paolotti to enlarge and beautify Trivio street, by improving the regularity of its condition and also to design a square for the sale of foodstuffs [4]. This project also remained on paper, whilst a temporary solution to the problem was found for the food market it was decided to take advantage of a wide open space surrounding the existing new Main (Maggiore) Cathedral that was used as the venue for the day to day business [7,23]. Later, another Patturelli, Giovanni Battista (the last of the twelve sons of the aforementioned Giovanni [3]), drew up a new project for the construction of the market, documented by an autobiography and sent to the king in 1848, and by some charts kept in the Archive of the State of Caserta [24]. Patturelli configured a building divided by the axial sequence of three courtyards with a fountain in the center of each, ordering the shops around these built up to the perimeter of the plot. Access to eighty proposed shops was provided directly via the urban roads from the North (limited by a newly built road) and to the West (limited by the existing Trivio street) and by the covered area arranged around the courtyards inside the building.

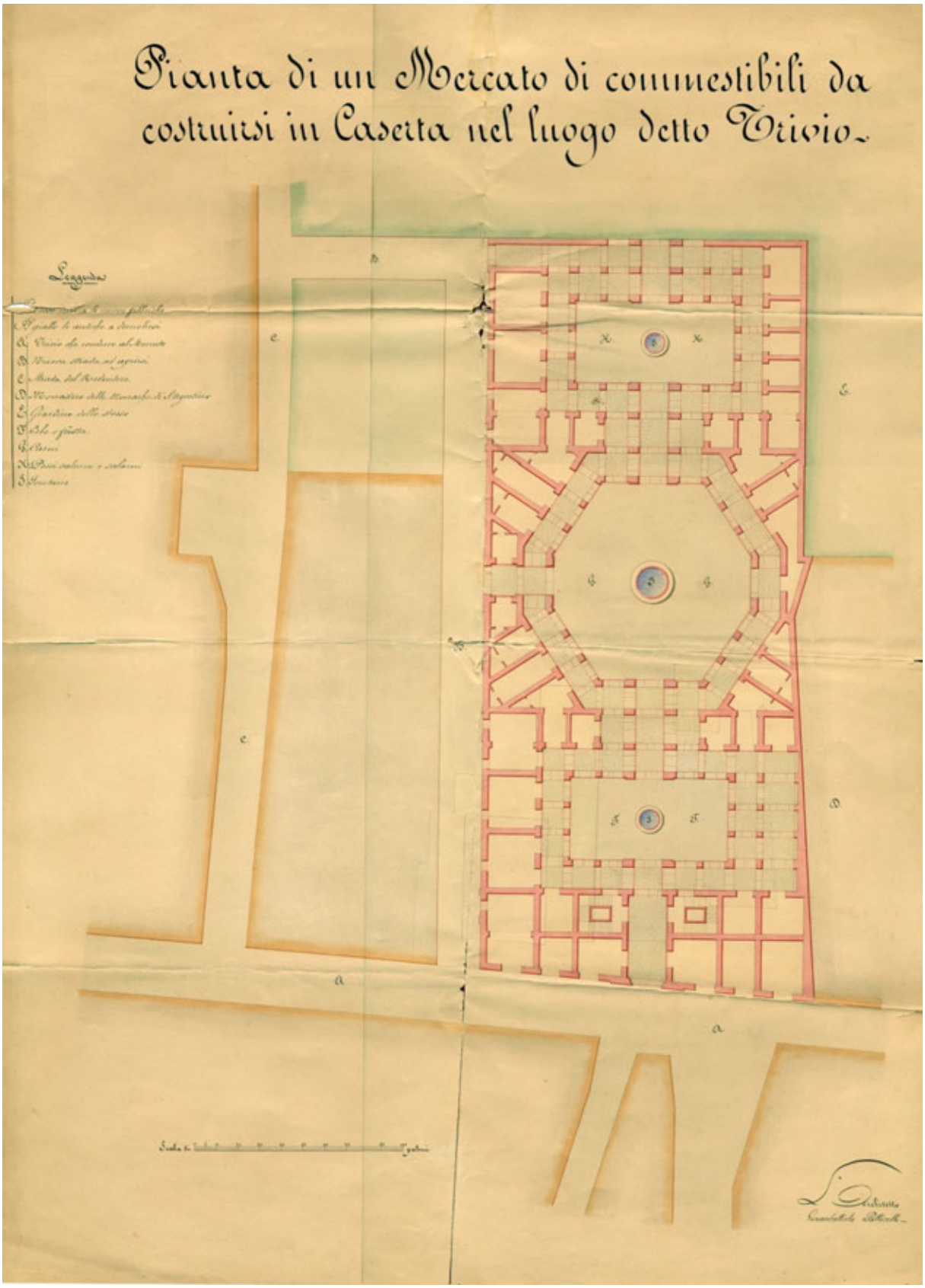

Fig. 2: Giovanni Battista Patturelli project for the new covered market.

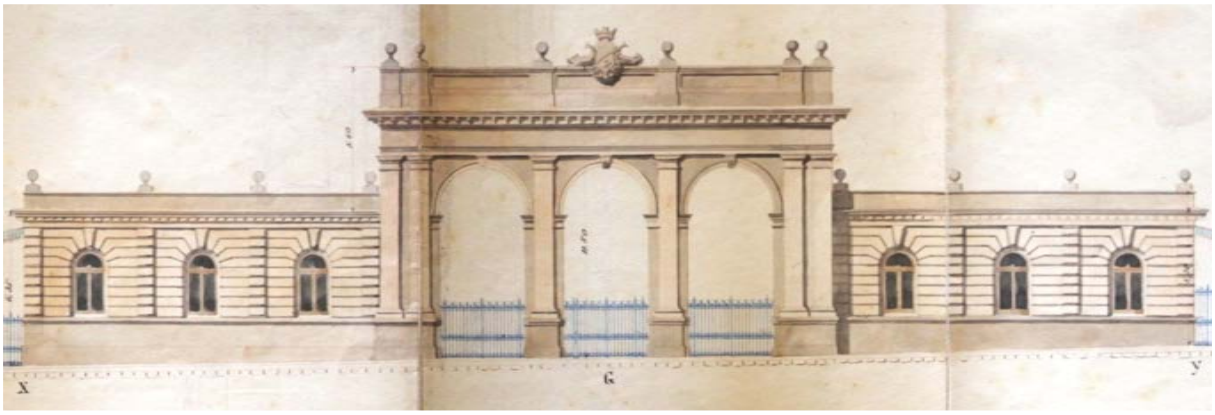

Fig. 3: Arrigo Veccia, the central part of the facade.

The Central element of the composition was a large central octagonal space divided symmetrically along the longitudinal axis around the median with a fountain situated in the center of the architectural composition. The elaborated planimetric's articulation contrasts with the elementariness of the main front in "via del Trivio", characterized by "muratura listata" of the ground floor and by the simple moldings of the windows situated at the first floor. Its central sector, which includes the tilt of the main compartment, it is strengthened by "listatura" extended to the floor, framed by Tuscan pilasters, and the crown set upon a thick sequence of shelves. Ultimately, the geometric register inspired by Renaissance, depict a whole characterized by a moderated elegance, which appears appropriated to the requirements of an architectonic adornment necessary to a public building. However, in spite of a first approbation, the citizen Decurionate denied the execution of the work, maybe with the flimsiness of the previous and well-known disagreements with Giovanni Patturelli on the occasion of the cathedral's construction [25]. In 1850 the Decurionate entrusted a new project to the architects Domenico Rossi and Gaetano De Lillo, which graphic arts, all the same, are unknown, such as the ones edited by Francesco Di Napoli and Francesco Tramunto in 1861 (modified by Di Napoli himself and Vincenzo Mongillo in 1867), by the technicians Contenoire, Rombie and Tarantino in 1869, and by Pasquale Toscani and Giuseppe De Lillo in 1875 [7]. It's supposable, even if it's not possible to comment the architectural and urban quality of the mentioned projects, that their failed realization is due to the problems tied to the expropriation of the chosen area, probably the one identified in Giovambattista Pitturelli's project. The new seat for the market's task, which took place in the square in front of the ancient Acquaviva's palace since the Four Hundred, was transformed in the main square of the city dedicated to Luigi Vanvitelli in 1879, and required the construction of a masonry building, notably interesting from an architectural and urban point of view, which was assigned to the daily sale of foodstuffs.

In 1894 the engineer Arrigo Veccia, planned the new daily market, composed of two buildings – one in the shape of the C letter and one in linear shape – located at the east side of the square dedicated to the ancient market (now Piazza Vanvitelli), linking it to the bordering areas by a trident of new streets, composed, from north to south, from via Bologna (now via Battistessa), via Genova (now via Alois) and via Firenze (now via Crispi), joined to the curvilinear route of via Principessa Maria del Belgio (now via Turati). Opposite to the small stores, the wide quadrangular area of Piazza Amedeo (now Piazza Matteotti) was destined to host the weekly fair.[14] The project, that for its urban arrangement of connection to the preexistent road conditions, recall the "Tridente" projected by Luigi Vanvitelli for the elliptical square in front of the Reggia, [13] predicted the construction of masonry buildings realized through technique production methods and traditional taste, joined together by modern platform roves realized with iron and glass, covered by pitches which incline towards roof gutters, confluent into empty pillars, joined to an underground system of discharge [26]. During post-war years, the necessity to achieve new low cost buildings, led the Institute "Case Popolari di Caserta" to extend the structure of the daily market, using a ground elevation with the purpose to host new accommodations addressed to the less well-off. In 1924 the engineer Luigi Fabricat projected the restoration of the nineteenth-century's built, transforming it into a three-storey built, made up of seven blocks functionally autonomous; each of them is provided by a central staircase, serving two apartments.[15] In this way, the interior public spaces, destined to the commerce, became a closed courtyard, useful to the real estate, while the access to the small shops – some of these were destroyed to allow the

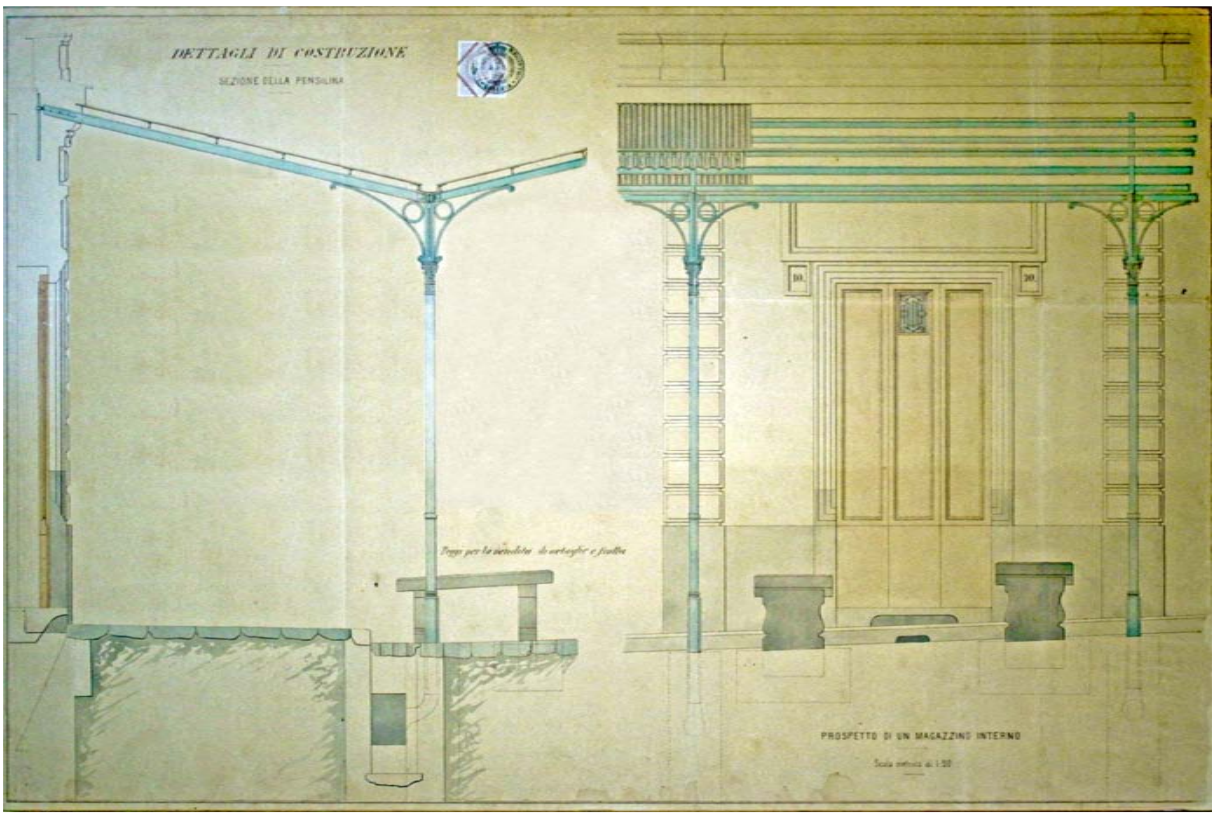

Fig. 4: Arrigo Veccia, the construction details.

staircases construction – was moved to the external side. Bureaucratic difficulties held the realization of the work, seeing as the contracting firm interrupted its activity in 1925, because of economic problems. Labors were committed to another firm, restarted in 1927 and concluded in 1929.
The initial project was substantially modified by Memma – succeeded to Fabricat, who died in 1927 – to restrict labor costs. For example, was decided to reduce the staircase constructions (from seven to three) and to replace the platform roof with a reinforced concrete landing. At the end, some apartments' entrances were disposed next to the staircases while the other ones were disposed next to the spectacular external landings. By the way, the external landing's continuity was interrupted by the following addition of other parts of it to the residences. On the other hand, the aesthetic of the inner spaces definitely improved thanks to the double arcade, opposed to the building in the shape of the C letter, supported by pillars "a stampella" out of the low ground, and corbels "a gattoni" anchored to the first floor's masonry, both made of reinforced concrete and delimited by an elegant parapet made of masonry. During the immediate post-war period, the building damaged by bombardments, was fixed rebuilding the central part of the main building and realizing a second floor above the isolated house in piazza Amedeo, projected by the engineer Luigi Giaquinto, while the elevation of a third floor above the portion of the central street of the trident (now via Alois) wasn't realized because of economic problems [16].
In addition to the changes of the building, there are changes brought by the lodgers to the internal apartments, the group of "Piazzetta Commestibili" represents one of the best expression of the local architecture of the first twentieth century. Therefore, the conclusion of the restoration of the building, still in action, appears as a target that absolutely has to be reached to improve the character of a crucial area for a urban structure, qualified by the latest recycling of "Casa del Fascio", but impoverished, on the other hand, by the ugly structures of the new daily market in piazza Matteotti.
The urbanization of the area began again at the end of the thirties with the construction of the new domicile of the "Confederazione Fascista dei Lavoratori dell'Agricoltura", projected by the engineer Giovanni Campopiano in 1937, arranged on the north side of the square, made up of a two storey house, communicating through a great posterior wing, used as a fruit and vegetables market.
The main entrance at the low ground includes a great central vestibule and four lateral settings; in one of these settings was located the staircase which led to the upper story. The same model recurred at the first floor, with a great salon in the middle and four lateral settings. The great posterior sitting room was divided into three parts by a row of reinforced concrete pillars, with the lateral areas lower than the central one.



Fig. 5: Palazzo Commestibili facade on Vincenzo Crispi Street.



Fig. 6: Palazzo Commestibili interior courtyard.

The building, answering to the description of architectural character based on the functionalist rationalism of Fascist's work, defined the expansion area at the East side of the city, establishing an ideal limit to the road axis of via Vincenzo Crispi, connecting it to piazza del Vescovado. When the work was almost finished, the "Federazione Fascista di Napoli" obtained the property of the entire complex, converting it into the "Casa del Fascio", because of the building size and its location in the great city square. The new project by the engineer Campopiano and Maglio, developed co-operating with the "Ufficio Tecnico della Fondazione dei Fasci di Combattimento di Napoli", was definitely approved by the Segretario Federale Amministrativo di Napoli in 1939 [17].
The change of purpose, led to a reflection about the locations and the connections among them. The central salon turned into a council room and a gymnasium, while the lateral settings were erected to obtain offices. Contemporaneously there was a second thoughts about the configuration of the view that appears on the square, with the building of the typical central tower, which middle balcony could have been used as a stage for possible assemblies in the opposite area. All that legitimate the special care devoted to the external hangings, all the same, because of a restricted financial difficulties, in the lateral areas the building was covered with a plaster panels dyed with a color similar to the local tuff (yellow), instead the tower and the pillars of the arcade were dyed with a color similar to the tuff "pipernino" (grey). The important building, still dominant in piazza Matteotti, has been restored by the architect Raffaele Cutillo in 2009, consolidating the structural elements and redefining the functionality using modern technologies and materials, but preserving the authenticity of the original aesthetic characters [11]. The bi-weekly market, before hosted in piazza Matteotti, moved to via Ruta since the eighties of the last century. Finally the arrangement of piazza Matteotti ended with the construction of the new covered market, projected by the Ufficio Tecnico Comunale and inaugurated in 2008.
This structure, which tripartite and wavy roof is the most connotative element, can be considered as a failed attempt to update the urban environment of the square, inserting new elements marked by a current architectural code. The disposition of the volumes of the new covered market, shows a redundancy marked by the inappropriateness of heterogeneous materials used for structural elements, which appears assembled illogically. The mediocre quality of this building impoverishes the unanimous quality of the pre-existent urban fabric, breaking architectonic and urban balance configured by twentieth-century interventions.



Fig. 7: Aerial photo of piazza Matteotti shooted in the year 2008

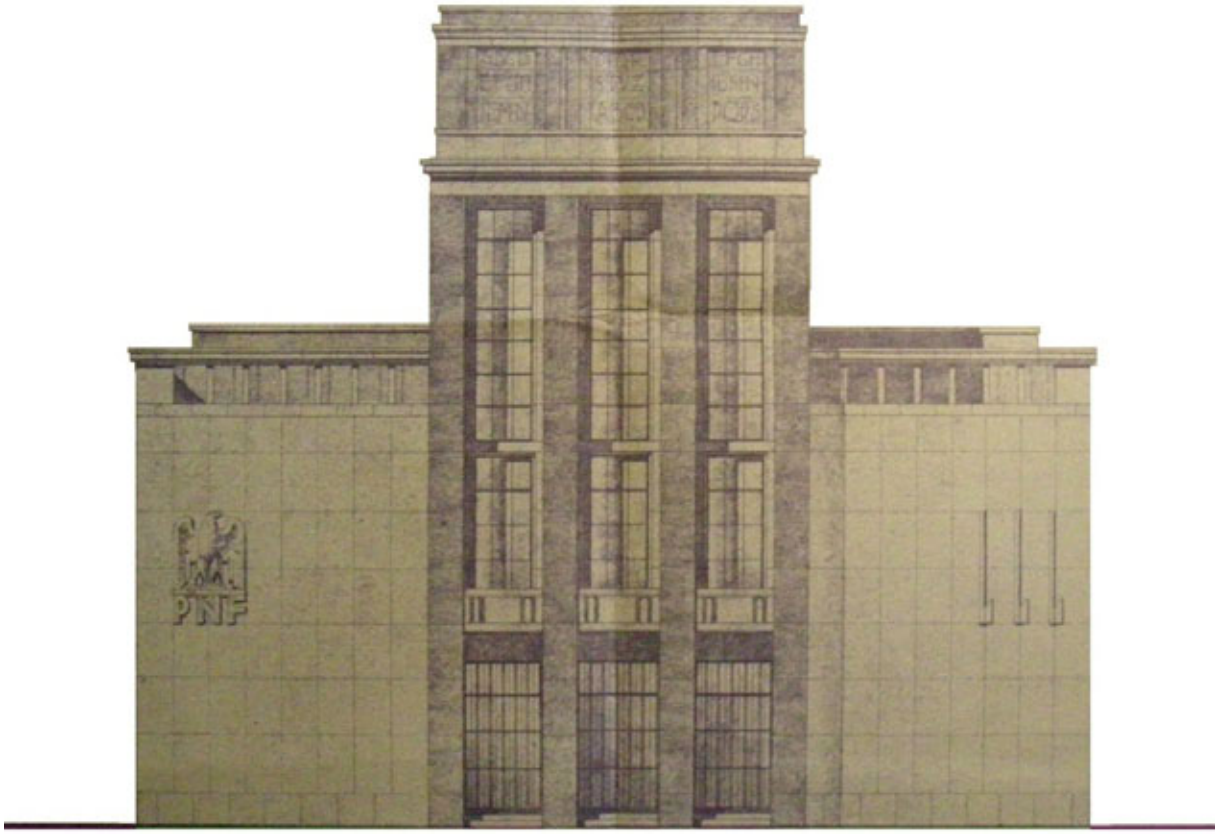



Fig. 8: The project for the Casa del Fascio.
Fig. 9: The Casa del Fascio restored by Raffaele Cutillo.



Fig. 10: The new commercial structure on Piazza Matteotti.



Fig. 11: Piazza Matteotti at the present moment.

Bibliographical References

[1] PATTURELLI, Ferdinando. *Caserta e San Leucio descritti dall'architetto Ferdinando Patturelli*. Napoli: Reale Stamperia, 1826.

[2] TESCIONE, Giuseppe. *Caserta medievale e i suoi conti e signori: lineamenti e ricerche.* Caserta: Societa di Storia Patria di Terra di Lavoro, 1956.

[3] MARELLO, Battista. *L'architetto Giovanni Patturelli e il Real Sito di S. Leucio: testimonianze iconografiche e d'archivio.* Marigliano: Edizioni Saletta dell'Uva, 1992.

[4] IANNIELLO, Domenico Arnaldo. *La via Mazzini*. «Frammenti», 1993 n. 11.

[5] IDEM. *Caserta nell'Ottocento. I due piani urbanistici*. Caserta: Quaderni di Frammenti**,** 1993.

[6] IDEM. *Il Tridente di Caserta*. «Frammenti», 1993 n.17.

[7] IDEM. *Piazze, strade e larghi di città. Le piazzette dei commestibili*. «Frammenti», 1994 n. 21.

[8] CARAFA, Rosa. *Genesi e sviluppo di Caserta Nuova: secoli XVIII-XX*. In G. DE NITTO, G. TESCIONE, *Caserta e la sua diocesi in età moderna e contemporanea.* Napoli: E.S.I., 1995.

[9] GIANFROTTA, Antonio. *Manoscritti di Luigi Vanvitelli nell'archivio della Reggia di Caserta 1752-1773.* Roma: Ministero per i beni e le attività culturali, 2000.

[10] SERRAGLIO, Riccardo. *Città medie dell'Ager Campanus*. GAMBARDELLA, Alfonso. *Ager Campanus. Ricerche di architettura*. Napoli: E.S.I., 2003.

[11] CUTILLO, Raffaele. SPINA, Luigi. E*x Casa del Fascio di Caserta: cronaca di un cantiere in avanzamento*. Milano: Electa, 2008.

[12] TEMPONE, Vincenza. *I mercati di commestibili a Napoli tra XVIII e XIX secolo.* Napoli: Viscione Editore, 2010.

[13] SERRAGLIO, Riccardo. *Architetture per i lavoratori tra Napoli e Caserta. Progetti e realizzazioni dal XVIII al XX secolo*. Napoli: La scuola di Pitagora Editrice, 2012.

[14] IDEM. *La costruzione di case economiche nella città del primo Novecento.* SERRAGLIO, Riccardo. *Social Housing a Caserta negli anni venti del Novecento.* Napoli: La scuola di Pitagora editrice, 2013.

[15] MOSCHESE, Patrizia. *Vincenzo Memma e Luigi Fabricat autori di residenze convenzionate*. SERRAGLIO, Riccardo. *Social Housing a Caserta negli anni venti del Novecento.* Napoli: La scuola di Pitagora editrice, 2013.

[16] VAIANO, Pasquale. *Tipologie edilizie e caratteri costruttivi dei nuovi quartieri.* SERRAGLIO, Riccardo. *Social Housing a Caserta negli anni venti del Novecento.* Napoli: La scuola di Pitagora editrice, 2013.

Archival References

[17] ARCHIVIO CENTRALE DELLO STATO DI ROMA, Partito Nazionale Fascista, Servizi Vari, II, vol. 1228.

[18] ARCHIVIO DELLA REGGIA DI CASERTA, Dispacci e Relazioni, env. 1559, fs. 18.

[19] ARCHIVIO DELLA REGGIA DI CASERTA, Reali Ordini e Dispacci, env. 2484, fs. 146.

[20] ARCHIVIO DI STATO DI CASERTA, Intendenza Borbonica, Affari Comunali, vol 13.

[21] IVI, env. 18.

[22] IVI, env. 21.

[23] IVI, env. 64.

[24] IVI, env. 82.

[25] ARCHIVIO DI STATO DI CASERTA, Atti Diversi Comunali, env. 28.

[26] Drawnings of the project, private archive of the architect Annamaria Bitetti.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Rural Campania: from the Pantano of Sessa Aurunca to Centore village

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Abstract
In the fifties of the XX century, after the preliminary operations of land reclamation of the Campania territory of the *Basso Garigliano*, the *Sezione Speciale per la Riforma Fondiaria* built some farmhouses and a rural village named *Centore*, a service center for settlers of the neighboring farms, located on the *Domiziana* street. The village was composed of a church, a bar, an ambulatory, a tobacco factory, a dairy shop, a cheese factory, a professional Institute of agrarian, a service center for agricultural vehicles, a football pitch, a nursery and an elementary school. In 1958, on the occasion of the exhibition of the Italian poultry, in the park of *Caserta* Royal Palace were exposed some models (in miniature) of colonial houses built in the area of the *Basso Garigliano*. In recent years, the complex of village *Centore* was considered, after the attention and scrupulous observation by the municipality of *Cellole*, a residential core of historical interest to be protected. Moreover, it is also considered for possible projects that could propose the functional recovery of disused structures. Currently, the most of the buildings are still used, including the church dedicated to St. Catherine of Alexandria and the restaurant.

Keywords: Garigliano, Reclamation, Pantano (Quagmire), Cellole, Centore.

1. The reconstruction of historical phases and ideas for the restoration of the rural village.
This contribution dedicated to the study of *Centore* (in province of *Caserta*) is part of a larger work conducted by who writes on the colonization of the *casertani* territories during the fascism and after the world war II. We intend to disclose, on the international cultural scenery, the history of the land reclamation of the plain of *Garigliano* in the XX century, reconstruct the phases of its colonization by the *Consorzio Aurunco di Bonifica* [1] and by the *Sezione Speciale per la Riforma Fondiaria* and investigate the potentiality offered by the area in terms of socio-cultural development. For historical research, was recovered archival and bibliographic material, from the archives, libraries, public bodies and private institutions of *Rome, Naples, Caserta and Salerno.* In particular, in some offices were found documents [5] (in some cases saved from waste by passionate employees of history of the territory) and historical photos, such as those relating to the *Manifestazione Avicola Nazionale* of October 5th, 1957 of *Caserta* city [11]. On that occasion, in the park of Royal Palace there was an exhibition characterized by the presence of some prototypes of colonial houses built (as we will see later, in this paper) by the *Sezione Speciale per la Riforma Fondiaria* in the *Basso Garigliano*. No less interesting are the other photographs that immortalize the land, farming vehicles and the lifestyles of the population in those years.

In the early years of the twentieth century, in the vicinity of the estuary mouth of the *Garigliano* river, were present some marshland areas known as *Pantano di Sessa*, *Pantano di Minturno*, *Pantano Doccia* and *Pantano Corso* [2] which were part of a area of reclamation directly controlled by the Italian State. In 1901, a commission of experts prepared a general project, then modified, to ensure the land reclamation of the vast territory, with the restoration of drain ditches (high and medium), whose disordered regime did not allow complete drainage of water from the ground, thus worsening the hydraulic conditions of the depressed areas, near the coastal dune [7]. In the period 1910-1912, to restore the marshy areas of the district, the *Genio Civile* (of *Caserta* city) built the pumping station of *Punta Fiume* which was obsolete respect to the technological possibilities of the time [3].

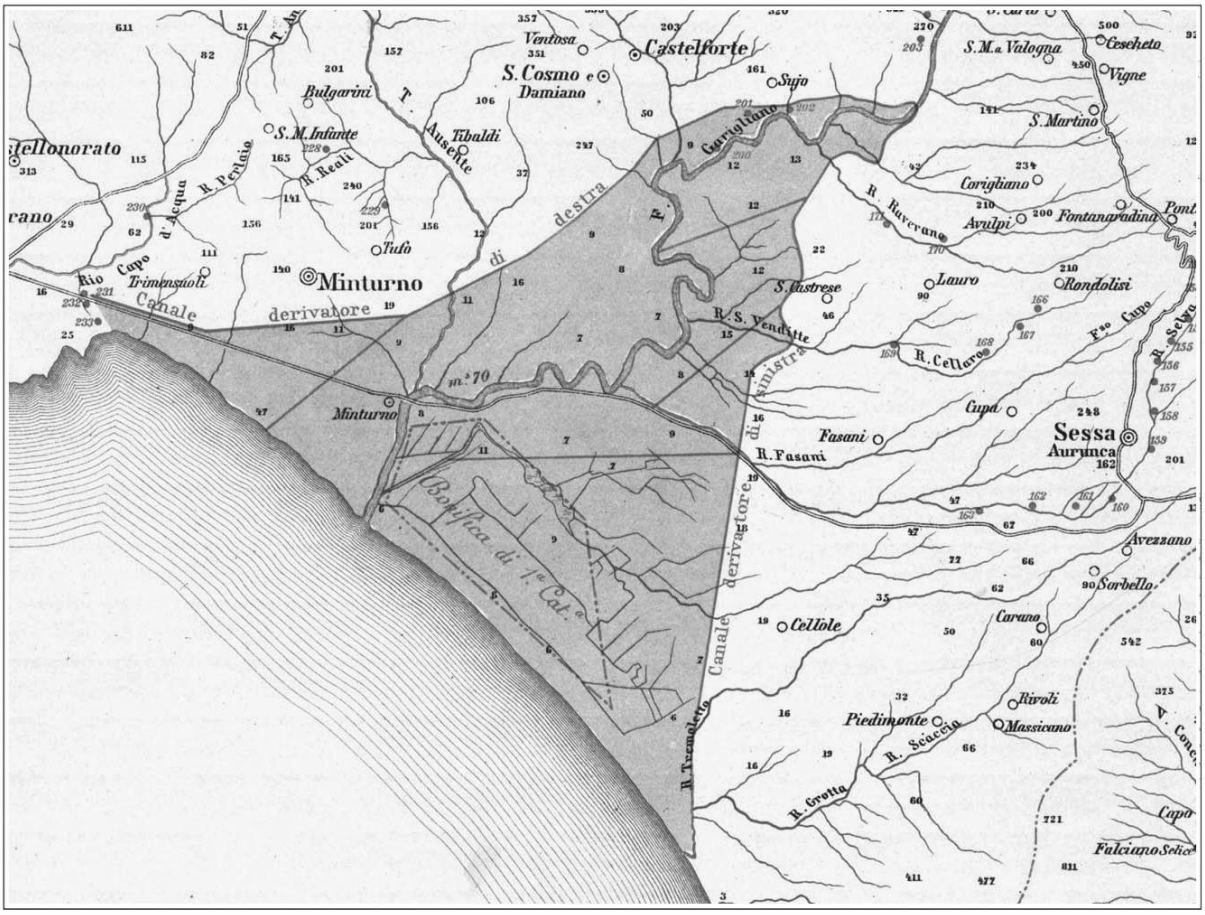

Fig. 1: Istituto Cartografico Italiano. hydrographic map (sheet n.171), 1889.

In the twenties, the *Consorzio Aurunco di Bonifica* was founded and on the February 24th, 1929 it presented a preliminary project of the land reclamation of the area of its jurisdiction, for an amount of work equal to *Lire 33.500.000* [7]. In 1931, on the initiative of the *Società Garigliano* was studied the modality to irrigate part of the district, in both the sides of the river, for a complex of approximately 6000 hectares [7]. In the same year, the *Consorzio Aurunco di Bonifica* appointed the *Milizia Forestale* to study the reforestation of the coastal strip to protect the countryside from the sea salt and for this reason were planted different types of trees, such as: *Pinus pinaster, Pinus pinea and Populus alba* [7]. In subsequent years, the consortium made other works and potentiated the pumping station of *Punta Fiume,* replacing the old steam engines, no longer efficient, with new ones, powered by electric energy [7]. At the end of the thirties of the twentieth century, various consortia including the consortium *Aurunco,* soon joined and became the *Consorzi Riuniti della Bonifica Campana.* Subsequent, in 1940, this new company presented a plan of land division of the area of the *Pantano di Sessa* and for surrounding, approved by the ministerial decree number 6440. The second article of the decree stated that the area had to be divided in unit, of width, respectively, from ten to five hectares, depending on whether it was private property dominated by the irrigation canal or if it belonged to the municipality of *Sessa Aurunca* [7]. In particular, the plan of transformation included the construction of three types of farms (provided with farmhouses and outbuildings), one for the *Pantano di Sessa Aurunca* and two for the outside areas. The type of farm called *podere del pantano* had to be constructed on a ground deep, fresh, and rich in organic material, belonging to the municipality and subject to an unspecified civic use. In addition, its extension had to be minimal and sufficient to guarantee an agricultural product capable to feed the farm family and the payment of the respective taxes. The farm type one, instead, of ten hectare, was to be devoted to mixed crops, with important breeding livestock. Finally, the type of farm named *Sussidiario* or *predunale* had to be built on sandy land less fertile located close to the coast and a part of its surface had to be grown with vineyard. Moreover, for each of them were studied four types of houses, all with two levels, with the ground floor consisted of a kitchen, the upper one of bedrooms and toilet, then, there was also a porch, a stall, a silo for fodder and outbuildings. All four types, according to the guidelines of the *Consorzi Riuniti,* had to be simple in the distribution of the parties, disposed on farms in order to avoid any unnecessary fatigue for the carriage of goods or equipment, airy, bright, friendly and relaxing and the most important thing is that the houses should have arouse in the farmer's heart, love for the countryside [7].

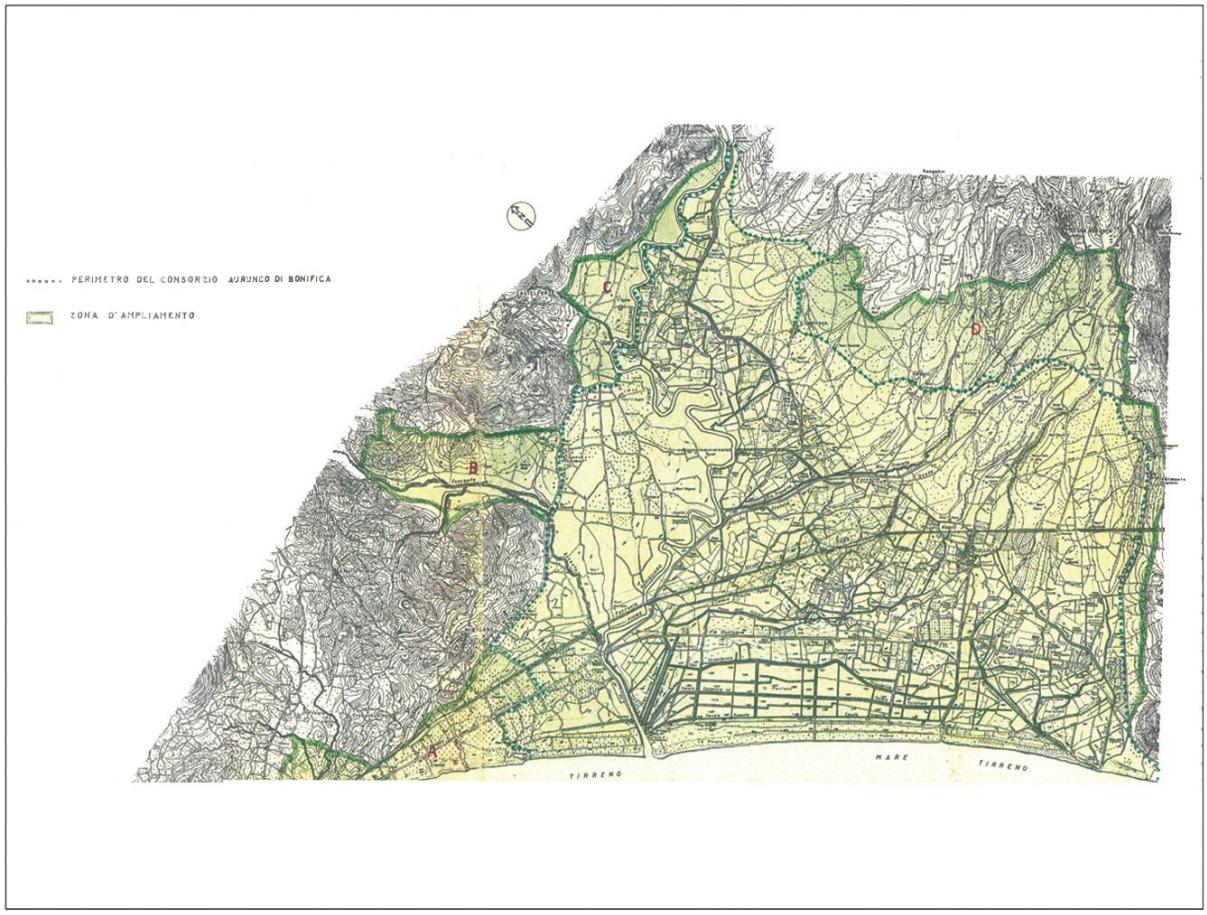

Fig. 2: the perimeter of the Consorzio Aurunco. Prof. Nallo Mazzocchi Alemanno.

In addition, to guarantee the life necessary conditions of the farms, the construction of new rural centers were not calculated since the existing ones were considered to be sufficient, such as: *Cellole* (now, an independent town*), Piedimonte-Rivoli, Carano, Fasani* and *San Castrese,* but the possibility of having to build others villages successively was not excluded, especially near the *Pantano di Sessa Aurunca* [7]. However, this plan of land transformation drawn up by the *Consorzi Riuniti* was not appreciated by several unitholders renters of plots of the *Pantano di Sessa* and probably also for the physical and verbal clashes between them and the public administrations, this proposed transformation plan was not put into effect [13].

In the fifties of the twentieth century, with the laws *Sila_104/1950, Stralcio_841/1950 (entitled, Norme per la espropriazione, bonifica, trasformazione e assegnazione dei terreni ai contadini)* and *Regionale Siciliana_104/41950,* some Italian agricultural areas were placed under the agrarian reform, including the plain of the *Garigliano* [13;15], near the *Pantano di Sessa Aurunca.* The purpose of the laws, according to the provisions of article 44 of the Constitution of the Italian Republic, was to intervene in some areas of the peninsula where there was still the problem of a monopoly of the land (latifundium) or there were situations of particular social hardship and of extreme fragmentation of the management system of private land [19]. In the plain of the *Garigliano*, in the locality *Centore*, near the former *Pantano di Sessa*, the regulations were implemented by the *Sezione Speciale per la Riforma Fondiaria*, a public body established at the *Opera Nazionale per i Combattenti* [10] with the decree n.70 of 1951, the same law that defined the scope of its intervention in the municipalities of province of *Caserta* as *Cancello Arnone, Castel Volturno, Capua, Grazzanise, Santa Maria La Fossa, Vitulazio, Villa Literno, Carinola, Francolise, Mondragone* and *Sessa Aurunca;* and those in *Salerno* area, as *Albanella, Altavilla Silientina, Pontecagnano-Faiano, Battipaglia, Capaccio, Eboli, Giungano, Serre e Trentinara* [6]. The agrarian transformation of *Centore* (placename which according to the researcher *Giuseppe Tommasino*, depends on the fact which in that area there was the hundredth milestone of the Appian street) [9] was implemented with the construction of about fifty farms of the total area of hectares 226, served by colonial houses, by infrastructure and by a service center, probably, first called *Borgo Clanio*, then *Borgo Centore* (in Italian language), as the name of the locality in which it was built. The Farms, the colonial buildings and those for unitholders were designed according to criteria of economy and simplicity, but ensuring a respectable settlement for the farm families. Moreover, these farms, even though built in the countryside and therefore far from existing community

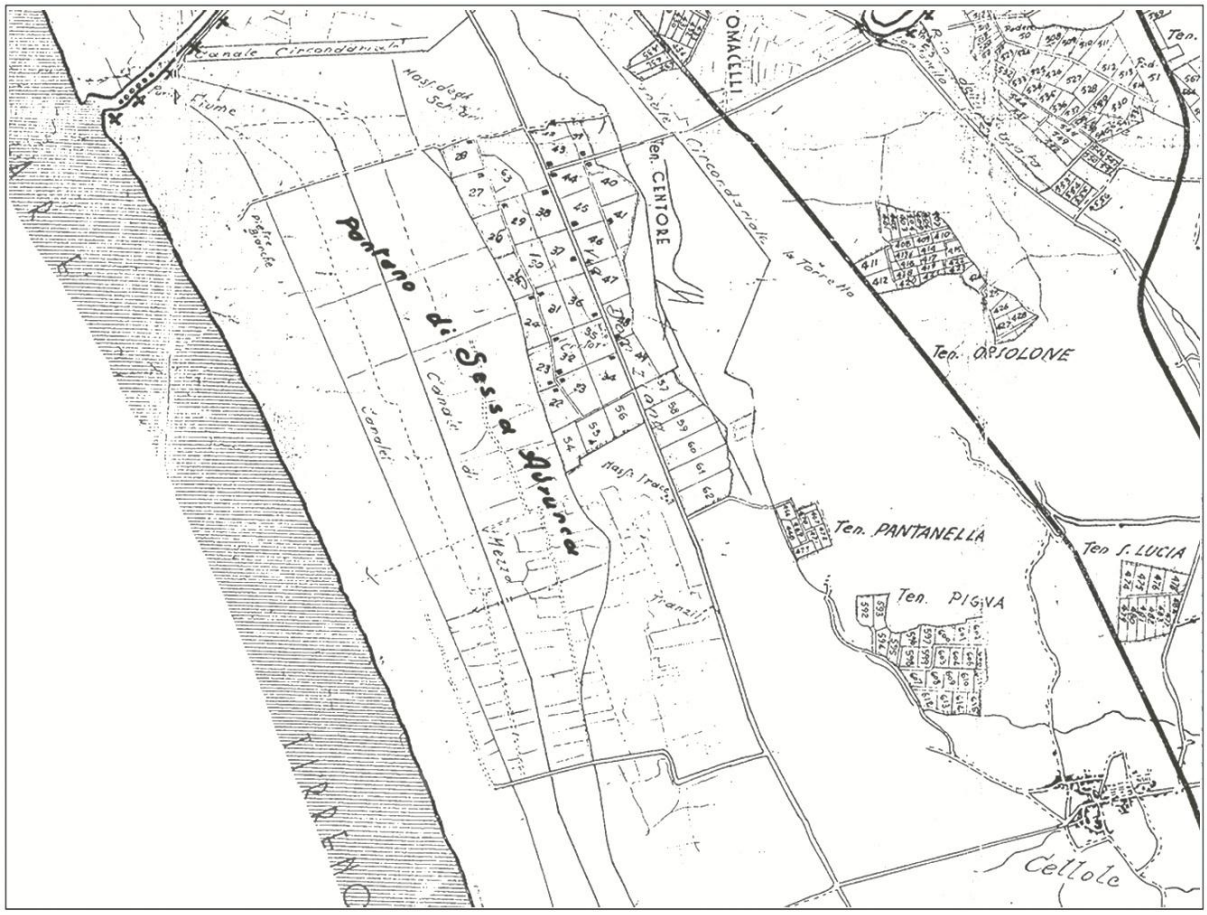

Fig. 3: Sezione Speciale per la Riforma Fondiaria in Campania: chorographic map (Garigliano).

centers, have allowed to those families to feel fulfilled since they could count on the services (municipal delegation, offices, churches, schools, etc.) offered by *Centore* village that was a point of reference for farmers. From studies of that period conducted by the *Sezione Speciale per la Riforma Fondiaria in Campania*, the village had to offer public services to about 1.000 people in the surrounding rural land characterized by an area of 2,700 hectares of which 226 divided from the *Sezione Speciale*, 135 divided into lots and the remaining in private ownership [12]. An initial project of the *Centore* village, from what emerges from a planimetry constituent a private collection of documents [4], is dated 1955 and drawn by the engineer *Claudio Corini*. Of this plan, we notice that the main village square, triangular, was to be built at the intersection of the streets *Domiziana* and *Pietre Bianche*. In the same years, was designed the final project, in it is obvious that the perimeter of the village is almost a quadrilateral circumscribed on three of the four sides by the following streets: *Domiziana*, *Pietre Bianche* and *interpoderale Centore*. The main entrance to the village is located on the *Domiziana* street, from which you can admire its main square of trapezoidal shape, dominated by flower beds, pine trees and from the church dedicated to St. Catherine of Alexandria [18] with its bell tower, a building certainly of architectural interest. In addition, on the same square there are the former elementary school (today, hotel management school), the bar and infirmary (today, bar and restaurant) and the former office of the *Ente di Riforma* (today, highway police station). The Church, slightly raised above street level with a base, has a rectangular plan and a single nave ending with a semicircular apse. Its facade has a large arched portal and a series of vertical cuts on the top [5;18], the Inside is very rational and enlightened by a series of openings at the top, the roofing is composed of wooden trusses. In the decentralized position of village, there are some abandoned buildings, accessible by internal road network, among which we distinguish the former tobacco factory of the cooperative *Santa Caterina,* the former cheese factory, the former service center for the agricultural vehicles, a vocational institute inside a former experimental farm [8] and a basement theater built recently, that apparently gets flooded during heavy rains. In addition, from what emerges from a magazine of the 1988 named *L'Achitettura, Centore* village has been a topic of interest for a contest sponsored by the *Ente di Sviluppo Agricolo in Campania,* which concerned the design of a public park for the promotion and the safeguard of agriculture [14]. Finally, a few years ago, the whole village of *Centore*, after the attention and scrupulous observation by the municipality of *Cellole,* it was considered a residential center of historical interest to be protected. It was a correct decision if you think that the village was built just after World War second and reflects a particular historical phase of

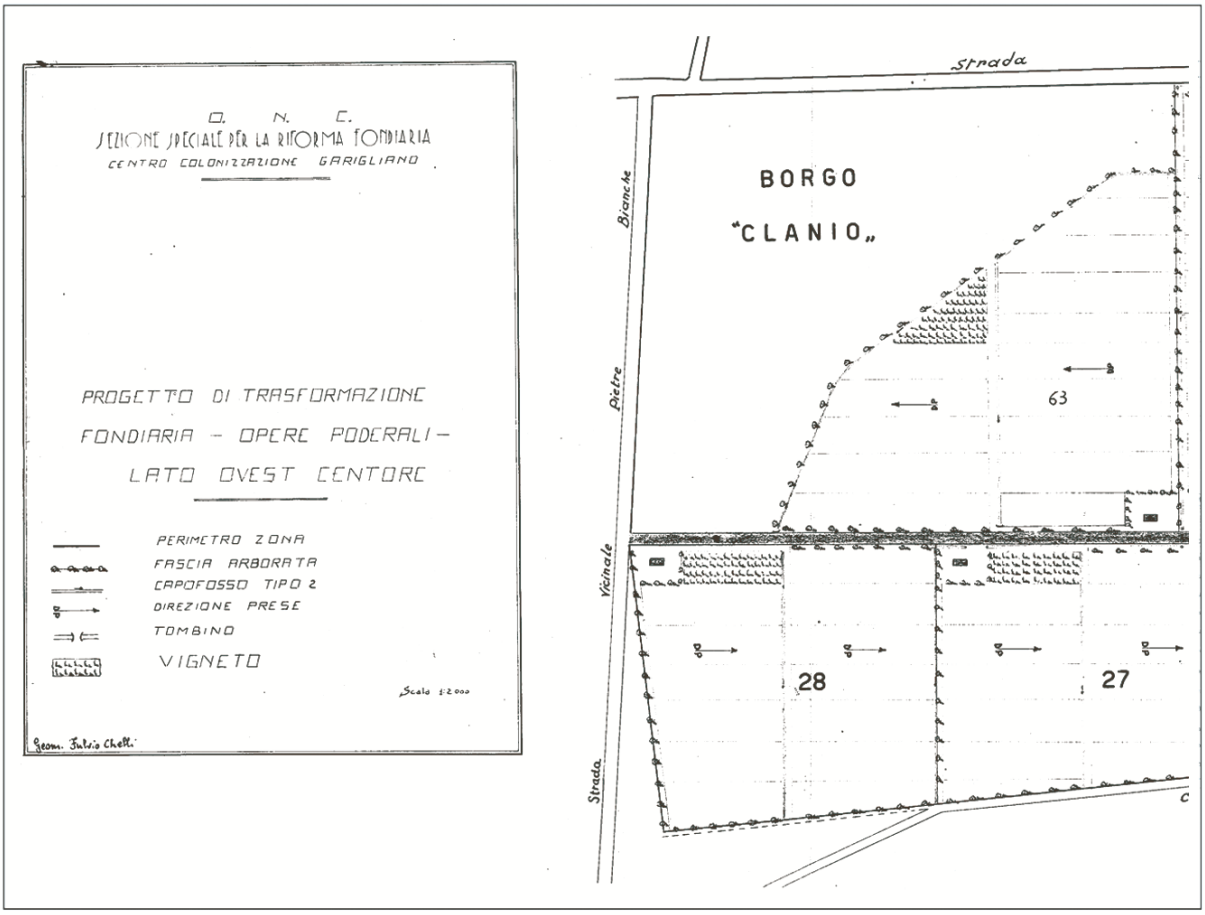

Fig. 4: Sezione Speciale per la Riforma Fondiaria in Campania: Centore land transformation, surveyor Fulvio Chelli.

the territory. *Centore* village, is now a place easily accessible from the *Domiziana* street, that connects the province of Naples to the *Basso Lazio*, a reference point and stopover for tourists and truck drivers from *Naples* and *Caserta* and directed, through aforementioned street, to the various companies of the area or to the renowned beaches of the *Basso Lazio*. The village is very busy at rush hours, in the summer and on Sundays, in addition, it is also considered for possible projects that could propose the functional recovery of disused structures, some of which have already gained a new use, for example, in the former offices of the *Ente Riforma* there is the highway police station; in the structure of the former elementary school and that of the old dairy has been placed the branch of the Hotel Management School of the city of *Teano* (*Caserta*), which differently from many other Italian schools situated in critical areas with heavy traffic, can enjoy of a relaxing geographical context for pupils, characterized by numerous trees and green areas. However, some buildings have not yet found a new destination for their use and are in a pitiful state of disrepair, it is the case of the former service center for agricultural vehicles, the former dairy factory, the former tobacco factory and the former agrarian institute. Future projects for functional recovery of abandoned structures must have as its objective the protection of economic interests and to appreciation the area. In this sense, the possible opportunities for economic development, of tourism and culture offered by the geographical location of the village are many, considering that it is located in an area of outstanding scenic interest. In fact, just a few kilometers away we find the natural park of *Roccamonfina - Foce del Garigliano*, the archeological city of *Minturnae*, the historical center of Sessa Aurunca and the *Ager Falernus* with its wines known since ancient times [20]. In addition, it would be interesting if in one of the abandoned structures (such as the former agricultural institute) will built a library and a museum of land reclamation and colonization, a place characterized by books, photos, documents and models of reconstruction of the works of transformation of territory, in order to pass on this particular segment of history to future generations. Finally, we hope that all these initiatives can ensure the protection and enhancement of these artifacts, without forgetting the existence of other rural villages situated just a few kilometers from *Centore*. These include, *Domizio* village (unfinished) in *Castel Volturno* town and *Appio* village [16;17;18] in *Grazzanise,* both built in the late thirties of the twentieth century by the *Opera Nazionale per i Combattenti.* These villages have undoubtedly a high historical and social value but are destined to perish if we continue to neglect them, for this reason, will be necessary new ministerial measures for consider these as assets to be protected, just as it has been for the *Centore* village.

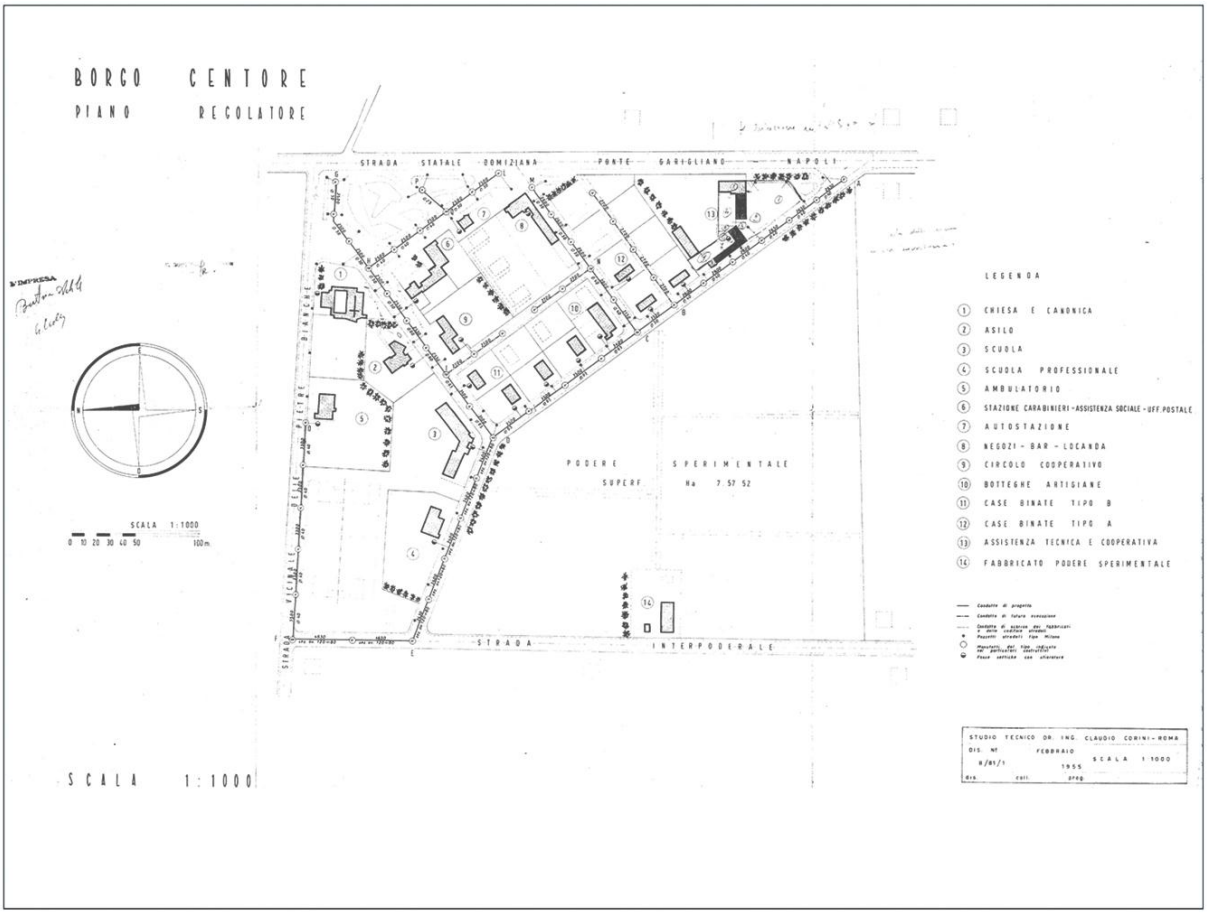

Fig. 5: technical office of the engineer Claudio Carini, project unrealized of Centore village.



Fig. 6: church of Saint Catherine of Alexandria, fifties-sixties of the twentieth century.

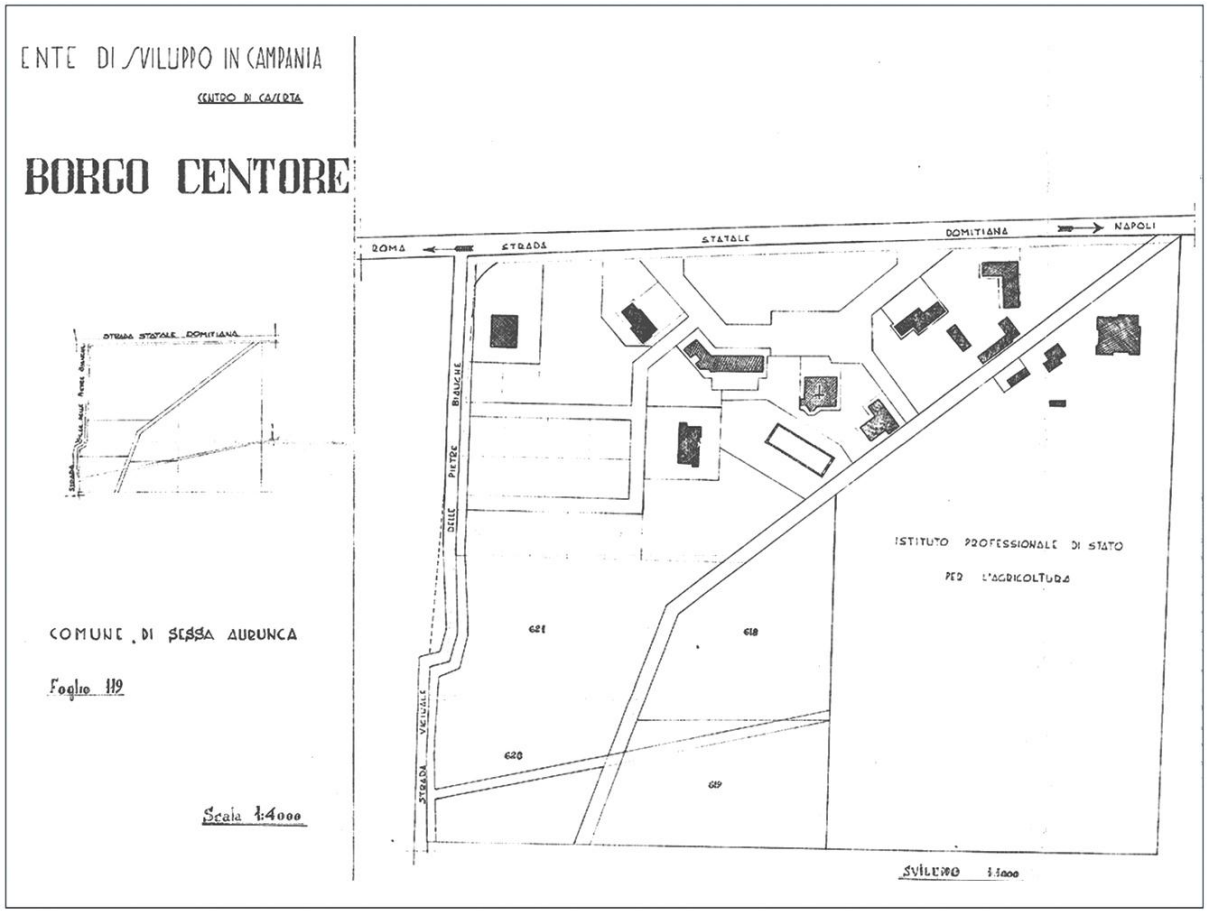

Fig. 7: town hall of Sessa Aurunca, borgo Centore, cadastral sheet n.119.



Fig. 8: aerial view of Centore village.

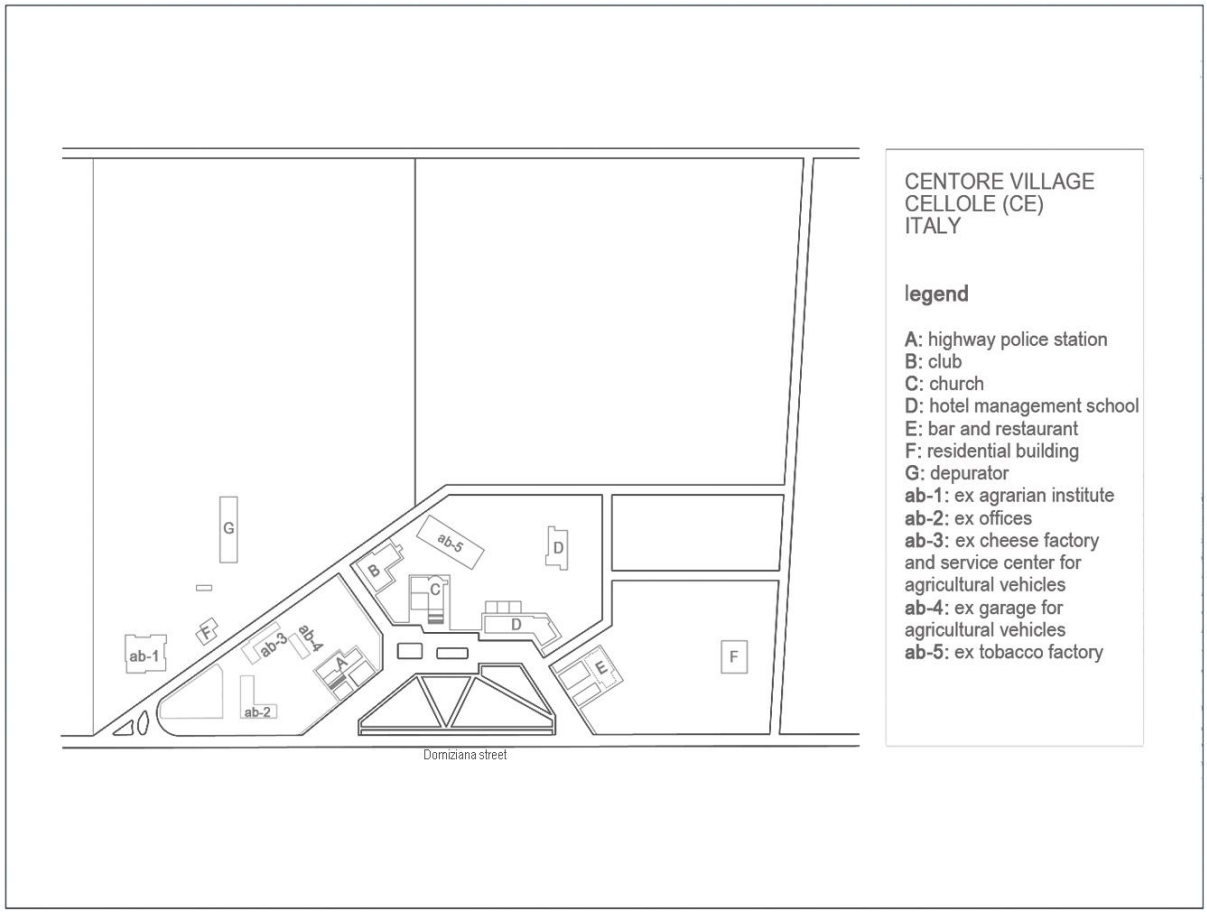

Fig. 9: planimetric sketch of the village.



Fig. 10: daytime view of church dedicated to Saint Catherine of Alexandria. Giuseppe Mario Infante, 2014.

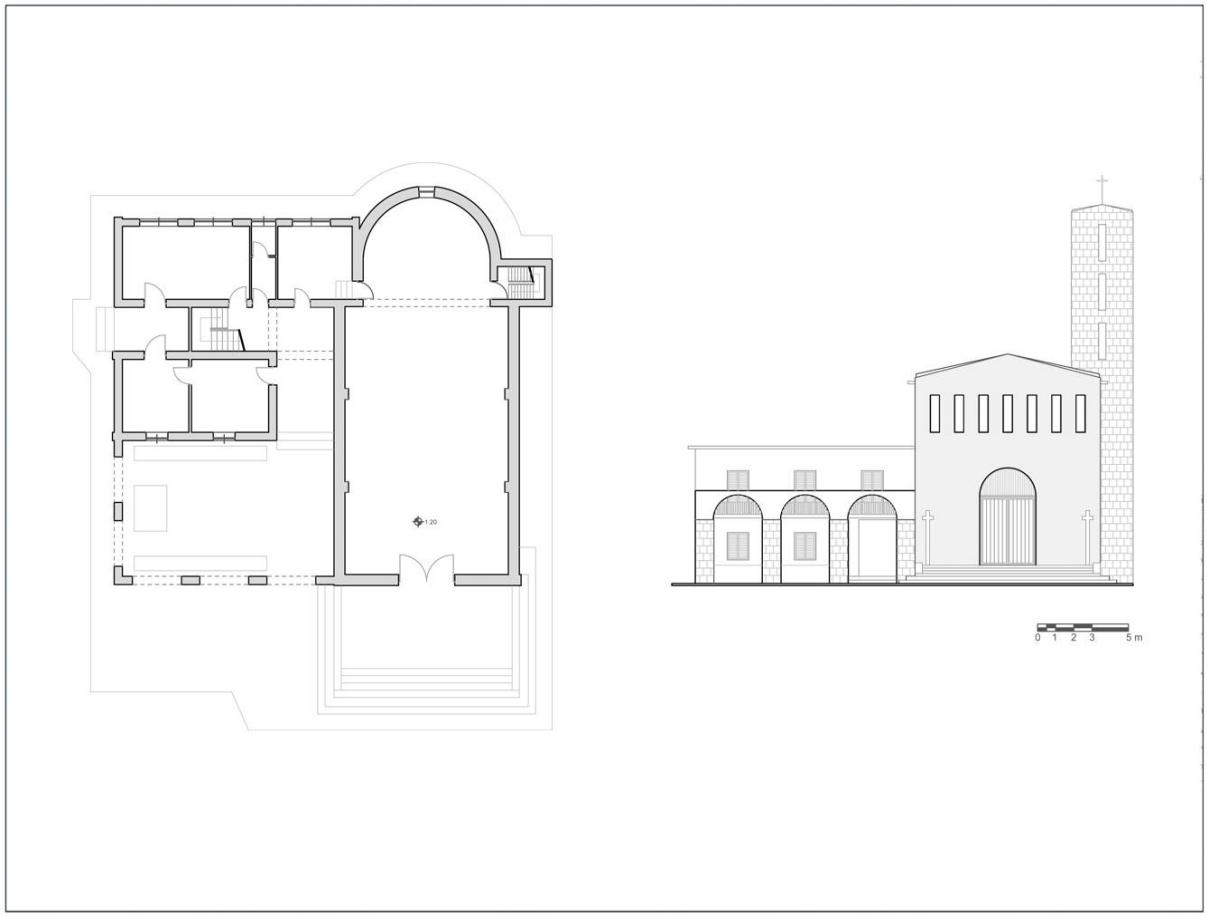

Fig. 11: plant and elevation (with little differences from the real one) of church devoted to S. Catherine of Alexandria.



Fig. 12: night view of church. Giuseppe Mario Infante, 2014.

Bibliographical References

[1] A.C.S. Ministero Agricoltura e Foreste: Direzione generale Bonifica e Colonizzazione, busta 39, fascicolo 1140. 1927-33.

[2] A.S.N.A. Prefettura di Napoli, Gabinetto, secondo versamento, fascio 676, fascicolo 7 (V.S.226). 1932-37.

[3] Private Archive of Nardella Francesco, *Direttive di massima del piano di trasformazione fondiaria* del comprensorio consorziale, (Consorzio Aurunco di Bonifica), Nallo Mazzocchi Alemanno.

[4] Private Archive of Nardella Francesco, *projects.*

[5] Archive of STAPACEPICA offices in Caserta (employment Di Nardo Larino), projects.

[6] Archive of STAPACEPICA offices in Salerno, ENTE DI SVILUPPO IN CAMPANIA. *Le attività dell'O.N.C. Sezione Speciale per la Riforma Fondiaria in Campania nei territori di riforma delle provincie di Salerno e Caserta, dalla Costituzione al 31-12-1965.* Napoli, 31 dicembre 1965.

[7] GAETANI, Livio. MEDICI, Giuseppe. *Piano generale per la bonifica del comprensorio: direttive della trasformazione fondiaria. (Consorzi Riuniti di Bonifica della Campania. Consorzio Aurunco di Bonifica).* Faenza: tipografia fratelli Lega, 1940. 174 p.

[8] ANGELINI, Franco. *Il podere sperimentale nella bonifica del basso Volturno.* Portici: stab. tip. ves. E. Della Torre, 1941. 21 p.

[9] TOMMASINO, Giuseppe. *Aurunci Patres (prefazione di Pietro Fedele).* 1ª ed. Gubbio: tipografia Eugubina, 1942. 344 p. Collana Minturnese, n. 10.

[10] OPERA NAZIONALE PER I COMBATTENTI. *36 anni dell'Opera Nazionale per i Combattenti 1919-1955*. Roma: 1955. P. 278.

[11] MANIFESTAZIONI AVICOLE CASERTANE. *Atti del 1° convegno per lo sviluppo della pollicoltura nel mezzogiorno d'Italia: Caserta 5 ottobre 1957 (teatro di corte del Palazzo Reale).* Napoli: tipografia Raimondi.

[12] OPERA NAZIONALE PER I COMBATTENTI. SEZIONE SPECIALE PER LA RIFORMA FONDIARIA IN CAMPANIA. *Le costruzioni rurali*. Napoli: 1960. P. 67.

[13] CAPOBIANCO, Giuseppe. *Crisi politica e blocco agrario*. *Alle radici del nostro presente: Napoli e la Campania dal fascismo alla repubblica, 1943-1946.* Napoli: Guida, 1986.

[14] L'Architettura, Edizioni 387-392, Milano: Etas, 1988.

[15] BOCCINI, Floriano. CICCOZZI, Erminia. *Opera Nazionale per i Combattenti, progetti.* 1ª ed. Città di Castello: Ministero per i Beni e le attività culturali, direzione generale per gli archivi, edizioni Edimond, 2007.

[16] PAPPALARDO, Giuseppe. *Borgo Appio e Borgo Domizio: episodi di ruralesimo nella bonifica del Volturno*, in SERRAGLIO, Riccardo. *Ricerche sull'architettura rurale in Terra di Lavoro*. Napoli: Edizioni Scientifiche Italiane, 2007.

[17] SERRAGLIO, Riccardo. *Borgo Appio e Borgo Domitio villages coopératifs in Terra di Lavoro. Le vie dei Mercanti. Cielo dal Mediterraneo all'Oriente*, Napoli: la scuola di Pitagora editrice, 2009, p. 805-812.

[18] SERRAGLIO, Riccardo. *Architetture per i lavoratori tra Napoli e Caserta, progetti e realizzazioni dal XVIII al XX secolo.* 1ª ed. Napoli: La scuola di Pitagora editrice, 2012. 321 p. Fabbrica della Conoscenza.

[19] http://www.treccani.it/enciclopedia/riforma-fondiaria/

[20] http://www.promozionecellole.it/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Subsidiarity and sustainability as a widespread cross-cutting approach to different anthropocentric events and aggregations: land government, fiscal federalism and geo-intelligence as international heritage of knowledge, scientific progress, land government and law enforcement policy

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Subsidiarity and sustainability as a widespread cross-cutting approach to different anthropocentric events and aggregations: land government, fiscal federalism and geo-intelligence as international heritage of knowledge, scientific progress, land government and law enforcement policy
The legislation ruling the territory consists of a complex set of technical, administrative, environmental and fiscal laws. The government operator needs the support of the most advanced scientific research knowledge in order to enforce administrative, criminal and taxation laws. Tax legislation extends its field of application in environmental legislation and must be considered a suitable instrument to anticipate and maybe avoid the complex criminal case of environmental disaster. The trio made by science, technology and taxation can be a solution: it should be established a background of knowledge generated by the synoptic representation of high density and multidimensional datas. A shared, total and diachronic knowledge of a territory allows an effective management and sustainability of its own exploitation. Scientific and governmental interlocutors in the survey, knowledge, analysis, representation, defense and requalification of the territory should be a triple point for all human beings. The scientific knowledge, law enforcement and repressive powers, should converge to outline standard discretization procedures in order to glean individual contributions and to integrate them into a complex and upgradeable platform of extended knowledge. This multidimensional and multiple layer 'cornucopia' has to be at disposal of all social community and the legal system, forever, as our heritage to the generations that will come.

Keywords: Geointelligence, government of territory, fiscal federalism, sustainability, law enforcement

1. Geointelligence as an international heritage of knowledge, scientific progress, land government and law enforcement

The legislation ruling the territory consists of a complex set of technical, administrative, environmental and fiscal laws. The government operator needs the support of the most advanced scientific research knowledge in order to enforce administrative, criminal and taxation laws. Tax legislation extends its field of application in environmental legislation and must be considered a suitable instrument to anticipate and maybe avoid the complex criminal case of environmental disaster. The trio made by science, technology and taxation can be a solution: it should be established a background of knowledge generated by the synoptic representation of high density and multidimensional data. A shared, total and diachronic knowledge of a territory allows an effective management and Sustainability of its own exploitation. Scientific and governmental interlocutors in the survey, knowledge, analysis, representation, defense and requalification of the territory should be a triple point

for all human beings. The scientific knowledge, law enforcement and repressive powers, should converge to outline standard discretization procedures in order to glean individual contributions and to integrate them into a complex and upgradeable platform of extended knowledge. This multidimensional and multiple layer 'cornucopia' has to be at disposal of all social community and the legal system, forever, as our heritage to the generations that will come. Fiscal law also can be also enforce with airborne remote sensing technology: the knowledge of our territory and its modifications it has to be something that our government and police must know, control and dominate everyday, everywhere, seamless. High density and multidimensional data acquired through the activities of airborne remote sensing technology conducted by economic and financial and economic police may be established as a basis for an activity of geo intelligence. Those informations, essential to control the territory and for application of tax law, are aimed at providing essential elements to the operator of the tax and criminal police enforcement activity. For example, one for all, a national geo-intelligence awareness offered by remote sensing police aircrafts may constitute a strong boost to contrast systematic and large-scale illegal housing: scans acquired by financial police equipped with airplanes in configuration Airborne Remote Sensing also could overcome all the difficulties in application of the fiscal federalism laws due to local governments fragmentary actions. A depth knowledge of the urban fabric, in the first place, allows to contrast criminal organizations: those criminal realities acquire power and acclaim on the full knowledge and control of their territory. They exert that control in the forms of 'ownership', imposing themselves as an alternative to the State power. This systematic scanning of portions of the territory allows the creation of spatial database, whose data can also be used for scientific research and police investigations. The creation of digital and multidimensional maps lays establish the correct pattern to create and implement geo-information databases, a fundamental tool for all the citizens and the daily activities of the national institutions. The famous social network Facebook has revolutionized the web world just to have paired and connected personal data to one or more digital images: bind a huge and widespread amount of textual data in possession of the various national, regional and local government in a single map database, georeferenced and always implementable, spread new intelligence frontiers with geo-economic law enforcement purposes. Effective policing financial enforcement is a '*condicio sine qua non*' in achieving fundamental principles of fiscal fairness and tax progressivity: that goals would significantly meet the justice expectations of the majority of taxpayers who contribute with their income to the survival of the legal and democratic nation. Tax fairness have the positive effect of increasing awareness and participation of the taxpayer in national and european contributory system: to increase the sense of individual responsibility that binds the tax levy to cover public spending allows the entire community to raise the level of negative social value that comes from the commission of offenses related to tax evasion and fiscal avoidances.

2. Land Management through legal and geographical representation of its territory: concepts of tax fairness and contribution capability applied to local analysis. A case study compared between Italy, Spain and Germany

Fiscal federalism is now, in its multidisciplinary approach, the focus of national and European policy debate: it is the backbone of the form of government, both national and Community level, determining the forms of operation and financing. The federal tax rules the purposes and mode of operations in which jurisdictions manage the national tax levy and its allocation between the central state and sub-state levels of government.

The supranational governments today are widespread and highly representative in international contexts: same national states, confederating in various ways, have transferred part of their sovereignty to supranational entities and to the sub-national levels of government at the same time. This reduction of centrality and sovereignty of national states is a consequence of an inevitable process, simultaneously centripetal and centrifugal, accelerated by the globalization of financial markets and the institutional subsidiarity.

The federal process is not limited to the split of national unity: it is the attainment of equilibrium in the process of development, in the diversity of local autonomy, strengthening the national identity through cooperative and mutual policies.

2.1 Fiscal federalism as a new legal dimension for land management and representation

Fiscal federalism, widespread among the forms of State all around international community, isn't an immediate consequence or a unique form of development of a typical federal state. In fact, as the following analysis, fiscal federalism can be institutionalized in a federal system such as the regionalized one; however, in the form of a federal state, it may be replaced by a financial derivatives system without any provisions of fiscal federalism principles. Today, many countries with a federal system, regardless of their form of State, have adopted the federal form of the tax system by institutionalizing the full correspondence between federalism and fiscal federalism are an example the United States, Canada, Brazil, Argentina, India and Australia. Fiscal federalism is also a solid

institutional reality in various European countries: systems of fiscal federalism are in charge, often politically institutionalized in a federal State as Germany, Switzerland, Austria and Belgium. Among the European countries with a fiscal federalism form of government and without a federal constitution, there are for example Spain, the regional state with a strong fiscal autonomy given to Autonomous Communities.
Even the Italian Constitution has identified as a form of recognition of local autonomy, the state regional decentralization in the programmatic intentions of the settlor was not then followed by coherent legislation. The approval of the necessary legislation, at least for the ordinary statute regions, took place only after 1970. A significant time delay was also caused by the harsh political opposition of central government to the possibility that regional governments ruled by opposition forces, such as in Emilia Romagna and Tuscany, from reaching autonomy. Even after 1970 national State has considered the regions only a mere kind of decentralization instead of state-entities with a proper autonomy.

2.2 Germany and Spain: different way to represent subsidiarity and sustainability in land management

The objective of this section is a comparative analysis of 'living' fiscal federalism in Germany, Spain and Italy, three quite autonomous legal systems very different but also very similar for law and cultural traditions. A essential element that distinguishes them and at the same time joins strongly them is that they are European Union Member States. The legal systems of Germany, Spain and Italy are particularly changeable in time and space: the legislative reforms are ongoing and relentless legal research is to define models of fairness and healthy public management.
Fiscal federalism, as a complex fiscal instrument for a proper territorial government, calls for a strict regulation of the financial relationships stability between all government levels providing reward or sanction mechanisms aimed at empowering national and local public management. The choice of a nation-state in establishing a system of fiscal federalism, such as last reforms of Germany, Spain and Italy, need to rule and set all those laws and legal institutions aimed at irresponsibility prevention in the financial management of local and national. Laws must bridge the accountability deficit that has always been present in multilevel government. A well structured system can ensure the sustainability of public spending, initially parameter for entry into the European Union but today it has become a prerequisite for the very existence of the EURO currency.
The experience of the territorial government in place in Germany is well important: land government features of German system develop since world war II until its evolution into being reformed by *Föderalismusreform I* and *II*, respectively, approved in 2006 and 2009.
The Spanish model implements a government of the territory through a particular form of asymmetric decentralization. The Spanish Constitution is the most recent among those considered in the present study: despite its approval in 1978, it was the subject of deep reforms, including that of 2009 which radically modified laws ruling land government. It has extended the powers reserved to local governments, Autonomous Communities, at the expense of the Spanish nation state.

2.3 Fiscal federalism in the *iure condendo* Italian experience

The Italian model of fiscal federalism, in a phase of uncertainty that has lasted since its inception, has to be analyzed through every implementation phase till its current progress. Its analysis should take into account the particular Italian regionalism: this proved to be a legal phenomenon of extreme avant-garde at the time of inclusion in our Constitution, although initially created through the form of mere administrative decentralization. To understand the perspectives of our territorial government should be carefully analyzed also the purpose of the last fiscal federalism enforced by Title V reform of constitutional law n. 3/2001, which found its first application in law n. 42/2009. Fundamental principles and objectives are also analyzed in the eight legislative decrees issued on basis of the delegation law n. 42/2009. Fiscal federalism as well as drawn by the Italian Constitutional law in order to become fully operational requires a number of steps to be issued over a period of 7 years : 2 years for the implementations and 5 years for transitional arrangements: timing for the implementation have undergone delays and accelerations due to the fluctuating fortunes of the national governments.
The analysis and the understanding of how the land government is being enforced both at the national and local law level needs to define legal and fiscal concepts such as equalization, budget sharing, shared responsibility, which highlight and outline how land government, through the structure of fiscal federalism, designs relations between the territorial and national public institutions. Furthermore, the nation-state provides tools for the sustainability of the public debt and for management control of entities responsible of public spending through fiscal federalism mechanism.

2.4 Compared analisys for a land government common model: social and economic sustainability of local government policies

The common model among German, Spanish and Italian form of fiscal federalism that emerges from the analysis carry us to understand how the federal-land government developments follow, unavoidably, evolution of fiscal taxation enforcements and land management. It is important to highlight how the elements common to all three countries, aimed at a full complexity of redistribution and equalization sustainability phase giving high role to national constitutional jurisprudence as high courts monitoring compliance with constitutions. Full analysis of the provisions regarding revenue, transfers and 'revenue sharing', control of accounting and public expenditures sustainability become fundamental to outline how land management is close to citizen in according to subsidiarity principle. In the analysis of the peculiarities of the different systems emerges throughout the centrality of the German element of taxation and its fiscal executive decentralization time against the particular dynamics of the strongly 'autonomic' spanish system.
An efficient territory government enforced through fiscal federalism laws needs to avoid any economical distortions and requires predetermination of sharp financial responsibilities held by all government levels with revenue or expenditure capacity, constitutionally guaranteed autonomy in the supply of resources, abstract ability in getting a balanced budget, compliance with the principles of equalization and solidarity.
In outlining salient aspects of fiscal federalism in Germany, Spain and Italy, it become obvious how much the implemented reform processes have been marked by severe difficulties and resistances both in legislative phase that during its application. Their complexity is further exacerbated by an extensive multi-disciplinary approach that distinguishes fiscal federalism enforcement to all other public law branches.
Germany, Spain and Italy are three examples which, although similar in a geopolitical and institutional point of view, have taken different paths to the approval of their fiscal federalism land government model.
Germany today is recognized among the states of the Union, as one of the major economic and institutional actors. Despite the delicate economic and financial environment, this country shows to be able to control its debt, earning a spread on the financial markets much lower than the European average. After World War II till today, german land government has been reformed several times: embryonic provisions of fiscal federalism came right from the Weimer Republic in 1919. Nowadays the German fiscal federalism is a mature, centered in the fiscal determination of taxation but strongly autonomist in equalizing redistributions : it guarantees full respect of local solidarity institutions and the pursuit of uniform living conditions throughout the whole national country.
Spain stand out, in world institutional landscape, as a young advocate of a asymmetric and reinforced regionalism: the spanish Autonomous Communities, as a strong asymmetric constitutionally guaranteed autonomy, identify in "*diferencial hechos constitucionalmente relevantes*" (differential constitutionally relevant facts) the heart and the protection of national identity and integrity. This form of asymmetrical land management among various levels of government counterparts is now gradually conforming by identifying many jurisprudential constitutional principles, even if not expressly stated in the constitutional text. The financial autonomy focuses mainly on two fundamental statements: the resources equalization in a cooperative and jointly responsible perspective and Autonomous Communities self-determination.
Italy has recently approved a major institutional reform after Constitution became law in 1948: the whole reformation process was started in 2001 by the Constitutional Law n. 3 and had to wait until 2009 for the approval of fiscal federalism main law. After almost three years after the delegating law, were issued by the Government all eight planned legislative decrees that completed the framework of Italian fiscal federalism. It is clear that the legislator has turned his attention to the Spanish model in preparation of law texts adding original and innovative solutions. The Italian constitutional system does not allow an institutional hierarchy among the various levels of government: this entails greater difficulties in adjusting the institutional relationships between a plurality of autonomous entities with respect to the laws that rule power and responsibilities between the Federal State and the nation state. As for Spain, the financial autonomy, limited and promoted by cooperative and solidarity principles, finds its foundation in institution resources equalization and regions and local authorities self-determination with respect to the State.

3. Subsidiarity and sustainability as a widespread cross-cutting approach to different anthropocentric events and aggregations

The analysis of those three jurisdictions come across that financial autonomy, for all three national government allocated to the respective sub-state government levels, has been a common proposed solution against a major cause of political-administrative indebtedness: the non-coincidence between taxation determination conditions aimed to cover costs with own revenues and unlimited spending capacity of third-party resources. This dichotomy has led to widespread forms of managerial irresponsibility, often shared with virtuous levels of government, that resulted in serious financial difficulties and defaults. To fight this accountability deficit were been voted provisions that impose to

level of government, as a fiscal autonomy holder that implements policies of exemption or concession arrangements and facilitations unsustainable, to suffer the full consequences of their financial management.
The analyzed systems are aimed at looking for a natural balance between the guarantees offered to territorial autonomy and guarantees for the protection of national integrity and uniformity both social and political conditions of life in the whole territory of national State. These values, which test the legal and logic stability of a complex regulatory system as land government, must comply with a further hierarchy that is struggling to form in a centripetal and supranational direction: the European Union. The stabilizing function, which in a federal arrangement typically is assigned to the central government, is to be progressively and inexorably absorbed by the Community institutions.
It's important to underline that excessively equalization policies could lead to distortions that would empty and overturn constitutional principles as solidarity and cooperative. Even excessive state aids can determine outgoing cash flows and incoming poverty, further aggravating the discomfort of areas already suffering from reduced financial capacity.
Fairness and solidarity management, strictly imposed by the fiscal federalism land management, inalienably determines continuous and relentless pursuit of efficient and responsible policies in the management of all public affairs. Those criteria cannot be only points of political programs proposed during the election campaign but must impose the exact fulfillment of provisions on keeping and preparation of public accounts.
Federalism and land government, as analyzed in Germany, Spain and Italy, open to a general sharing of fiscal policy, even if there hasn't been directly attributed fiscal territorial power in taxing to local government. Fight against tax evasion is one of the main tasks to be pursued in the field of sincere cooperation between national, local authority and central government. Tax evasion, such as derivative finance or excess of equalization, is a danger to correct assessment of distributed resources and services provided territorially. National government and fiscal police need to represent on databases and digital maps all fiscal value related to their own territory to fight locally tax evasion. To do this government must join all resources from fiscal operators, citizens information databases, research center and all available technology.
Today is related high importance to all processes reforming national land managements: fiscal federalism, having a look to Italian or other European country experience, could be identified as different allocation in a subsidiary way of power; but, at the same time, excluding internal federation processes of European member states, the unitary dimension of land government is given by Europe Union institutions.
Surely the target of the modern European institutional reform proceeds towards unity under European Union, suggesting that it could be considered improper to attribute the term of "federalism" in those internal reformist processes in national states under EU. No doubt that fiscal federalism can be summarized as a subsidiary reorganization of national powers: it is certain that this seemingly simple institutional reorganization is an opportunity to put an end to decades of reckless and irresponsible management of local and national public resources.
At the moment one of the greatest resistance that meets the EU as a federative process is precisely the lack of waiver by the member states of national tax powers: a fiscal federalism land management imposed to all EU member states, as a similar patterns in common but differentiated geographically, could be the common key to continue on the path of political institutions growth. That path of political and institutional EU reform, currently at a so uncertain stage, needs to be sharply improved: maybe one of the possible land government model would be offered by Germany, Spain, Italy or by a further common and shared model as an 'institutional interpolation' between these three ones.
In this context, the Spanish model, in particular, stands out among those in cooperative federalism and solidarity, since it concerns a national legal system in which local identities and local historical origins have very old but whose strong contrasts are still alive actuality.
Why not imagine a greater Europe Union, politically united, composed of 28 or more States or autonomous communities, through a european cooperative and supportive fiscal federalism confers extensive autonomy to local levels of government?

Bibliographical References

[1] CARBONI G. G., *Il federalismo fiscale dinamico in Spagna*, in Federalismi.it, 2010

[2] ESPOSITO G. M., La nuova organizzazione amministrativa dell'intervento pubblico. Procedura della programmazione economica, Torino 2001.

[3] ESPOSITO G. M., *Politiche pubbliche e sviluppo economico di regioni ed enti locali nel quadro del'Unione Europea*, in Edizioni scientifiche italiane, Napoli 2002.

[4] ESPOSITO G. M., *La programmazione e la realizzazione delle grandi opere pubbliche*, in PICCOZZA E. (a cura di), *La finanza a progetto (project financing) con particolare riferimento ai profili pubblicistici*, Torino 2005.

[5] ESPOSITO G. M., *Tutela dell'ambiente e attività dei pubblici poteri*, Torino 2008.

[6] FERRARI G. F. (a cura di), *Federalismo, sistema fiscale, autonomie: modelli giuridici comparati*, Roma 2010.

[7] GAMBARDELLA C., *I layer della forma urbis*, Napoli 2000.

[8] GAMBARDELLA C., *La leggerezza della geometria*, Napoli 2000.

[9] GAMBARDELLA C., *Le Vie dei Mulini. Territorio e impresa*, Napoli 2003.

[10] GAMBARDELLA C., *Atlante di Pompei*, Napoli 2012.

[11] GAMBARDELLA C., *Hyperspectral and thermal airborne surveying for the characterization and the monitoring of natural and anthropized environment*, (con Pasquale Argenziano, Alessandra Avella, Stefano Bastoni, Giuseppe Casbarra, Flaviano Tessitore), *Proceedings of* Le Vie dei Mercanti. Heritage, Architecture, LanDesign. Focus on Conservation, Regeneration, Innovation – Atti dell' XI Forum Internazionale di Studi, Aversa-Capri. Napoli 2013, ISBN: 978-88-6542-290-8.

[12] MORBIDELLI G., PEGORARO L., REPOSO A., VOLPI M., *Diritto pubblico comparato*, Torino 2009.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Waterways
From the past, a resource for the future

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Abstract
The objective of this article is to contribute to the enhancement of natural and environmental heritage present in the territory of Formia in view of the disclosure and sharing of cultural-historical and architectural aspects typical of some local areas sometimes poorly understood - especially by younger generations - but still intended to arouse interest and useful stimulations to understand the present as it unfolds. In this section we propose a digression on the history and evolution of the city of Formia - garden city and area of great scenic and environmental interest because of its topography and hydrographic features. The Roman Cistern of Formia, located below the present Piazza S. Anna, is a wonderful example of hydraulic engineering. This irregularly-shaped underground structure is characterized by impressive architecture: 65 meters long, 25 wide, with more than 60 large pillars measuring six and a half feet high. This chapter provides a description of the history, discovery and recovery work through the consultation of documents from local and national archives and the classification of the main methods of analysis suggested by scholars who, over time, made the Cisternone their object of study. The last part of the paper illustrates a possible scenario for the realization of an integrated tourist route in which the Roman Cistern of Formia has its rightful place and promotion.

Keywords: Water, Roman Cistern, Formia, Heritage

"Prima di entrare nel deserto
i soldati bevvero a lungo l'acqua della cisterna.
Ierocle gettò per terra
l'acqua della sua brocca e disse:
Se dobbiamo entrare nel deserto,
io sono già nel deserto."
(Jorge Luis Borges)

1. Introduction
The objective of this article is to contribute to the enhancement of natural and environmental heritage present in the territory of Formia in view of the divulgation and sharing aspects - historical, cultural and architectural characteristics of some local areas sometimes poorly understood - especially by younger generations young - but still intended to arouse interest and useful stimulations to understand the present as it unfolds.

2. Formia and its History
"Il mio Paese è curva di terra ove l'arancia profuma di mare." (F. Miele[1])
Formia, a city garden and land of great scenic and environmental interest characterized by the imposing limestone Aurunci mountains, which, extending as far as the promontory of Gaeta, frames and protects the splendid gulf.

According to a false etymology (Strabone, Festo, Servio), the city was founded by the Laconi, who called it *Hormiai*, moorings (cfr. Palermo: *pan-hormon*, “tutto approdo”), and *kajadas* the cavity formed by the promontory, Latinized in *Formiae* and *Caieta*.
Even the events of the pre-Roman period are uncertain. Some sources refer to the settlements of ethnic groups such as Ausoni and Aurunci, which overlapped in the beginning of the fifth century B.C. with the presence of the Volsci, though still not supported by archaeological evidence.
The oldest evidence of colonization of the territory can be traced back to a series of terraces of polygonal walls placed along sheep tracks converging towards the urban center, a sign of an original settlement of rural and pastoral civilization.
The presence of a truncated ogive coverage places them in the period of the Punic - Etruscan influence, in the late seventh century B.C. The center of the urban settlement is located in the area between Castellone, separated by a proto-urban core near the natural inlet of Sarinola and including the Cascio hill, primitive part of the city.
The dock becomes the key element of the subsequent development of the Roman town of Formia. In this new historical-social context the nodes of trade are increased with the passage through the city of the Via Appia in 312 B.C. and trade plays an important role with the production of olive oil and renowned "Formiano" wine.
In 188 B.C. Formia received full citizenship (*civitas optimo iure*) and was registered to the Aemilia tribe, entering thus into the Roman-Italic communities.
During the reign of Hadrian, Formia is transformed with the idea to reproduce and replicate the image of the ‘City’.
The opportunities offered by nature , the richness of the soil, the mild weather and the landscape of rare beauty made it a popular destination of prominent personalities of the City and the entire coast was built with villas plants, fish farms (piscinae), among which that of Mamurra on the promontory of Gianola, a forerunner of the open terraces and porches, and one at the port Caposele with excellent prototypes of vaulted structures on columns Formia making a sought after and prestigious center of *otium*.
Imposing mausoleums and stately villas, such as those by Lucio Munatius Plancus, Lucius Sempronius Atratino and Cicero, in whose estate was reached by the executioners of Mark Antony on December 7, 43 B.C., after a useless attempted escape by sea. In addition, it is likely that Formia was home of the architect Vitruvius, author of the famous treaty of ten books "De Architectura" dedicated to Augustus.
The decay of Formia dates back to the year 867 as a result of the transfer of the bishop’s venue in the *Castrum Cajetanum* and the translation of the relics of St. Erasmus - subtracted to the attack of the Saracens and the continuous raids - when the fate of the city, "no longer able to ensure the safety of the prelate and the performance of its functions" (Miele-Frecentese) changed permanently.
After his near-total destruction, which occurred in the second half of the ninth century, the inhabitants of Formiae took refuge partly in Castellone - close to the cathedral which became a powerful Benedictine abbey - and partly in survived homes which stood between the Via Appia and the sea giving life to the district of Mola di Gaeta, so named because of the presence of numerous water mills.
In the district of Castellone , the natural gradient of the land was regularized through works in large blocks , which gave origin to a variety of platforms on which the buildings were erected, mostly sacred ones according to the planning of special effects, which , given the high flow, did not come to fruition before the first century B.C.
In its place, at the end of the thirteenth century, on the occasion of the fortification built in Gaeta by Charles II of Anjou, a castle with a high, cylindrical tower was erected, and strategically diverted along the coast a stretch of the Appian Way.
After the Norman Conquest (1140), part of the territory of Gaeta, the village of Castellone and Maranola was assigned to the county of Fondi, was passed to the powerful Onorato I Caetani, who proceeded to reorganize the defenses and the construction of new strongholds (Castellonorato); then with the Aragonese conquest of the Castle of Mola lordship became a branch of the family who assumed its title (1460).
During the Spanish viceroyalty, the renewal of consular in 1568, and the increased security with the end of the maritime supremacy of the Turks in 1571, gave new impetus to trade and erudition of travel. Mola became a Grand Tour post and destination renowned for its amenities and comfortable accommodations. In addition, with the further strengthening of the fortress of Gaeta, the nobles and bourgeois, disadvantaged within its walls, built many stately homes and villages between the two of them along the Via Appia, with a gradual recovery of the urban fabric. This revival made the administrative autonomy an aspiration, first reached with the invasion of Napoleon and then ratified by the Bourbon resettlement with the City of Castellone and Mola di Gaeta.
During the events of the unification of Italy in 1860-61, the municipality was siege-based to the fortress of Gaeta, whose capitulation marked the end of the kingdom of Naples, and was awarded the ancient

name of Formia in 1862, which was followed in 1865 by the crest of the mythical Phoenix rising from its ashes, with the motto “Post fata resurgo”, and in 1866 reached the title of "city”.
Between the late nineteenth century and the subsequent thirty years, there was a significant boost, especially related to the mills and pasta factories, the brick kilns, agricultural production, favored by first rail link Sparanise-Formia-Gaeta (1892) and then by the Rome-Formia-Naples (1922, 1927), as well as the simultaneous construction of the port, which made it a center of commerce servicing a vast area. In 1927, Formia passes from the province of Caserta to that of Rome, and in 1928 it is increased by a mountainous territory and population with the aggregation of the areas of Maranola and Castellonorato. At this stage it becomes a location of "resort and care" with a regulatory plan and taking on the role of a center of higher education. Then in 1934, it is inserted in the province of Littorina, today’s Latina. In the last conflict, thanks to its position in the Gustav Line it inflicted terrible destruction and mourning, and for this reason was decorated with a silver medal in 1961. The reconstruction plan has improved its road network through the expansion of the railway and the port.

3. The Roman Cistern

The Roman Cistern of Formia, situated below St. Anna's Square, is a wonderful example of hydraulic engineering. The supply of water has always been a major concern and a decisive factor in the emergence and development of human settlements. As amply documented by the ruins of Pompeii, as early as the sixth century B.C. dwellings and public buildings were equipped with tanks designed for storage of rainwater, with a typical Mediterranean regions, which were joined later for direct funding from the permanent springs.The "Castellone Cistern", dated to the first century B.C. is a massive underground structure 65 meters long, 25 wide with an irregular plan divided longitudinally with rows of pillars (about 60) twenty feet and a half tall that set the environment in 4 aisles covered with pseudo-cruise vaults with a total area of 1,200 square meters and a capacity of at least 7,000 cubic meters.



Fig. 1: Entrance to the Roman Cistern in Formia.

The water followed a long and complex sloping path fully integrated and responsive to the morphology of the site. The pipeline at 217 meters above sea level with a first section at 1450 meters underground, wound behind the town walls in the vicinity of the square of S. Erasmo, at an altitude of

54 meters above sea level, then, probably on a stretch of arches, reached the Castle Square, where it entered the tank through *fistulae* located in the ceiling.

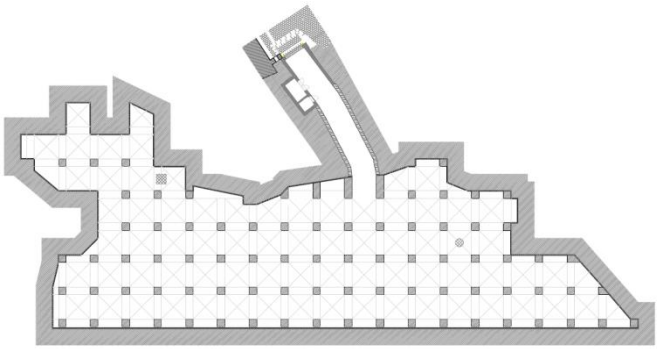

Fig. 2: Architectural plan.

In this way, public buildings (baths, fountains, nymphs) and private buildings (residences, craft shops, commercial facilities) of the city's plain receiving water reserves steadily thanks to a simple but effective system that was in use for many centuries until the finding of a new system in the mid-nineteenth century when the Bourbons inserted it into an aqueduct which came from the Valley of Santa Maria la Noce feeding a fountain beneath the Tower of Castellone and Villa Real Caposele.



Fig. 3: Overflow regulation.



Fig. 4: Cross vault.



Fig. 5: Fistulae with water regulator.

From a structural point of view the Cistern is one of the hydraulic underground Roman wonders which adds to the few examples which have come to us from ancient times, as the “Piscina Mirabilis” of Miseno, dating from the Augustan age and the famous “Yerebatan Sarayi” of Istanbul, built under Constantine, in which the jewel of Formia has many typological affinities.



Fig. 6: Piscina Mirabilis of Miseno



Fig. 7: Yerebatan Sarayi of Istanbul

The walls are in *opus incertum*, bound together by mortar and cocciopesto that assured that the water seal, along with the vaults preserved in perfect condition.
In addition to historical-architectural detail, it is interesting to analyze the phases of discovery and recovery work through the consultation of documents from local and national archives and the classification of the main methods of analysis suggested by scholars who, over time, made the Cistern their object of study.

3.1 From Discovery to Retrieval

The underground building, after centuries of oblivion, was brought to light around 1994 thanks to the interest of a group of researchers[2] who conducted the preliminary investigation by some directions and testimonials - passed down in oral form - by the locals and some related work carried out in 1930 for the restoration of a sewer, although some attempts had already been made previously as evidenced by the words of Pasquale Mattej[3].
.... "Mr. G. Paone with some masons descended in the basement vault of Castellone and finding a large stagnated water sewage where they could not proceed, made a small boat which crossed the vast vaulted corridors. For the first time it was discovered that the houses had been built on the overlying straight by massive pillars that rose from beneath the stagnant waters. Two of these pilasters were huddled onto two huge bronze lions that rested on two travertine bases surrounded by the waters ..."
These were followed by those of Felice Tonetti[4].
… "The next morning an opening allowed me to descent as well. I descended, in fact, and was faced with a show of enormous magnitude. A long series of triple pillars of stone and earthenware piston, still like new, stretched as far as the eye could see, and held four times a barrel of at 2.90 meters wide and the pillars measure 0.90 meters sideways. The huge underground is partly filled with crushed stone that the older masons recall being laid down more than thirty years ago, after having been removed from the cable run for the large sewer of Castellone. Where the soil does not reach, the underground is full of clear water. It has not been able to fully explored ..."
On January 6, 1994, climbing down a manhole, the Friendship Group of St. Anna " Castellone" , accompanied by the inhabitants of the place, found themselves in a huge underground basilica, which for years had been used as a dump and was almost completely filled with mud and water.
Only in 2003 the difficult task of emptying it was accomplished, returning a piece of the past to the city.



Fig. 8: The Cisternone before the emptying of mud, water and debris.

… “Above the central plateau of the ancient Arce of Formia, St. Anna’s Square in the center of Castellone, you can hear the voices and the noises ringing. But underneath, I went a bit of steps and entered the heart of the earth, reign supreme silence and wonder. The cistern seems to re-emerge like magic from a legendary past ...”
Paolo Brogi (Corriere della Sera newspaper, 29 July 2003)
A further step aimed to the recovery occurred in December 2010 through a regional funding which has enabled the creation of an innovative lighting system aimed at highlighting the features of the architectural structure, enhancing its historical aspects and its function within the city. The 1,200-square-foot cistern was covered by a system of lights that consume only 170 watts.
The entire system emphasizes with a light and dark relationship that has its origins in the mists of time between water and man. Warm, red lights indicate the walkway of the ancient man who went to draw from the well and the contemporary man who now admires the work of the ancient past as well as the practical function of the cistern, white lights enhance the purity and transparency of the water. A striking encounter between "flesh" and nature that gives the idea of the ancient Roman world divided between its origin in the rural community of shepherds and intelligence to be able to take advantage of an ingenious nature like few others.



Fig. 9: Scenic effect with the new, innovative lighting system.

4. Reflections and Conclusions

The last part of the paper illustrates a possible scenario for the realization of a tourist route where the integration of the Roman Cistern of Formia will have its rightful place and promotion.

4.1 From Conservation to Management

For a long time in Italy the main objective related to cultural heritage has been that of its preservation. This dominating attitude clearly exercised a “passive viewing” of cultural heritage, not seen as a potential engine of economic development, but purely as a heritage to be maintained, considering that this was the best way to ensure its survival over time. But the sharp increase in the demand for knowledge and enjoyment of cultural heritage, quantitatively relating to a “tourism resource” has gradually led to a change in their social role.
In this context, driven by new and more modern beliefs, the challenge is to be able to return the Roman Cistern to a new life giving it an adequate place in the present and making it a living part of an integrated tourist route, accessible and visible to the historical - cultural city of Formia. From the two Cryptoporticus of the Villa Comunale to the Antiquarium opened in 1997, and the nymphs on the beach of Caposele ‘domus’ Cicero located below Villa Rubino, a ' tower ' whose tradition identifies it as the tomb of Cicero ' - and the Villa Mamurra in the site of Gianola.

A new territorial concept, a renewed culture of the coastal city meant not only as a vacationers' destination in the summer months, but a place full of suggestions, destination of dreams suspended between history and nature.

Bibliography

CICCONE, Salvatore. *Le Mole di Formia: Permanenza e rinascita di una città.* "Lunario romano 1995", Roma 1995, p. 175-195. ISBN 88-8183-165-1.

MIELE, A. G., FRECENTESE, R. *Formia. Itinerario tra origini e alto Medioevo*. Roma 1995.

MANDIA, Anna. *"Il patrimonio rurale in Terra di Lavoro. Ieri. Oggi. Domani?".* Le Vie dei Mercanti. S.A.V.E. Heritage. Safeguard of Architectural, Visual, Environmental Heritage, Nono Forum Internazionale di Studi, Aversa-Capri 9-10-11 giugno 2011, Napoli, La scuola di Pitagora, Napoli, 2011, Collana 'Fabbrica della Conoscenza' (direttore C. Gambardella), ISBN 978-88-6542-046-1F.

TONETTI, F. *Formia romana*. In Atti del II congresso nazionale di Studi romani, Roma 1930, I, Roma 1931, p. 128-145.

CASSIERI, Nicoletta. *Formia, Museo Archeologico Nazionale e Monumenti.* IPZS, Libreria dello Stato, 2013. ISBN 978-88-240-1428-1.

Note

[1] Franco Miele (1924 – 1983) painter, poet and art critic
[2] Friendship Group "S. Anna" Castellone (Tonino Palmaccio, Arch. Antonio Padula, Erasmo Palmaccio, and Engineer Giovannone Orlando)
[3] Writer, journalist, painter and writer, Pasquale Mattej of the Barons of Formia (1813-1879) was undoubtedly the greatest exponent of the local nineteenth-century culture, as well as a distinguished scholar and researcher in the history and art of his homeland: his artistic legacy and literature is immense.
[4] Podesta' Formia

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Risk Management Planning. Phlegrean area and the case study of Bacoli[1]

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Abstract
The coastal region from Bacoli to Sorrento Coast contains, besides an alternation of fine landscapes and large areas of unplanned urban sprawl, different natural risk elements, object of planning tools that affect substantially urban policies and urban plans
In fact, if a Civil Protection and Emergency Plan is a project of all activities and procedures that need to be adopted to deal with an expected disaster in a region, it is evident that the coordination with urban planning is fundamental, especially in sensitive areas such as the coastal ones.
In the article, using the case study of the Italian city of Bacoli (near Naples), I'll explore the possibilities offered, in the emergency planning, by the sea as a specific escape route in case of natural disaster. The reflection starts from an examination of the particular orography and geography of the Phlegraean coast, the area topography, the level of interconnections and infrastructures. The strategies developed during the preparation of the emergency and civil protection plan, from which this article starts, identify in the waterfront, especially adapted, infrastructured and safe, a fundamental option in the management of major emergencies of the Phlegraean area.

Keywords: safety & security, large scale plans & projects, social practices

1. Introduction. The risk as a variable
The contextual nature of risk perception and response is very typical of contemporary society and of a "second kind of modernity" (Beck, 2000), in which the risk factors "described by science" are relativized by the cultural background of the society in which they occur, exposing to oblivion some obvious risks or, conversely, believing that anything is potentially dangerous, according to the perspective from which the events are observed (Lupton, 2003).
Throughout the metropolitan area of Naples there is an overlap of risk factors that periodically generate more or less serious events: landslides, soil pollution, earthquakes, bradyseism and volcanic hazards, which are quite infrequent but extremely dangerous.
The latter is a real evolving risk (among the biggest all over Europe), connected to the volcanic activity (Vesuvius and the Phlegrean caldera), that weighs significantly on spatial planning, on its possibilities and on direction of its development paths.
The relativization of this risk and the characteristic cultural approach held by population (Douglas, 1996), have almost reduced its perception and only in the last decade, institutions have undertaken preventive works, planning actions and regulatory constraints .
Regione Campania (the authority appointed to territory administration and coordination of risk prevention) has been promoting longstanding actions and instruments of coordination-prevention on

[1] The present paper is research result of a joint reflection of the two authors. However, paragraphs 1, 2 and 3 can be attributed to Giuseppe Guida, paragraph 4 to Giovanni Bello.

many different levels of cogency and institutional spheres which converge in order to form a strategic reference frame in dealing with natural disasters.
The final outcome will be a network of plans and programs connected to emergence, whose core is the writing of Emergency and Civil Protection Municipal Plans meant as planning instruments of all the organized activities and all the procedures adopted in case of expected disasters in a given area, in order to ensure the effective and immediate use of needed resources required to overcome the emergency.
Therefore those plans may define both the risk scenarios for a proper management of crisis situations, and the explanation of planned urban actions that can be integrated to and complementary with other types of plans and policies for the area (especially the municipal urban planning).
In this scenario land resources are the central point of reference for emergency control, in terms of safe places, waiting areas, infrastructures and equipment, both existing or proposed.
In this regard the Civil Protection Plan can have a strong connection with urban and territorial planning, partially overcoming the intrinsic sectoriality of the approach.
This paper will use the case study of Bacoli, near Naples, to describe the path of Emergency and Civil Protection Plan associated with the various forms of risk caused by the Campi Flegrei caldera as well as its acting as a strategic and complementary instrument in urban planning.

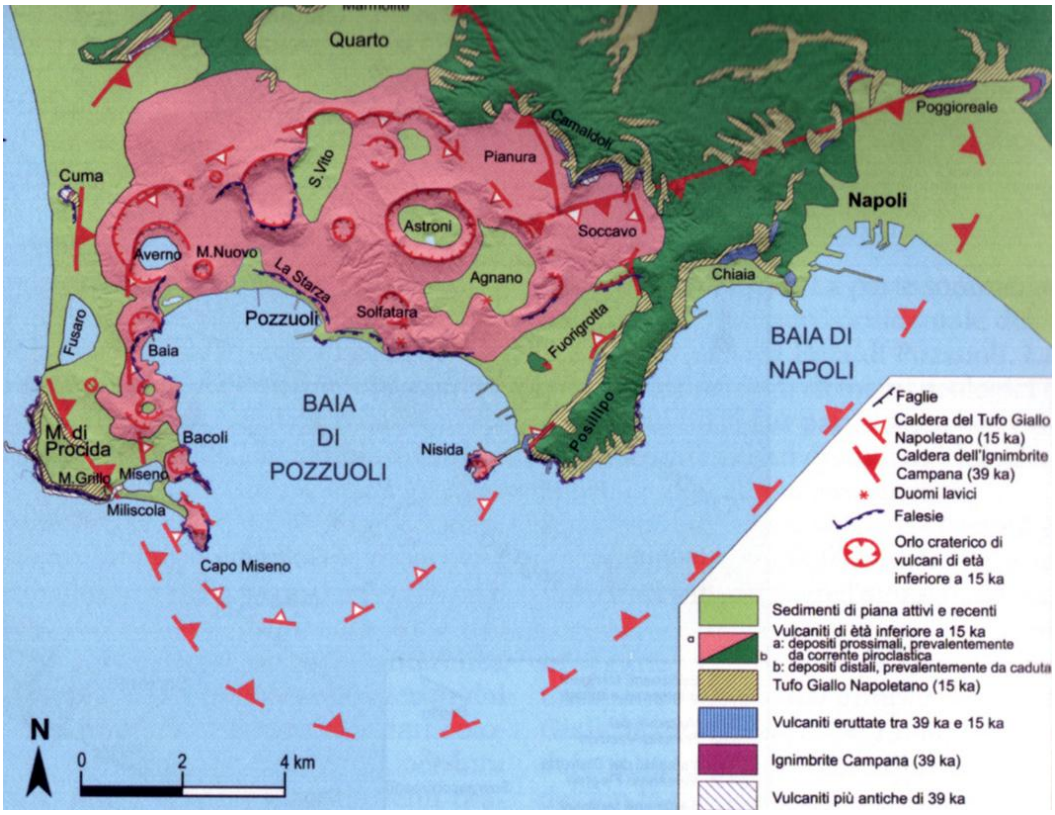

Fig. 1: Schematic geological map of the Campi Flegrei caldera (Source: Orsi *et al*., 1996).

2. Morphology of the risk in the Phlegean Area

The whole Gulf of Naples is characterized by the presence of four volcanoes: The Somma-Vesuvius system, Campi Flegrei and Ischia resurgent calderas, Procida volcanic field (Orsi & Zollo, 2013). For what concerns Campi Flegrei system (whose last eruption took place in 1538), the activity is proved by intense and millennial fumaroles, by hydrothermal waters and frequent bradyseismic events, which cause ground deformations together with seismicity and variations of chemical-physical characteristics of the fluids emitted from fumaroles (*ibid*.).
The most recent bradyseismic activities occurred in 1970-72 and in 1982-85; the 1970 one took by surprise the unprepared scientific world and the emergency apparatus. Indeed up to that moment the area was not monitored, and the only precedent related to ground motion phenomena was in 1538, as already mentioned.

In 2012 the alert level of that area grew from "basic" to "attention" on a scale of four levels defined by the 2001 Area Flegrea Emergency Plan.[2]
This new standard was adopted by the Civil Protection Department after a consultation with the Major Risks Committee, as a result of the new parameters detected by the Vesuvius Observatory, even if there aren't many elements which may help to predict a short-run evolution (Martini, 2013) .
Despite this risk scenario, the urbanization of the whole Phlegrean area and specifically of the town of Bacoli grew up along the second half of the 900, in a fragmented, uncoordinated and, of course, partly abusive way, considerably increasing the load settlement[3]. All this occurred in spite of several planning instruments operating on the municipal area: the 1976 General Plan, the 1999 Campi Flegrei Landscape Plan, the establishment of Campi Flegrei Park, four S.C.I.'s (Sites of Community Interest) and Regional Basin of Campania Centrale predictions.
At the same time, the chaotic building of many areas of the city produced as a consequence the lack of infrastructural system, which is poorly interconnected and not adequate to cope with natural disasters, even the smaller ones, as often reported and repeated by media.

3. Emergency Planning as a urban strategy. The case study of Bacoli

Emergency and Civil Protection Municipal Plan is a planning instrument able to assess and prevent the effects of common risk factors that can statistically affect a territory.
The goal of this Plan is to define scenarios for an incisive management of crisis situations. It is in this sense that goes the recent amendment of the Law 225/92 (already complemented by the Law 401/2001) that introduces specific requirements for municipalities through the Law 100/2012.
The Bacoli Emergency and Civil Protection Plan is currently only a "preliminary project"[4], and it establishes as pivotal matter of the planning the risk connected to bradyseism and to all other kinds of risks (geological, seismic, fire risks and so on), and primarily all their possible interaction.
With the aim of satisfying these needs we must at first define the risk scenarios basing our consideration on the vulnerability of the territory (areas, involved population, damageable structures etc.) in order to have overall and reliable information related to the expected event (above all in the specific case the volcanic and bradyseismic risk) and therefore be able to assess in advance the operational response required to overcome the emergency stage. All that will be considered in terms of resource allocations, infrastructures sizing and forecasts that are realistic and compatible with the spending power of the local authority or with projects funded by other institutions (especially those actions financed by Structural Funds and European Investments).

[2] The bradyseism, which is characterized by a slow lifting motion (negative bradyseism) or a decreasing motion (positive bradyseism) of the soil, happened on September 7, 2012 with a low energy earthquake swarm and some events perceived in the area located between the historical center of Pozzuoli and Arco Felice. The statement issued by the Vesuvius Observatory showed that the swarm was not an isolated phenomenon, but an event connected to a larger process that involves the whole Phlegrean Area. At the time of writing this article, the phenomenon seems to have settled down with a clear decreasing of significant events.
[3] In the four cities of the area (Bacoli, Monte di Procida, Pozzuoli and Quarto) the population has increased from about 70 thousand inhabitants in 1951 to almost 160 thousand in 2013. In the metropolitan area, the city of Naples has decreased from 1.004.577 inhabitants of 2001 to 959.574 of 2012, whereas during the same decade some of the Vesuvian countries (Somma Vesuviana, Ottaviano, San Giuseppe Vesuviano and Terzigno) and those located Northwest of Naples (Giugliano in Campania, Pozzuoli, Bacoli and Monte di Procida) recorded the highest average growth of all the current Province of Naples (Guida, 2014).
[4] The Bacoli Emergency and Civil Protection Plan is being drafted by Municipality Urban Area (SPM arch. Gennaro Ciunfrini), with scientific advice of the Department of Architecture of the University of Naples "Federico II", prof. arch. Michelangelo Russo (Scientific Responsible), arch. Giuseppe Guida (Scientific Adviser), arch. Giovanni Bello (Collaborator). The final plan will identify in details what has been established at level of strategies. Additionally, the project will adopt an analytical approach of ELC (Emergency Limit Condition) which concerns the test of behavior of the various components with the intent of urban emergency management (Bramerini *et al*, 2013).

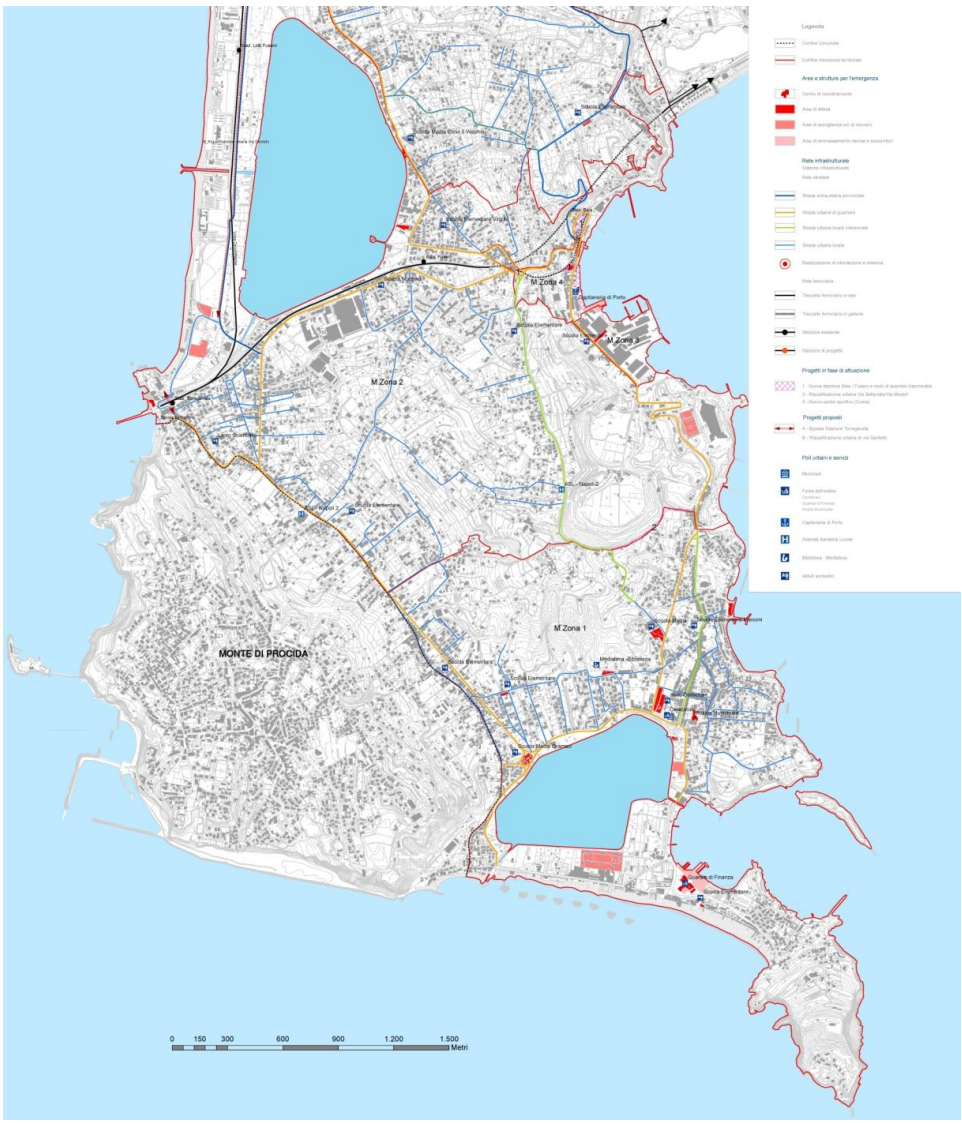

Fig. 2: Emergency and Civil Protection Preliminary Plan of the Town of Bacoli Areas and facilities for emergency (excerpt).

Provincial and regional plans are less detailed that municipal plan, which allows citizens and Civil Protection workers of different sections to have a frame of reference corresponding to the real size of expected event, involved population, alternative roads, possible evacuation routes, waiting areas, temporary lodging camp, gathering places and so on.
Proper planning strategies for mobility and evacuation routes are critical to the success of the plan. Strategies must include prevision of new projects of reorganization, adjustment or increase of the current network and standing areas. Notably, Bacoli Emergency Plan identified the sea resource as a specific evacuation route for expected catastrophic events.
In this sense, one of the basic elements contemplated here is population and its distribution on the territory. Through the interpolation of Istat data and their georeferencing, it has been possible to graphically and dynamically identify the different "weights" within the geographical subdivision.
Subsequently local territory has been divided into 5 “micro-areas”, representing section of territory characterized by uniformity of positional, urban, historical, cultural, environmental, socio-economic factors, as well as of delivery of service and infrastructure related to mobility. Table 1 describes the entity of the gathering places previously located in the plan for each micro-areas.
Further refinement of data and follow-up inspections of the effectiveness of the evacuation routes, especially the maritime ones, and of different types of risk dimension will lead to identify or modify what have been indicated and downsized.

Microzones	Gathering place	Surfaces	Population
Microzone 1	Miseno/Fondi di Baia	37.402mq	10.581
Microzone 2	Torregaveta	27.620mq	9.803
Microzone3/4	Porto di Baia	9.925 mq	882
Microzone 5	Fusaro	15.125mq	5.369
	TOTALE	90.072mq	26.645

Fig. 3: Entity of micro-areas (microzones) in terms of surface and population

4. Evacuation routes and planning strategy

The available data about Bacoli infrastructural level show a mobility system that doesn't seem to be insufficient, but barely interconnected, fragmented and consisting of a limited intermodality among different kinds of transports. For example, it's clearly showed how the mobility network, both road transports and iron transport, can't assure presently evacuation and safety measures not only for the most of Bacoli inhabitants, but also for the nearby town Monte di Procida, whose whole flow converges on Bacoli's territory, and then gather with Naples' Ringroad routes and Domitiana's routes, passing through the Town of Pozzuoli.

Additionally, in case of significant natural calamity, the iron transport can't be seen as crucial in evacuation plan, due to railroad's risk of deformation.[5] Emergency and Civil Protection Plan, here partially explained, tested and prorated ponderal incidence on maritime transport's infrastructure network, that is a strategic system in the management of evacuation routes.

Geographic and morphological location of Bacoli's territoty has led Emergency Plan to provide as preferential evacuation route, especially for certain micro-areas (1, 2, 3, 4, where 4/5 of 27 thousands of Bacoli inhabitants live), the maritime way, trying to locate from time to time the best destination for each path.

On Bacoli territory there are three small harbor areas: Baia, Miseno and Torregaveta.

Presently, Baia harbor has a 4.5 meters of maximum draught and it is generally used by leisure boats for docking and laying over. The harbor, which can contain approximately 600 boats, with 25 meters of maximum length, is adequately equipped for assistance and nautical service. There are commercial docks, also used by local shipbuilding. Porto Miseno, further South, is essentially subdued to Finance Police's boats; here there aren't leisure boats, but it's possible to drop anchor and moor to buoys, which are usually granted to licensed private citizens, who during the summer, may create a congestion of people and vehicles, provoked by the excessive number of leisure boats. Additionally, it should be considered also the risk caused by the huge presence of mussels breeding at the harbor entryway.

Therefore, it's evident that even in this case, specific spaces assigned to emergency use must be provided in case of need. Lastly, on the West part of the Coast, the small Torregaveta harbor is located; it is endowed with a dock and well linked to the nearby Cumana Railroad.

The ponderal rate of evacuation routes given by these landing places (especially the one in Torregaveta), will be able to absorb in perspective also part of the charge of the neighboring town of Monte di Procida, which, as already said, weighs completely on Bacoli territory in matter of mobility.

Thanks to initial tests, done on location of waiting areas, reception and gathering places, it is possible to quantify, in regard to the involved micro-areas, that almost ¼ of Bacoli population may be engaged in a generalized emergency exodus through the sea (about 5000 people, together with a variable index given by Monte di Procida citizens).

[5] Railway transportations are provided by Cumana railroad, which connects the centre of Naples with Campi Flegrei area.

The Emergency Plan identifies for the whole evacuation routes system some necessary adaptations. This orientation is going along and simultaneously with the redaction of the new PUC (City Urban Plan), so that to obtain planning previsions which at the same time can be univocal, more feasible and effective.[6]
Figure 4 shows in form of concept the first strategies derived from the preliminary plan. These strategies summarize data at the present stage, and use them to draw possible configurations, related particularly to the connection network and tools, be they already available or in progress.

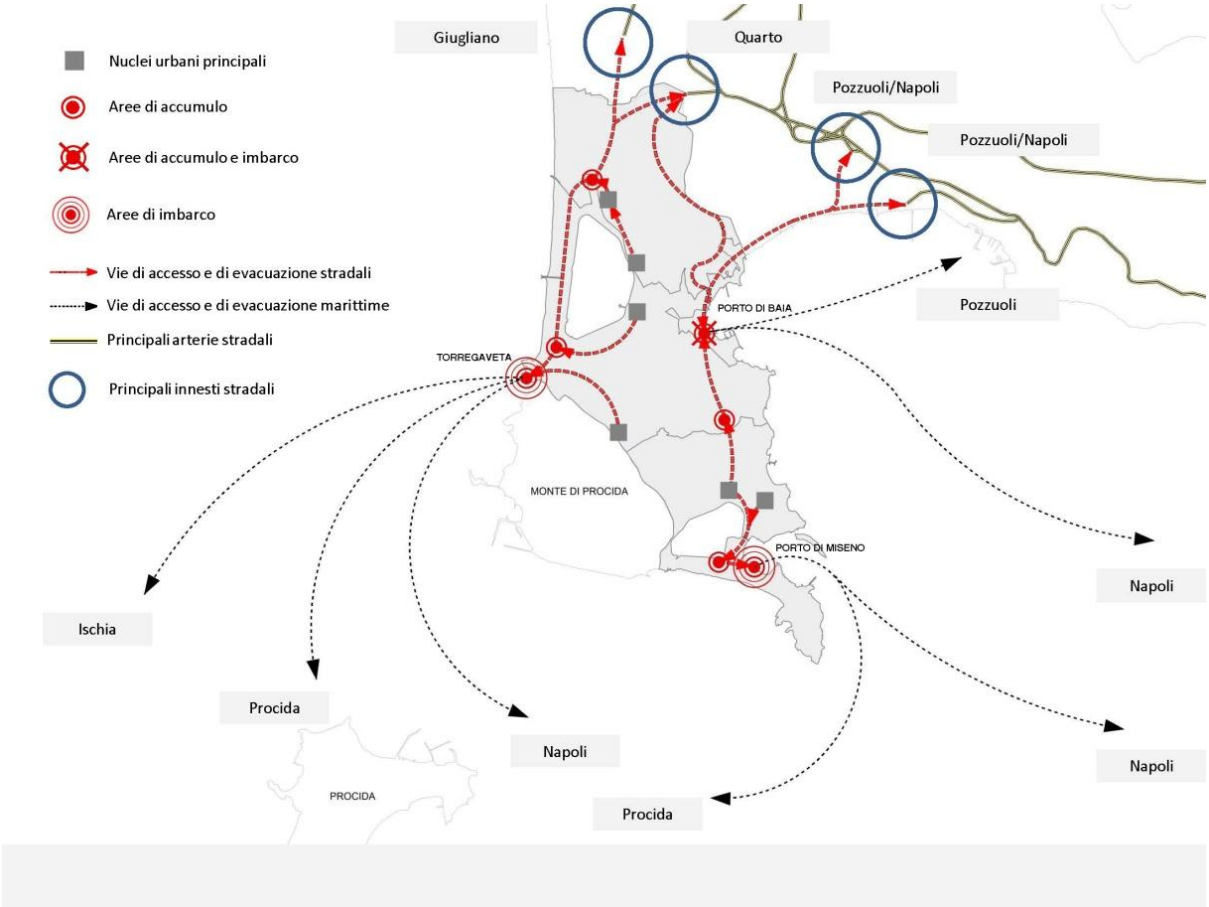

Fig. 4: Emergency and Civil Protection Preliminary Plan of the Town of Bacoli - Outline of strategies for evacuation routes.

5. Conclusion

Emergency planning, *ex ante* and *ex post* event, can also give the opportunity to think over the planning models and urban strategy in certain territories which are subject to natural hazard and to a misuse of territory and resources that have considerably increased the so-called “exposed value”.
Additionally, this risk is at the mercy of social and cultural variables which may modify its perception beyond scientific evidence, negatively affecting in particular the phase of prevention and priority definition. Therefore, risk management is not an issue that should be addressed uniquely to the limited field of emergency plan, but on the contrary it should be connected with a wider territorial and urban planning in cognitive, planning and operative way.
In this sense, emergency plan must accurately take into account urban and geographic condition of territory and its ongoing planning and development. The example here exposed is hinged precisely along this project, and Bacoli is the first of Phlegrean towns to be endowed with an emergency plan in which different parts of urban system are evaluated according to a relational approach, able to better identify strategic elements (strategic buildings, emergency areas, accessible and connecting infrastructures, by integrating in the specific case, evacuation ways, etc), using the available civil protection resources in a more effective ways.

[6] In 2014 Municipality of Bacoli started, together with Emergency and Civil Protection Plan, the redaction of the New Urban Municipal Plan, committed to Studio Architetti Benevolo with Goldstein Architettura and arch. Guido Riano.

Bibliographical References

Beck, Ulrick. *La società del rischio. Verso una seconda modernità*, Carocci, Roma, 2000 (orig.: *Risikogesellschaft. Auf dem Weg in eine andere Moderne*, Suhrkamp, Frankfurt a.M.. 1986).

Bramerini, Fabrizio. Cavinato, Gian Paolo. Fabietti, Valter. (eds), "Strategie di mitigazione del rischio sismico e pianificazione", *Urbanistica Dossier*, n. 130, 2013

Douglas, Mary. *Rischio e colpa*, il Mulino, Bologna, 1996 (orig. 1992, *Risk and Blame. Essay in Cultural Theory*, Routledge, London).

Guida, Giuseppe. "Le regole indispensabili per la Città Metropolitana", *La Repubblica/Napoli*, 15 aprile 2014.

Lupton, Deborah. *Il rischio. Percezione, simboli, culture*, il Mulino, Bologna, 2003 (orig.:, *Risk*, Taylor & Francis Books Ltd.- Routledge, 1999).

Martini, Marcello. "L'attività recente dei Campi Flegrei", *Ambiente, Rischio, Comunicazione*, n. 5, Amra-Doppiavoce, Napoli, 2013.

Orsi, Giovanni, Zollo, Aldo. "Struttura e storia dei Campi Flegrei", *Ambiente, Rischio, Comunicazione*, n. 5, Amra-Doppiavoce, Napoli, 2013.

Orsi, Giovanni, De Vita, S., Di Vito Mauro. "The restless, resurgent Campi Flegrei nested caldera (Italy): constraints on its evolution and configuration", *Journal of Volcanology and Geothermal Research* 74 (3), 1996.

Regione Campania – Assessorato alla Protezione Civile. (*Linee Guida per la redazione dei Piani di Emergenza Comunale*, Napoli, 2013.

Referring Web Pages Web: http://www.protezionecivile.gov.it/jcms/it/campi_flegrei.wp

Referring Web Pages Web: http://it.wikipedia.org/wiki/Eruzione_del_Vesuvio_del_79

XII International Forum Le Vie dei Mercanti
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DESIGN AND REPRESENTATION OF LANDSCAPE OF "TERRA DI LAVORO"

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Abstract
The territory of Campania, which is within the larger boundaries of *Terra di Lavoro*, occupies the part of the region that once the Romans called Campania Felix, also known as *Ager Campanus*, that is "the prosperous Campania". Today it corresponds to province of Caserta, which is smaller than it has been for centuries in the historical context of the Kingdom of Naples. The province of *Terra di Lavoro* infact also included parts of the current provinces of Naples, Avellino, Latina, Frosinone, Benevento, the town of Venafro and adjacent areas until Capriati al Volturno, Molise.
The entire province, since ancient times, has always been characterized by the extraordinary proliferation of cultural, historical, artistic heritage but also by the wonderful landscape of *Campania Felix*. The landscape of ancient *Terra di Lavoro* manifested its beauty through nature, the splendour of this territory has attracted the attention of the famous poet Pier Paolo Pasolini who, in the poem "The Ashes of Gramsci," writes these pithy lines: "It is now near the *Terra di Lavoro*, some herds of buffaloes, a few bunch of houses between tomatoes plants, ivy and poor planks. Every once a rivulet, sleeping in the ground, appears between branches of the elm trees full of vines, dark as a drain. Inside, in the train that runs half empty, the frost».

Keywords: Represent, Terra di Lavoro, Drawing, Landscape

1. Drawing and representation
We revered and throw open our eyes when we see him but we never stopped to think what is the landscape. It derives from the French paysage which in turn derives from pays and indicates the appearance of a place, the totality of its forms and interactions between them.
On what the landscape, debate different schools of thought, but the official definitions are two: the European Landscape Convention "defines a certain part of the territory, as perceived by people, whose character is derived from the action of natural factors and/or humans and their interrelationships, and the cultural heritage of the landscape" defines a homogeneous part of territory whose characters derive from the naturefrom human history and interrelations between them ".
Represent a landscape means penetrating in its complex reality, analyzing all aspects, without stopping to its appearance, but account should be taken of a number of essential elements: it is therefore to put in place a complex procedure, which will lead to "deep" knowledge of the landscape, through a careful and reasoned analysis. The term "representation" is derived from the Latin re-ad-praesentare, which literally means re-submit, make (again) present. In all civilization man has always sought to represent reality drawing to express an emotion, a feeling, a message or simply to convey what his eye received.
Leonardo da Vinci described the eye as the main instrument of knowledge, and the design as the most suitable to register the objects observed, but also to create new images. The design was considered a method to know the world, to understand, to design new things and finally to transmit the knowledge acquired. Similarly, Le Corbusier called the drawing "a means to observe and discover",

but also to remember, and then to "invent and create". The design comes from the need to communicate the characters, the identity, the quality of a particular spatial situation, with its distribution, technological implications, construction and image; but also by the need to communicate spatial transformations within the evolutionary dynamics of each project. "Drawing" should be construed according to its oldest academic tradition, such as "design" metalanguage (shared between the Arts), how to know concerning the figurative dimension-and therefore "communicative" (representative) – architectural construction. Scrolling texts dedicated to the masters of architecture from Palladio to Aldo Rossi, from Leonardo to Le Corbusier, our interest is drawn from images of the works but, often, even more so from the drawings, the graphical representation of their ideas. The design should be understood as the ability to understand and convey the knowledge of urban transformations, evolution of the territory and of the environment variables and constants.
The urban and territorial representation is defined specifically to describe not only the landscape, but also the dynamics (expected or desired existing) concerning it.
The real knowledge of the architecture and the landscape is achievable only through a geometric analysis of the spaces designed to emphasize the close relationship between the configurative genesis of surfaces (and their intersections) and their translation in its pictures, as Aristotle already knew in the 5th century a.c. "the soul never thinks without not an image."
Only knowledge, understanding of the genesis and succession processes allows a correct representation and, with it, the design of spaces and also amenities of figurative high complexity. To re-establish the identity of a place like an architectural artefact becomes increasingly need a real work of knowledge representation, which can be done only through discretization and measurement of all those tangible and intangible values of the territory which are essential for traces of the past in the present action. Discretization and measure are the only actions that allow to pass from a knowledge of "natural" type a "cultural" type and their interaction gives rise to a result that has a value added otherwise unimaginable.
The landscape is the set of elements characterizing and distinguishing features of an area. In order to know a "landscape" we must know it represent. Here I should like to emphasise how can no longer suffice a geometrically defined, but it is increasingly necessary a kind of relief which prospect the *n* dimensions of product and territory, multi-dimensional relief, a relief that assumes a multi-criteria analysis, integrating the multiple skills, return the right value to the heritage of cultural and environmental heritage.
My research-study is based on the method of reconstruction of the territory moving from simple geometric relief to the relief of all its constituent components: this is, precisely, the purpose of the multi-criteria analysis. Multi-criteria analysis [Fig. 1] puts in motion a complex process, a process of accumulation of knowledge and of knowledge, based on the relationships between technology, society, politics and economics, and it is precisely the set of these relationships to give life to that quid that becomes physically measurable and quantifiable and that returns to renderer the role and dignity of the designer. Therefore the major task of this analysis is to measure and discretize reality: be it an object, an artifact, a piece of a whole city or more generally an entire environmental system. The environment, as we know, is a complex and articulated system, consisting of territories which are nothing but the environments defined by legal and administrative areas.
For this the action of the multicriteria analysis aims at deeper knowledge of the suspect through the complete expertise to contribute to the deep knowledge of the environment. A method to reconstruct the territory is a cultural attitude that enables the detector to understand both generators of signs that the object context to be analysed. Discretization of architecture, in its parts and its entirety, constitutes the essential methodological basis for each hypothesis.
The detector which operates using multicriteria analysis, through the operation of land measurement, interprets and discretizes the event, reconstructs the relationship between the parties, between place and space, between territories and between economics and architecture project, because knowledge of the signs of already allows us to design the future border.
Multidimensional knowledge as a fundamental tool of balanced and sustainable development of the territory, which can be implemented only through a serious and clear operating relationship between man and environment, based on the desire to recover the historical memory and conscious recovery of each sign and artifact that characterize and founded the identity of a place and retrieve its essence.
The eco geometry can therefore be understood as the discipline that allows you to manage the representation of complex system of the territory and by relating individual know-how, redraws a new identity as integral of knowledge.

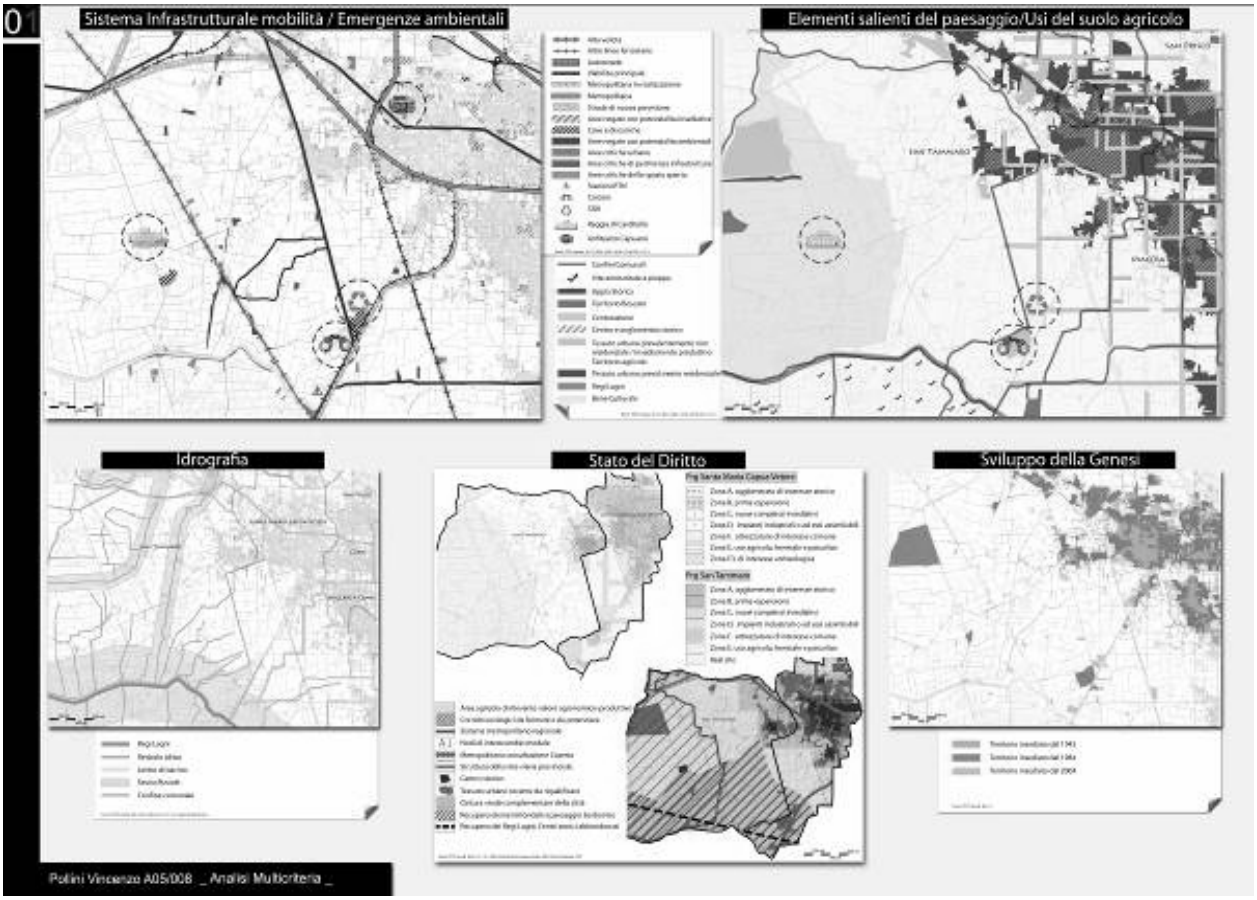

Fig. 1 Analysis Multicriteria

Another key step, is given by the study of the aspects that have damaged his image, the changes that have taken place over time and those that have changed positively or negatively the environment due to natural factors and/or human. The latter can only from the analysis of the physical, biological features (Lakes, rivers, mountains, etc.) and anthropogenic (city, houses, roads, etc.) and continue with an investigation of theoretical knowledge, cultural, historic, town planning, storage and cataloguing of urban heritage.

The analysis of the changes, however, must have some logical antecedent to the study of the roots in order to explore the area and find traces of its evolution and its components. Traces of the past, in fact, assume a value of testimony, integrating together with transformations and changes of this, outline the fate of the territory.

The complexity of today's issues related to land management and the environment "safety, quality, efficiency" involves an ever increasing demand for knowledge on the State and on the territorial transformations in all its aspects — physical, institutional and socio-economic.

Today there is a need for a new commitment to cultural and political level-to achieve a better institutional and systematic knowledge of the territory and the environment of the country, aiming at its preservation and enhancement. Therefore, the concept of representation can no longer be traced nor belong to a single discipline, but must relate to different sectors, different disciplines, which cannot be taken into account in their individual specificity, but as parts of a whole.

A complex representation that, starting from an analytical phase, discretize the unit and then entrust it to the various skills. A project of knowledge integrates knowledge, both for "already done" and the "what to do" ensuring quality. Only in this way, the added value will be born from their integral, thus creating a real table of knowledge.

Today, we are equipped with formidable terrestrial tracking tools [Fig. 2], aereophotogrammetry [Fig. 3] and satellite [Fig. 4] with high technological content, supported by sophisticated software able to return the 3D environment subjected to investigation.

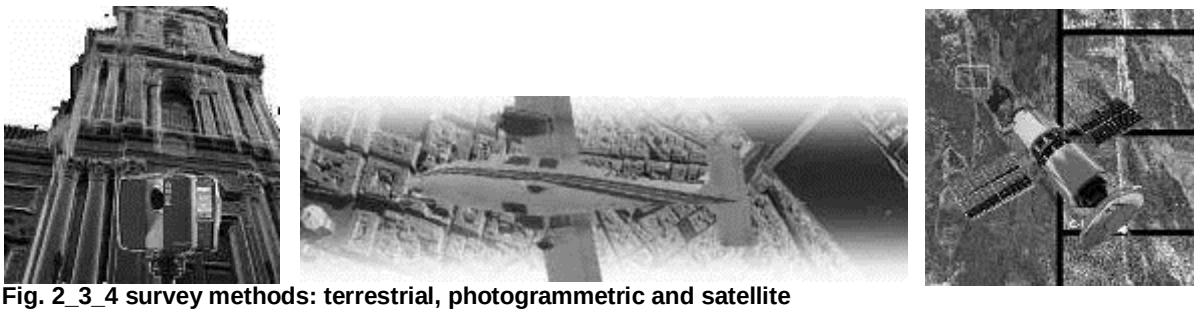

Fig. 2_3_4 survey methods: terrestrial, photogrammetric and satellite

Among these, particular software is the GIS (Geographic information system or GIS stands for Italian Territorial Information System "), considered by many to be one of the most powerful tools of all information technologies, because it allows to integrate knowledge from multiple sources [Fig. 5] and create an environment of collaboration.
GIS systems are fundamental tools to evaluate, analyze and represent each type of spatial phenomenon; question then of a computer system can produce, manage and analyze spatial data associating to each geographical and scenic element one or more alphanumeric descriptions. In essence, therefore, the minor times you get quality and results.
Discretization of architecture in its parts and its entirety first is the essential foundation to any hypothesis of constructing a genomic data base. It is therefore appropriate to analyse the diversity of every artifact within a general field to identify the various elements, going up to the limit of minimal units of meaning, to be included as part of an organized structure according to flexible and paths that allow reading multiple routes. This indicates the need for storage systems, in addition to quantitative data and identifying information, including data about the formal qualities of architecture, able to explain the shape of the parties, in relation to a reading of the constitutional architecture and character of its elements first. The city as a complex system of relationships is proposed as a field of experimentation and analysis and reflection articulated on multiple levels of knowledge. Definitions that valences and identify constituent traits that characterize the collection, decoupling and recomposing, is an operation that must be carried out within a cognitive structure that allows global then lunges on specific connectable as appropriate. In this sense, every investigative structure, knowledge, should be conducted through relief operations, processing, cataloguing, valuation and management of all components of the tangible and Intangible Cultural Heritage, the environment and Built in order to allow a reading for each unit construction is related to the context (theoretical, historical, cultural, urban, formal, legislative) which outlined the morphology. Next to this if the development of new technologies for the relief and the representation of architecture are now a boost to configure complex information systems, you must counter that each major project, processing, cataloguing, valuation and management of the natural and built heritage is set to theoretical bases related to specificity of architecture. Geographic information systems (Geographical Information System – GIS) [Fig. 6] computer systems are specifically designed to support the implementation of geographic information systems (GIS), which require the use of information "specialized" to achieve their goals.

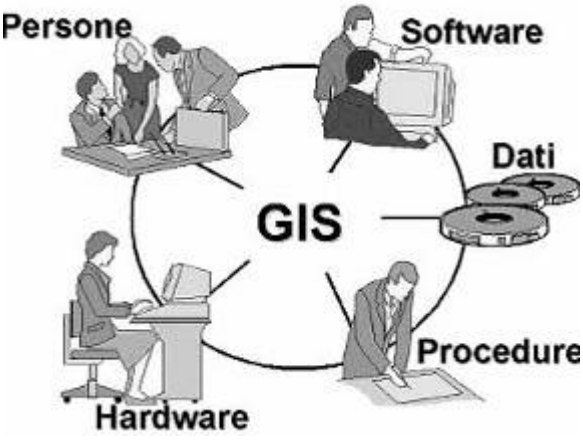

Fig. 5 Environment of collaboration

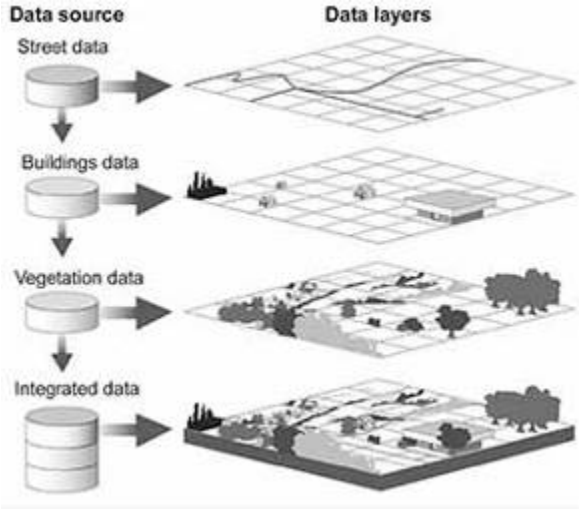

Fig. 6 Stratification of the layers

A SIT is in fact an organized set of geographic data and human resources, planned and prepared to capture, store, maintain, manipulate, analyze and illustrate all forms of geographically referenced data. A system of organizational, informative resources capable of managing and using data describing these phenomena on the Earth's surface, to the service and for the purposes of a specific production process. The relevance of the location and geographical component/territorial for the activities of the research organizations, public administrations, institutions and enterprises in almost all areas (Central and local governments, public goods and services, utilities, agriculture, manufacturing, trade and services, etc.) is highlighted by the growing importance that go assuming the distinctive characteristics of the "local system" territorially identified and defined, albeit "fuzzy" terms, scope, boundaries of land or area; In addition, the possibility of having knowledge and information detailed geographical scale up to the level of architectural artefact is often an essential element of knowledge bases research bodies, enterprises, institutions, local administrative entities, public and private operators that provide services in many areas.

Finally, with the spread of interest in economic dynamics, social, political and environmental factors that affect the territories of most of the planetary system growing importance, availability and rapid access to data and information available on regional.

Geographic database systems, generally known as GIS (geographic information systems) or sometimes SIT (territorial information systems, although this name is used mostly in reference to planning applications and environment), constitute the innovative component, both from the technological side/side methodological information/information, the collection, organization and use of that data type. For some years in Italy, a little late compared to other European countries but with a good recovery trend, the use of GIS had a remarkable increase, especially from public (State, regions, local authorities, territorial institutions) "holders" of georeferenced data both "hard" and "soft". Relevant examples include zoning and land information (such as the use of GIS-SIT, which was followed by the adoption of CAD, is practically generalized), the system of infrastructure and technological networks, transport and communication (including logistics), the mapping of environmental, cultural heritage, landscape, and industrial production, until the recent development of several "portals" to promote territorial areas (although the latter may not produce desired effectseven for the current fragmentation that reduces its effectiveness).

In different disciplines and applications, GIS have become indispensable tool and widely used not only for storing data, but above all for their analysis, development, implementation, evaluation and management that fully exploit the spatial nature: think of the problems of the Government of the territory, or more generally the use of soils (including agricultural crops), nature and environmental protection hydrological research, geological and geomorphologic characteristics, (which are also used 3D GIS), remote sensing up to archaeological research.

Ultimately the representation plays a major role in the design process, through the draft or other forms of representation the project defines and is transmitted as know formalized during the various stages of implementation, using all the technological opportunities that allow us to enter the body of the natural and built environment in order to discretize, to measure it and evaluate it for any size multidimensionality with the scientific expertise that identifies.

In a landscape, we must investigate and reconstruct reality, describing his childhood, places, objects, the points of view of memory, all the material and immaterial components, this represents a eco geometric model of reality, a paradigmatic model of environment and built.

Behind the gradual change of human needs, there is a biological significance of design: the biodisegn. It is an echo of geometry, which is the knowledge of what exists and what it will, through the transformation of all the components that make up the reality.

It consists in the knowledge of what exists and what will be, becomes the most fascinating part of the architecture and landscape architecture, because we will find during our linear path that surprise, that deviation, that will put in crisis the ideas of our imaginary journey.

1.2 The landscape of Terra di Lavoro

The territory Casertano, which is within the larger boundaries of Terra di Lavoro, occupies that part of the region that once the Romans called Campania Felix [Fig. 7], also known as Ager Campanus, "the prosperous of Campania". Its territory coincides with the historical and geographical region of Liburia, also known as (hereinafter the Decree Rattazzi, the law October 23, 1859) Terra di Lavoro, which had as its capital before Capua until 1818 and then Caserta. Land of fires? No, to tell the truth is Terra di Lavoro. Yes, because this was the name of a vast region which also included the present province of Caserta. It is thanks to Terra di Lavoro that the Campania earned the nickname of "felix". Since 79d.c., was the most fertile area of Campania, and Plinio the elder coined the nickname just to distinguish it from other areas. Then, over time, through the Middle Ages until you reach at the time of the Kingdom of Naples, he took with him the whole load of an area of Campania florida and happy, that in 1221 Frederico II wanted to even make.

The whole province, since ancient times, has always been characterized by the extraordinary proliferation of cultural, historical, artistic, but also material goods, products of the land known to the world as an essential part of Campania felix.

The splendor of this territory has attracted the attention of the famous poet Pier Paolo Pasolini who, in the poem "the ashes of Gramsci", refers to these pithy words:

"It is now near the *Terra di Lavoro*, some herds of buffaloes, a few bunch of houses between tomatoes plants, ivy and poor planks. Every once a rivulet, sleeping in the ground, appears between branches of the elm trees full of vines, dark as a drain. Inside, in the train that runs half empty, the frost».

The name of this noble and ancient province immediately evokes the notion of intellectual energy and lots of manuals, which empowered the natural gifts of a fertile land, pleasant and ideal for human settlement since prehistoric times. The landscape of Terra di Lavoro constitutes a document, an idea, an image, a word, but especially an emotion. In fact, the complex set of factors and processes denudation processes that determines the different nature of soils, landscapes and their different capacities and aptitudes.

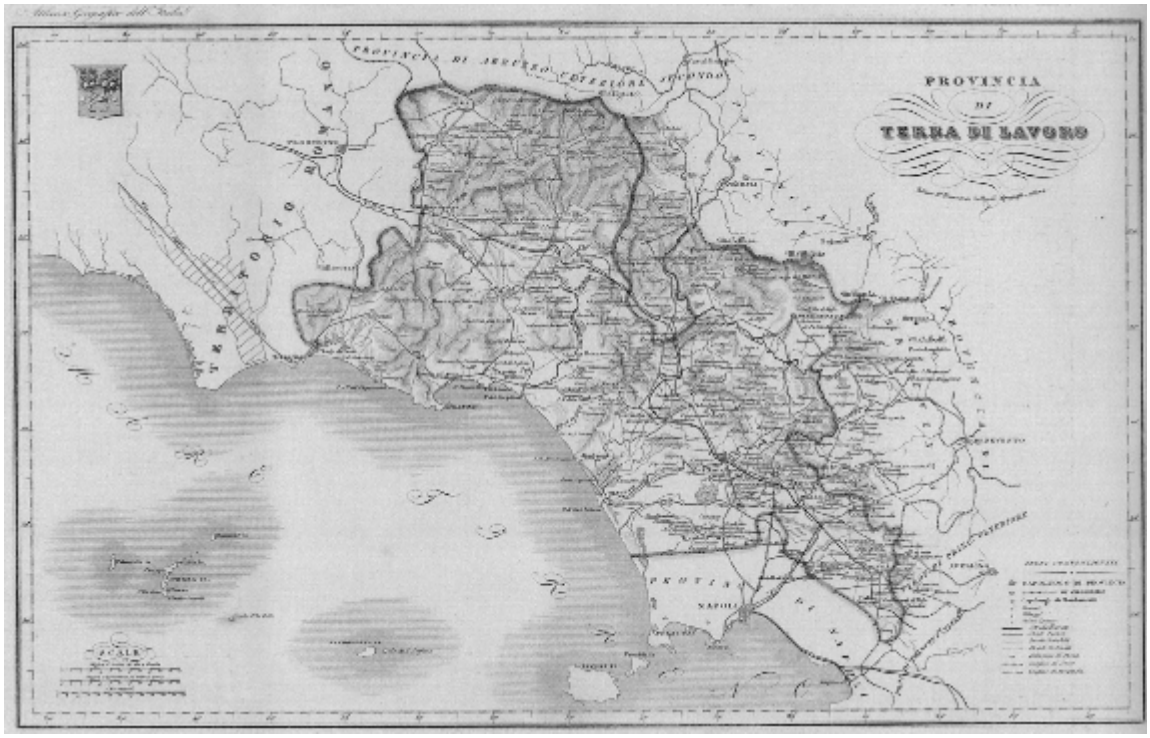

Fig. 7 J. Jansson, "Terra di Lavoro olim Campania Felix" from "Atlantis majoris", Amsterdam 1660

The study started from the analysis of soils, precisely from their sub-layer, and to do so have been reported all the symbolism of the *geological map* produced by Regione Campania soil conservation Sector. On the basis of the available data you can notice the prevalence of sandy, dunes and beach and silt-clayey deposits, outcropping in a wide band about 1-3 miles above the sea; and silt-Sandy fluvial deposits-associated deposits peaty marsh, that crop up in most of the area concerned and reach the highest heights in the vicinity of the Volturno River. [Fig. 8] are the geomorphologic phenomena to characterize a soil and the soil which determines the development of civilization and that makes the work so fertile Land. From privileged pleasant climate and the fertility of the soil, the region is characterized by a mostly hilly territory, with mountainous areas on the border with Basilicata and Molise. Vesuvius, among the few still active volcanoes in Europe, the Gulfs of Naples and

Salerno, separated by the Sorrentine peninsula and the islands of Ischia, Capri and Procida offer landscapes of rare beauty. The soil is therefore a living body in continuous becoming, composed of inorganic particles, organic substances, air and water, which affect biogeochemical cycles are necessary for the maintenance of the living beings on the planet's surface. It derives from continuous phenomena of complex interaction between the air (atmosphere), water (hydrosphere), geological substrate (lithosphere), living organisms (Biosphere), human activities (anthroposphere) and represents the ' membrane ' through which take place exchanges of energy and matter with the lithosphere and other environmental compartments. The " pedo landscape " is a " new ideas " cross: we may think of the pedo landscape such an enrichment of the classical concept of landscape, such a " landscape of which you are also understood the soils supporting it, " or as the " dynamic combination between the outward appearance of the landscape and its intime the pedo genetic roots. " The pedo landscape function is the most extensive and complex of functions that soils play in the ecosystem, beyond production or protection objectives, involving the balance of the environment as a whole, including cultural aspects, also sociological, historical and naturalistic itineraries.

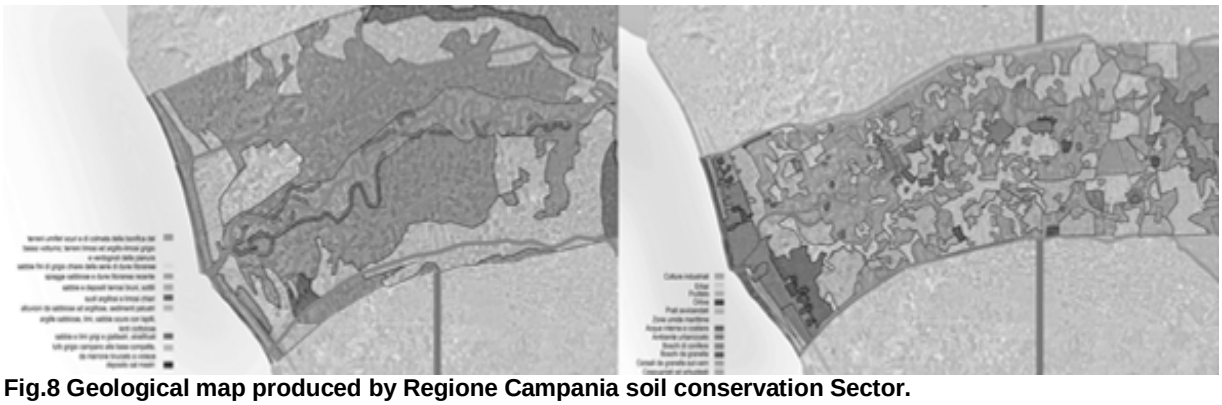

Fig.8 Geological map produced by Regione Campania soil conservation Sector.

From relative swot analysis of air (also known as SWOT Matrix), is a strategic planning tool used to evaluate the strengths (Strengths), weaknesses (Weaknesses), opportunities (Opportunities) and threats (Threats) of a project or in a business or in any other situation where an organization or an individual must make a decision to reach a goal. It can be seen as the most important strengths of this area are characterized by the presence of an environmental heritage, landscape and natural history of great importance.
Another strong point is given, by the high presence of numerous farms buffalo, from which arises a major agri-food excellence in analysis: buffalo mozzarella. Of secondary importance is not even from a warm temperate climate, which, as already mentioned, makes this area one of the most fertile of the whole region, creating a favorable environment in the presence of fauna and flora found along the lower reaches of the river Volturno. [Fig. 9]



Fig.9 Medium temperature and sunny hours of Campania

Although we have described the strengths on the other are opportunities that must be regarded as the greatest awareness of men to protect the enormous wealth that our land has to offer. Within this analysis were also highlighted the weaknesses as well as the strong presence of clayey soils, the high percentage of degraded areas, which can lead to threats such as the abandonment of traditional agricultural activity and increasing pollution. We can observe the magnificent beauty of the landscape of terra di lavoro through works of PhilippHackertun master of landscape of cultural life and more specifically the artistic landscape of terra di lavoro. Jacob PhilippHackert was a landscape painter of Brandenburg, who did most of his work in Italy, he traveled throughout Italy, gaining a reputation as a

talented landscape painter. In 1786 he went to work for Ferdinand IV, King of the two Sicilies in Naples, where he commissioned various paintings. The depiction of the landscape Hackert the ground paints inside the Real site of Carditello, appointed by Ferdinand IV of Borbone to the direction of the work of decoration and furniture of the Real site of Carditello. [Fig. 10]



Fig.10 Paintings of Jacob Philipp Hackert in the Royal Site of Carditello, depicting the Terra di Lavoro in the year 1780

The estate of Carditello, also known as the real site of Carditello, or palace of Carditello, was part of a group of 22 sites of the royal dynasty of the Bourbons of Naples, which also included the Royal Palace in Naples, the Royal Palace of Portici, the Reggia di Capodimonte and the Reggia di Caserta.
These places were not only dedicated to recreation (mostly hunting) of the Bourbon Royal family and his court, but in some cases constituted real companies, entrepreneurship expression inspired by the not important ideas in vogue at the time. The estate is an elegant architectural complex of neoclassical style, originally designed by Charles of Bourbon to hunting and breeding of horses and later, at the behest of Ferdinando IV di Borbone, turned into farm model for grain cultivation and breeding of fine breeds of cattle and horses. It was surrounded by a large estate of Woods, pastures and land for cultivation. Carditello was one of real places which possessed the title of "real Treat" because, despite its function as a business, offer a pleasant stay to the King and his court to the special hunting thanks to rich and numerous woods which possessed. The structure was built by the architect Francesco Collecini, a pupil and collaborator of Louis Vanvitelli. La Palace has a plan to double "T" designed with the alternation of long bodies with eight octagonal towers in the factory body joints, the King, President of the King with the façades decorated with greater sophistication. A view coeval of the Palace and the area in front of view appliances agricultural and clay slope with fountains and obelisks and a podium without the circular temple built at a later date. Buildings was entered through three entrances, two lateral and one central. All around a vast wooded area. [Fig. 11]



Fig.11 Royal Site of Carditello

The current state of disrepair, the crumbling plaster from time, defaced the frescoes and the ill use have failed to erase the beauty of architecture of attacked improper urbanization of ancient feud, in fact, are still guessed the richness and artistic and architectural beauty of the Palace and the magnificent overview of the place.
The Campania Felix still enchants the visitor with the aroma of Mediterranean pine trees, orange groves and lemon trees, the cliffs overlooking the sea, golden beaches, clear sea, the same age-old charm that won the mythical heroes, Greece, the Romans and the imagination of the whole world.
But Campania is also rich in history and a rich and diverse architectural heritage. In fact the Campania, Sicily and Tuscany, is the region with the largest number of Unesco sites. The five sites of Campania are: The Royal Palace of Caserta, the aqueduct of Vanvitelli and the San Leucio; the historic Centre of Naples; Pompeii, Ercolano and Torre Annunziata; the Amalfi Coast; the Park of the Cilento, Paestum, Velia, and the Certosa di Paluda.
The man who observes the landscape of Terra di Lavoro remains fascinated by what he is facing, arousing in him inner emotions and sensations that converge in the recognition of the landscape. This recognition is subjective, because each of us, in the face of a landscape sees the latter way, filtering with personal experiences, with its cultural background, things that other people do not notice, and converse.
The mental processing of forms and aspects of what we see, is different for each of us even though the elements that constitute the landscape exist and are physically present at the place. We could say finally, mediating, that the landscape is the product of the tension between subject and object, between the cultural filter of each observer and natural field. Should be suggested to think about landscape as aesthetic places entities; with this statement we want to emphasize the aesthetic aspect is a member of the physiognomy of the territory, intending to say that its appearance contributes to individuality of the place as that specific place. You still want to put emphasis on the uniqueness and individuality of each landscape and characteristics on membership of nature and history. The landscape is not subjective aesthetic sense but rather as intersubjective all cultural and aesthetic values in particular. Having said that the definition of landscape has been established by the European Convention considering the landscape of Terra di lavoro: *"defines a certain part of the territory, as perceived by people, whose character is derived from the action of natural factors and/or humans and their interrelationships".*

Bibliographical References

[1] RICHARDS John A., *Remote Sensing Digital Image Analysis: An Introduction*, Springer 2013. ISBN 978-3642300615.

[2] GAMBARDELLA Carmine, *Tra antico e moderno. Il progetto di un'identità in divenire*. In: Atti del Seminario di Studi Internazionali su Architettura e Città. ROMA: Kappa, ISBN: 9788865140048

[3] GAMBARDELLA Carmine, *Ecogeometria*. Edizione Scientifiche Italiane, 2011.

[4] MARTUSCIELLO Sabina, *La rappresentazione come eco dell'architettura*. Edizione Scientifiche Italiane, 2003.

[5] TOPCU, H. *I Piani di gestione delle città storiche UNESCO e il "Paesaggio storico urbano".* INU Edizioni-Urbanistica, 2012.

[6] DE FIORE G., *La figurazione dello spazio architettonico*, Genova 1967

[7] DE RUBERTIS R., *Il disegno d'architettura*, Roma, 1994

[8] FATTA F., *La rappresentazione dell'architettura in fotografia: analisi critica e campi d'applicazione nell'ambito del rilievo dell'ambiente*, Palermo, 1990

[9] GAMBARDELLA C., *I layer della forma urbis*, Napoli 2000

[10] GAMBARDELLA C., *La leggerezza della geometria*, Napoli 2000

[11] GAMBARDELLA C., *Le Vie dei Mulini. Territorio e impresa*, Napoli 2003

[12] GAMBARDELLA C., *Atlante di Pompei*, Napoli 2012

[13] GIOVANNINI M. (a cura di), *Spazi e culture del Mediterraneo*, Roma 2006

[14] VITTA M., *Il paesaggio*, Einaudi, Torino, 2005.

[15] SIBILIO PARRI, Barbara*. Economia e Diritto del terziario, Uno Strumento Di Gestione Del Patrimonio Culturale: Il Caso Dei Siti UNESCO*. Milano: Franco Angeli Editore, 2011;

[16] Referring Web Pages Web: http://www.sitiunesco.org

[17] Referring Web Pages Web: http://www.planetek.it/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Seismic Safety of the "Corpus Domini" Bell Tower

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Abstract
Masonry towers constitute a huge amount of the Italian built heritage. Therefore, their safety assessment against earthquakes has a significant social importance. They are unique architectural typologies, usually conceived in ancient time exclusively to withstand vertical loads. On the other hand, the recent national and international codes require the actual ultimate behavior of these structures under strong horizontal excitations to be deeply studied, encouraging the use of sophisticated non-linear methods. Recent Italian earthquakes (Umbria and Marche 1997, Puglia and Molise 2002, Abruzzo 2009, Emilia 2012) provided wide observational information about the recurrent behavior, the damage patterns and the intrinsic vulnerability of bell towers. The mechanisms of damage and collapse of this type of structures are varied and depend on both the geometry (slenderness) and the structural characteristics (quality of masonry walls and constraints). The development of mechanical models able of analyzing the failure mechanisms for all types of bell towers is not always viable, so it is suggested to carry out specific checks too, even though approximated as specified in the Italian Guideline "Cultural heritage seismic risk assessment and reduction with reference to the Italian national building code NTC/2008". This paper presents the results of seismic analysis carried out on a seventeen-century masonry tower in Italy, the "Corpus Domini" bell tower in Maddaloni (Italy). The results of linear and nonlinear analysis are compared and discussed, in order to provide general guidance on the main structural problems of this specific type of bell tower (recurrent in several earthquake zones of Italy).

Keywords: Seismic Safety, Bell Tower, Masonry, Code provisions.

1. Introduction
Most of historical structures has deteriorated over time by natural and environmental effects, such as earthquakes, because of inadequate preservation, which is considered a fundamental issue in the cultural life of modern society. Therefore, if the actual behavior of structures is known, protective measures can be supplied. In bell towers, the systematic observation of damage caused by recent earthquakes highlighted the high seismic vulnerability of belfries, located in their upper part. This is due to the presence of top mass and wide openings that imply slender pillars. The vulnerability consequently rises from their modest vertical-load bearing (related only to dead weight) that does not ensure stabilizing effect with respect to overturning. Quite frequently, bell towers are in contact with other lower structures. Customary cases are towers built as part of or next to churches, towers incorporated in various ways within the urban setting and towers built into city walls. In these structures, the presence of horizontal constraints at different heights can deeply modify the seismic behavior: limiting the slenderness, introducing localized stiffening elements and producing stress-concentrations, thus the vulnerability is greatly increased. In the literature, there are several research studies dealing with the seismic assessment and the vulnerability analysis of masonry towers, with regard to different aspects: mechanical and numerical analysis by computational [1,2] or simplified

approaches [1,3], experimental testing methods and structural identification [4,5], modal identification through experimental data of full-scale environmental vibration testing [6,7], seismic assessment by nonlinear static analysis. In the Italian National "Guidelines for evaluation and mitigation of seismic risk to cultural heritage" [8], different simplified mechanical models are identified for the most diffuse types of historic structures: buildings, palaces and other structures with bearing walls and horizontal diaphragms [9], churches and other structures with large halls, without intermediate diaphragms [10], towers, bell towers, and other tall and slender structures. The adoption of these models, though affected by uncertainties, permits to supply a homogeneous evaluation on territorial scale and, thus, a preliminary design of future strengthening interventions. The analysis based on simplified mechanical models (LV1) allows the evaluation of collapse acceleration by means of a method based on a limited number of geometric and mechanical parameters or utilizing qualitative tools (analysis of the construction characteristics, critical and stratigraphic surveys). Seismic behavior of towers depends on certain specific factors: structure slenderness, degree of connection between walls, presence of adjacent structures in the lower portions (which may create horizontal constraints), presence of slender architectural elements at the top of the structure (steeples, towering gables, battlements, etc.) or in any case belfries. For towers, the Italian National Guidelines [8] propose a simplified model based on failure hypothesis due to combined axial force and bending moment. The model considers towers as cantilevers which, if loaded by lateral forces in addition to their dead loads, may be subject to crises in a generic section due to crushing in the compressed zone, after the reduction of the effective un-cracked area due to non-tensile-strength. In this paper, the "Corpus Domini" bell tower is studied applying the LV1 level proposed in [8]. The results of linear and nonlinear analysis are compared and discussed.

2. The "Corpus Domini" bell tower

The "Corpus Domini" Basilica in Maddaloni is situated in the oldest part of the city called Olivet, near the ancient S. Aniello Church, on the slopes of the Maddaloni Hill. The building is very articulated and seems oversized as compared to the surrounding urban context. The Basilica was built in the eighteenth century on pre-existing late sixteenth [11]. The bell tower was designed by Orazio Salerno in 1781, on the right side of the main entrance of the church, about one meter from the front side. There is little historical information on the designer, but it is known that he worked in the years when Luigi Vanvitelli was directing the building of the Royal Palace in Caserta and the Carolingian aqueduct in the Maddaloni Valley. Also a wooden model of the tower, along with the graphics and the technical report, was commissioned to Orazio Salerno. The construction began on May 13, 1781 and was completed in 1790. Because of the damage caused by lightning on February 12, 2010, a restoration design was drafted by the architect Mariano Nuzzo; and the interventions ended on 2012. Although the tower shows good structural conditions, its safety against potential future earthquakes is of primary importance. The bell tower is about 49.12 m high, and has nine portions with both square and circular cross-section. Table 1 shows the dimensions of each portion, and the material by which it is made.

N.	Height [m]	Material	Section [m] side or diameter	f_{mc} [MPa]	Weight [kN/m^3]
1	0 – 0.75	limestone	8.02	4.5	22
2	0.75 – 10.25	brick	8.02*	2.4	18
3	10.25 – 11.05	limestone	8.40	4.5	22
4	11.05 – 20.65	tuff	7.66*	1.4	16
5	20.65 – 21.48	limestone	8.40	4.5	22
6	21.48 – 30.55	tuff	7.66*	1.4	16
7	30.55 – 31.38	limestone	8.02	4.5	22
8	31.38 – 39.86	tuff	6.44**	1.4	16
9	39.86 – 49.12	tuff	6.44**	1.4	16

* unless the openings

** variable

Table 1: Geometry and material of the "Corpus Domini" bell tower.

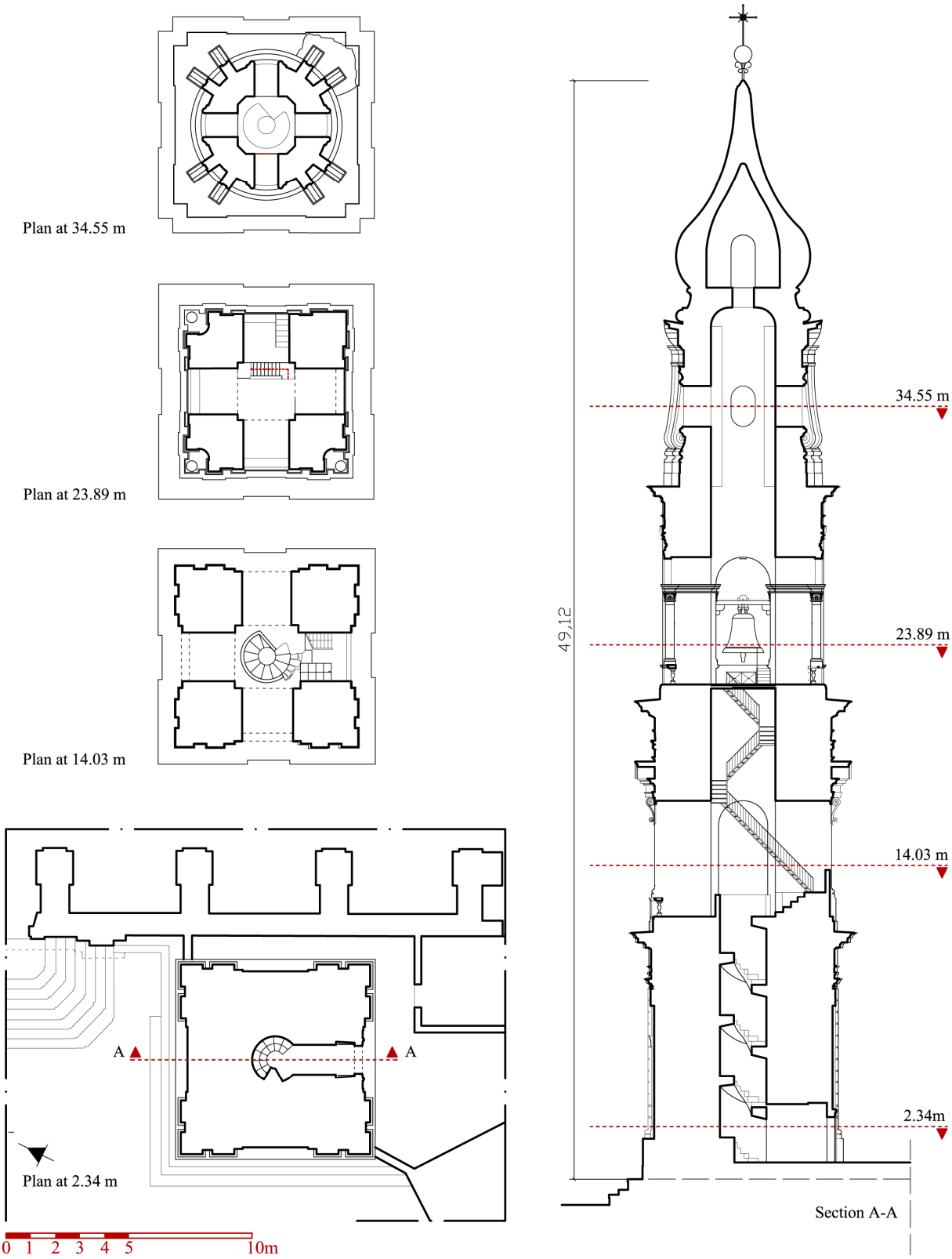

Figure 1: Plans and section of the “Corpus Domini” bell tower.

3. Simplified mechanical modeling and analysis

The assessment of safety, as well as the necessity and the suitability of eventual retrofits, has to be determined from the comparison of the structure capacity, evaluated as the result of qualitative and quantitative knowledge and analysis of the building, and the seismic action demand [9]. This assessment can be performed by simplified methods, that are different from the specific ones used in the strengthening design. Safety index I_S greater than 1 indicate structures able to withstand the required seismic forces, provided by the seismic code; on the contrary if I_S is lesser than unity, the

safety is lower than that prescribed. Similarly to the index I_S, it can be defined an acceleration factor f_a, defined as:

$$f_a = \frac{a_{SLV}}{a_{g,SLV}} \tag{1}$$

where $a_{g,SLV}$ is the design ground acceleration, corresponding to the assigned return period of the earthquake, related to subsoil A. The acceleration a_{SLV} is the ground acceleration leading to the achievement of the structure ultimate limit state (SLV), computed as a function of the fundamental period of vibration T_1 of the structure, as defined in the Eqn (5.26) of the "Guidelines for evaluation and mitigation of seismic risk to cultural heritage" [8,12]. The simplified model proposed in the Guidelines [8] is based on the assumption that towers are structures with cantilever-behavior.
The analyzed bell tower was divided into n sectors with uniform geometric characteristics and the checks were performed in correspondence of each section change. The ordinate of the elastic response spectrum $S_{e,SLV,i}(T1)$, required by Eqn (5.26), corresponding to the ultimate limit state SLV in the i-th section of the bell tower (taking into account the confidence factor F_C) is calculated by:

$$S_{e,SLV,i}(T_1) = \frac{q \cdot g \cdot M_{u,i} \cdot \sum_{k=1}^{n} W_k \cdot z_k}{0.85 \cdot W \cdot \left(\sum_{k=i}^{n} W_k \cdot z_k^2 - z_i \cdot \sum_{k=i}^{n} W_k \cdot z_k \right) \cdot F_C} \tag{2}$$

where:

- q is the behavior factor;
- g is acceleration of gravity;
- z_i is the height of section i with respect to the foundation;
- W_i is the weight of the ith sector;
- $M_{u,i}$ is calculated as described below.

Where the tower has got squared rectangular cross-section, under the hypothesis that normal forces are not larger than $(0.85 \cdot f_d \cdot a \cdot s)$, the resistant moment at the base of the sector may be computed by:

$$M_{u,i} = \frac{\sigma_{0i} \cdot A_i}{2} \cdot \left(b_i - \frac{\sigma_{0i} \cdot A_i}{0.85 \cdot a_i \cdot f_d} \right) \tag{3}$$

where:

- a_i is the cross-section side orthogonal to the direction of the seismic action, depurated of any eventual openings;
- b_i is the cross-section side parallel to the direction of the seismic action;
- A_i is the total area of the section under analysis;
- σ_{0i} is the average normal stress of the section;
- f_d is the design compression strength of the masonry, opportunely reduced in relation to the knowledge level achieved.

Where the tower has got circular cross-section, the resistant moment at the base of the same sector may be calculated as:

$$M_{u,i} = A_{set} \cdot 0.85 \cdot f_d \cdot y_G \tag{4}$$

where:

- A_{set} is the area of the sector of the circular crown;
- y_G is the distance of the point of application of the resultant from the center of the circle.

For each cross-section, the peak ground acceleration (demand) that causes the resistant moment (capacity) is estimated. The minimum value of the peak ground accelerations, among those obtained for the analyzed sections, represents the acceleration corresponding to the ultimate limit state for the bell tower.

3.1 Seismic safety of the "Corpus Domini" Bell Tower

According to the above briefly described procedure LV1 outlined in [8], by considering the geometric features of the "Corpus Domini" Bell Tower, the acceleration factors (f_a) of nine portions were computed. These portions are the most representative in terms of geometries and openings; their plans are reported in Figure 1. Seismic safety was evaluated according to the only one direction because all the examined portions are symmetrical. The safety verification was performed at different heights because it was not possible to identify a priori the most critical section, due to the tapers in wall thickness and the opening impairments. The acceleration factors f_a are computed through Eqn (1), according to a seismic safety level corresponding to buildings of limited relevance and to a class

of normally crowded use (Class III), and assuming a ground motion acceleration $a_{g,SLV}$ of 0.202 g and a B soil class. The fundamental period of vibration was computed as $T_1=C\cdot H^{3/4}$, where H is the tower height and C is equal to 0.05. In addition, in computing Eqn (5.26) of Guidelines and in Eqn (2), the S coefficient was assumed equal to 1.197, the F_0 factor equal to 2.519, and the behavior factor q is equal to 3.6. The indexes are computed assuming a confidence factor of 1.35 (corresponding to a complete survey of the geometries and a limited one for constructive elements and mechanical properties of materials). The analyses led to F_a values lower than one for the tuff portion number 4 and 6, with values ranging between 0.4 and 0.6, and for the brick portion number 2, where is equal to 0.7.

4. FEM modeling and analyses

The safety index of the tower was also evaluated using a finite element modeling. The analyses were performed using the "strumas" model of the computer program MidasGen®, specifically developed for the study of masonry structures. This a "micro-macro" modeling based on the hypothesis of homogeneous equivalent material [13], where, starting from the definition of a representative elementary volume and different constitutive models for the three constituents (brick, bed and head mortar joints), the properties of the equivalent masonry material are computed through a homogenization procedure. The technique of homogenization is the one proposed by Pande [14] and is based on the equality of the deformation energy. The properties of the equivalent masonry material depend, therefore, on the size of blocks, the thickness of horizontal and vertical mortar joints, on the Young's and Poisson moduli of blocks and mortar, on the tensile strength of blocks and mortar. The model assumes a indefinitely elastic behavior in compression. The analytical procedure is linear in each step, but if the principal tensile stress exceeds the strength of a constituent, its contribution to the new stiffness matrix of the homogenized material is reduced or canceled. The reduction depends on a parameter of stiffness abatement, assumed to be equal to $10e^{-4}$, which corresponds to a nearly elasto-plastic behavior [16]. The FEM model of the "Corpus Domini" tower is composed of 47976 brick elements (Fig. 2). Eight node solid elements of size about 0.3 x 0.3 x 0:25 m, with isotropic behavior were used for modeling the masonry structure. The material parameters, including the compressive strength, were selected according to the Italian National Building Code [15], and the selected values are listed in Table 2.

Material	E [MPa]	G [MPa]	f_{mt} [MPa]
brick	1200	840	0.15
limestone	2400	1560	0.30
tuff	900	630	0.10

Table 2: Mechanical properties of the bell tower materials.

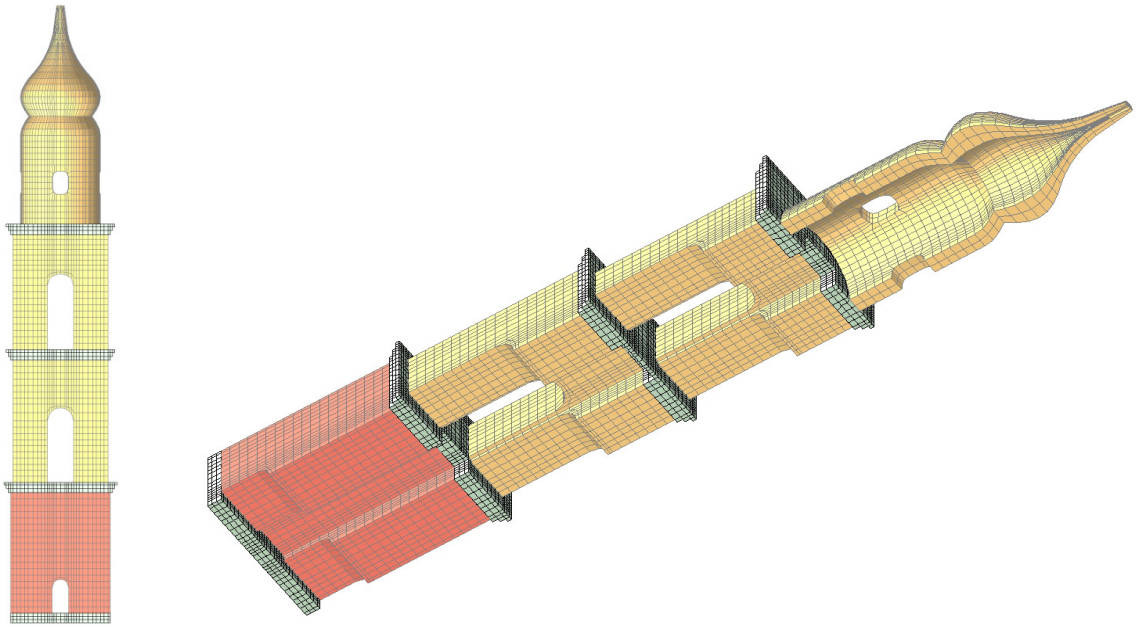

Figure 2: F.E.M. model of the “Corpus Domini” bell tower

4.1 Modal characterization

In order to assess the seismic response of the bell tower, initially a multi-modal simplified analysis was performed, even though the ability of such an analysis to represent the actual behavior of masonry buildings is limited, due to the largely nonlinear behavior under dynamic seismic action. Moreover, the knowledge of eigen-values, eigen-modes and activated masses is needed for determining the shape of the horizontal load forces to utilize within the subsequent pushover procedure. The first three period of vibration are listed in Table 3.

Mode	Frequency [Hz]	Period [s]
1	4.196	1.278
2	5.009	1.254
3	15.424	0.407

Table 3: First three frequencies and periods of the “Corpus Domini” bell tower.

4.2 Pushover analysis

The nonlinear static analysis was carried out applying loads in two stages: first the vertical loads and then the horizontal ones. Several distributions of lateral loads were applied. The corresponding capacity curves were subsequently converted to capacity curves of single-degree-of-freedom systems. Following the procedure described in [15], it was possible computing the safety indices in terms of capacity/demand ratio, to be also compared with those determined through the LV1 simplified analysis. The tower capacity was identified with the achievement of the maximum stresses in compression, thus making a conservative assumption. The control point was placed at the mass center of the ninth sector. This occurred for the Z-horizontal direction of loading; the corresponding maximum displacement is equal to 69 mm, showing a noteworthy large deformation capacity. Fig. 3 shows the vertical stresses in the entire bell tower at the above maximum displacement: the figure highlights that the maximum strengths are achieved in the lower tuff sector. Usually, the tall and slender shape of towers makes them more vulnerable at the base settlements, limiting the maximum allowable displacements under earthquake. In addition, the boundary condition of cantilever type makes them unsuitable for redistributing stresses and dissipating energy. The characteristic limited ductility of the masonry accentuates this brittle structural behavior [17], which is often accompanied by a concentration of stresses at the basement and can be amplified by the brittleness of deteriorated masonry. In the "Corpus Domini" bell tower, the noteworthy difference in terms of material properties between the intermediate diaphragms in limestone, the lower sector in bricks and the main portions in tuff, besides the achievement of the maximum stresses in the tuff portion, allowed larger deformation capacity of the whole tower. Fig. 4 shows the stress distribution in the tuff portions only, which are the most representative. The cracked zone is concentrated at the base of the pillars. Following the

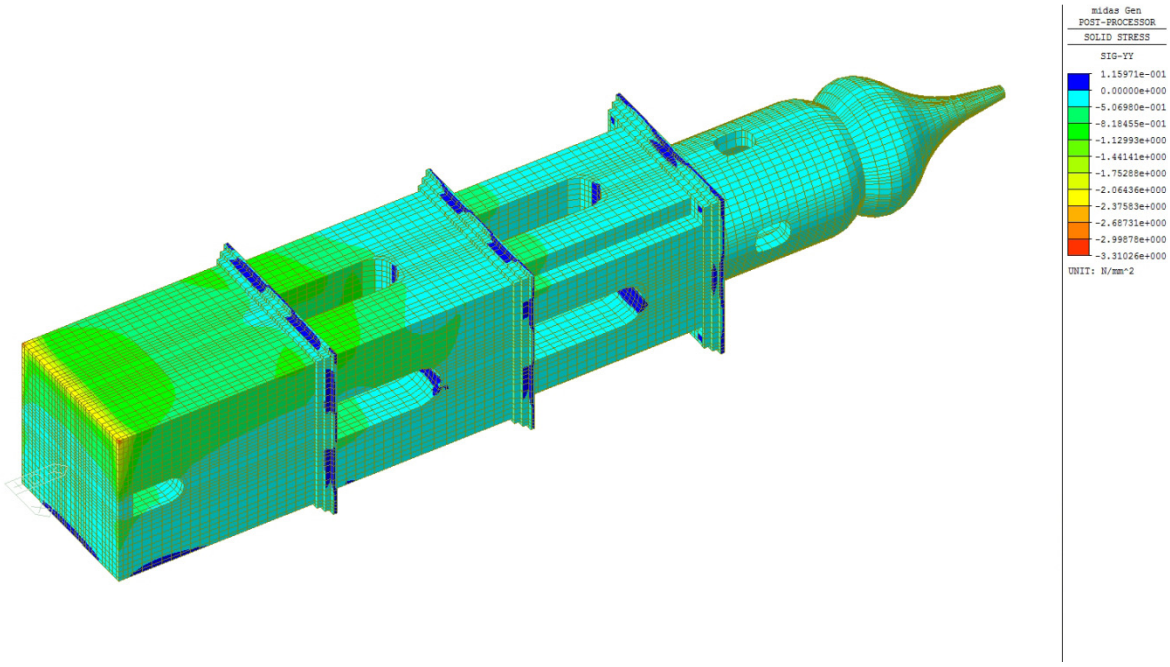

Figure 3: Vertical stresses in MPa.

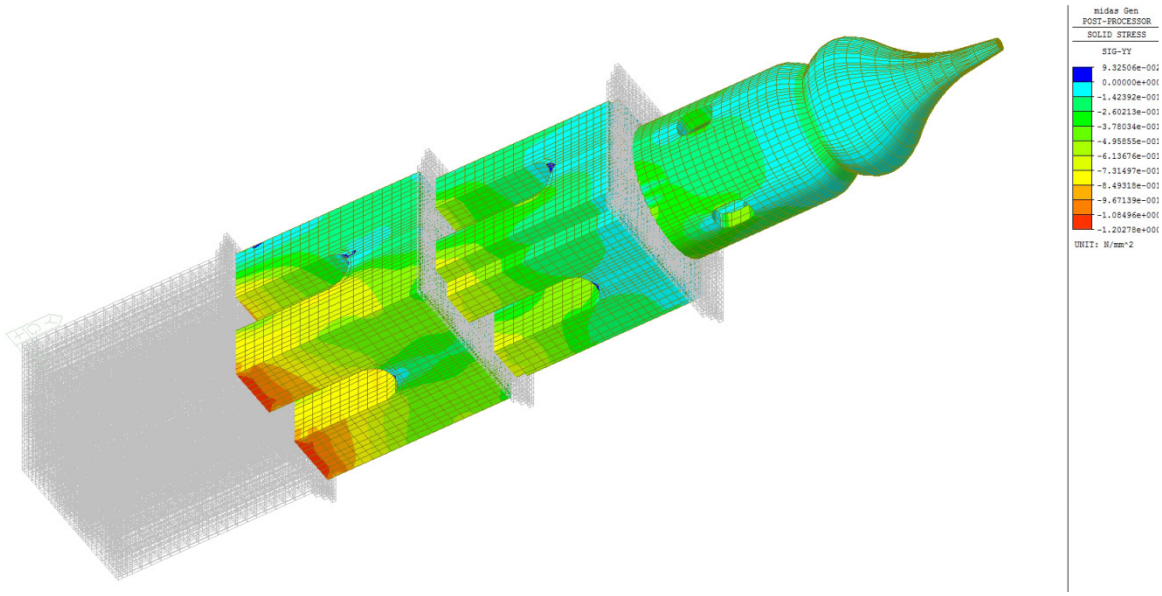

Figure 4: Vertical stresses in the tuff masonry [MPa]

procedure provided in NTC/2008 [12], the displacement demand in the Z-horizontal direction is equal to 180 mm, and then the minimum safety index is equal 0.38. Therefore the safety assessment of the bell tower under horizontal loads is not verified also for the pushover procedure.

5. Conclusions and safety assessment remarks

Masonry towers constitute a huge amount of the Italian built heritage. Therefore, their safety assessment against earthquakes has a significant social importance. They are unique architectural typologies, usually conceived in ancient times exclusively to withstand vertical loads. Many of these buildings are then characterized by structural schemes not suitable to withstand seismic events. This paper presents the results of the seismic analysis carried out on a seventeen-century masonry tower in Italy, the “Corpus Domini” bell tower in Maddaloni (Italy). The results of the LV1 simplified procedure and nonlinear static analysis are compared and discussed, in order to provide general guidance on the main structural problems of this specific type of bell tower (recurrent in several earthquake zones of Italy). The results obtained through FEM analysis essentially confirm those of the LV1 analysis. Moreover, the safety indexes obtained by the simplified analysis are larger than unity, except for the tuff portions. The response obtained by the FEM model confirmed the exceeding the allowable stress levels in the tuff masonry portions. It has to be considered, however, that in both models the brick coating of the tuff masonry was not considered, and then the possible increase in strength was not taken into account. Finally, the seismic safety evaluation of masonry towers should be performed both by global seismic analysis, controlling the entire structural system capacity, and by local failure mechanisms analysis, controlling all the possible out-of-plane mechanisms.

Bibliographical references

[1] Pena F., Lourenço P.B., Mendes N., Oliveira D.V., Numerical models for the seismic assessment of an old masonry tower, 32:5, 1466 1478 2010.

[2] Milani G., Casolo S., Naliato A., Tralli A.G., Seismic assessment of a medieval masonry tower in Northern Italy by limit, nonlinear static, and full dynamic analyses, International Journal of Architectural Heritage, 6:5, 489-524, DOI = 10.1080/15583058.2011.588987, 2012

[3] Curti E., Parodi S., Podestà S., Simplified models for seismic vulnerability analysis of bell towers, Structural Analysis of Historic Construction, Taylor & Francis Group, London, 2008, ISBN 9780415468725

[4] Binda L., Zanzi L., Lualdi M., Condoleo P., The use of georadar to assess damage to a masonry bell tower in Cremona, Italy. NDTE International, 38, 171-179, 2005.

[5] Ivorra S., Pallares F. J., Dynamic investigations on a masonry bell tower, Engineeering Structures, 28, 660-667, 2006.

[6] D'Ambrisi A., Mariani V., Mezzi M., Seismic assessment of a historical masonry tower with nonlinear static and dynamic analyses tuned on ambient vibration tests, Engineering Structures 36, 210–219, 2012.

[7] Ferraioli M., Mandara A., Abruzzese D., Miccoli L., Dynamic identification and seismic safety of masonry bell tower, XIV Convegno Nazionale "L'Ingegneria Sismica in Italia", Bari, Italia, 18–22 Settembre 2011.

[8] DIRETTIVA P.C.M. 9 FEBBRAIO 2011 – Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme tecniche per le costruzioni di cui al decreto del Ministero delle infrastrutture e dei trasporti del 14 gennaio 2008. (11A02374), S.O. alla Gazzetta Ufficiale n. 54 del 26.02.2011.

[9] Guadagnuolo M., Paolillo A., "Territorial seismic safety evaluation and appropriate survey: liberty buildings in Naples", Atti del X Forum Internazionale di Studi "Le Vie dei Mercanti" – Less More architecture, design, landscape, Aversa-Capri, Italia, Maggio 31-Giugno 2, 2012, ISBN: 9788865421291.

[10] Faella G., Guadagnuolo M., "La sicurezza sismica degli opifici mediterranei in muratura", Atti del V Forum Internazionale di Studi "Le Vie dei Mercanti" - Rappresentare il Mediterraneo, Capri, Italia, Giugno 14-16, 2007, ISBN: 9788889579534.

[11] Sarnella G., Le vicende costruttive della chiesa del SS. Corpo di Cristo in Maddaloni, Estratto da Rassegna ANIAI 4/1988; G. Sarnella "La chiesa del SS. Corpo di Cristo di Maddaloni dalla fine del Cinquecento a tutto il Settecento", estratto da Rivista Storica del Sannio n. 13, 3^ serie anno VII, arte tipografica 2000.

[12] Ministero delle Infrastrutture e dei Trasporti, Norme Tecniche per le Costruzioni, D.M. 14.01.2008, Official Bulletin n. 29, 4 February 2008. (in Italian).

[13] Luciano R., Sacco E., "Homogenization technique and damage model for old masonry material", Int. J. Solids and Structures. Vol. 34 (24), pp: 3191-3208, 1997.

[14] Pande G. N., Liang J. X., Middleton J., Equivalent elastic moduli for brick masonry, Comp. & Geotech.. 8, pp: 243-265, 1989.

[15] Ministero delle Infrastrutture e dei Trasporti, Circolare n. 617, Istruzioni per l'applicazione delle "Nuove norme tecniche per le costruzioni" di cui al D.M. 14 gennaio 2008, 2 February 2009. (in Italian).

[16] Lee J. S., Pande G. N., Middleton J., Kralj B., Numerical modeling of brick masonry panels subject to lateral loadings, Comp. & Str.. 61 (4), pp: 735-745, 1996.

[17] Carpinteri A., Invernizzi S., Lacidogna G., In situ damage assessment and nonlinear modelling of a historical masonry tower, Engineering Structures 27, 387-395, 2005.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Paper's Title Rural design and territorial development

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Abstract
The topic of this study is the redesign of the agrarian landscape of Caserta (Terra di Lavoro). The redesign is about the experimentation of new projects, which don't try to be a solution, but an array of possibilities capable of triggering a new growth. The target of the research is the redesign of a territory for the creation of "new cultural landscapes". The aim of the plan is to allow for sustainable development, so that the characteristics, heritage and qualities of the rural settlement may be preserved. The project involves the formulation of theoretical models applicable in the territory. The result will be an atlas of models useful to design new landscapes. There will be multiple project proposals which are part of a dictionary. Projects were done on three areas of the territory. Each model has different features formal, geographic and orographic. Planning and developing, in its various contexts, as a unique form of rural life with a distinct character. The proposal studies several solutions to the problems using three rural design strategies. These are examples only and, therefore, contain only very general guidelines. But this lack of rigidity makes the proposal very flexible and adaptable on all territory. Models leave space for future sustainable growth of the rural landscape.

Keywords: rural, landscape, sustainability, model.

1.The place. Terra di Lavoro

The place of study is a part of Campania, the flat area between the slopes of Mount Massico and Campi Flegrei . The ancient Romans called this part of Italy Campania Felix (happy Campania) . This area is rich in of mythology and history. Is famous , as always, for the fertility of the land. It is described by poets and writers as a Garden of Eden . Here lived Strabone , Virgil, Pliny , Goethe, Pasolini, Maiuri . All of them talked about the beauty and the fertility of this rural landscape. The presence of the Regi Lagni, antique reclaimed Clanis, and the temperate climate have made these lands so fertile. Those have been a source of the population for centuries. Here was born a peasant culture that currently is almost completely lost. Actually, the rural characters are still very strong, but the area is highly degraded. Industrialization, the loss of rural life and the spill of toxic waste have transformed the area in a negative way.
Today we can still see the presence of centuriatio, a system for the division of land that used by the Roman surveyors. The rural areas still retain the courtyard houses, typical buildings of the place. The houses were farms, the spaces were marked by the agricultural products working.

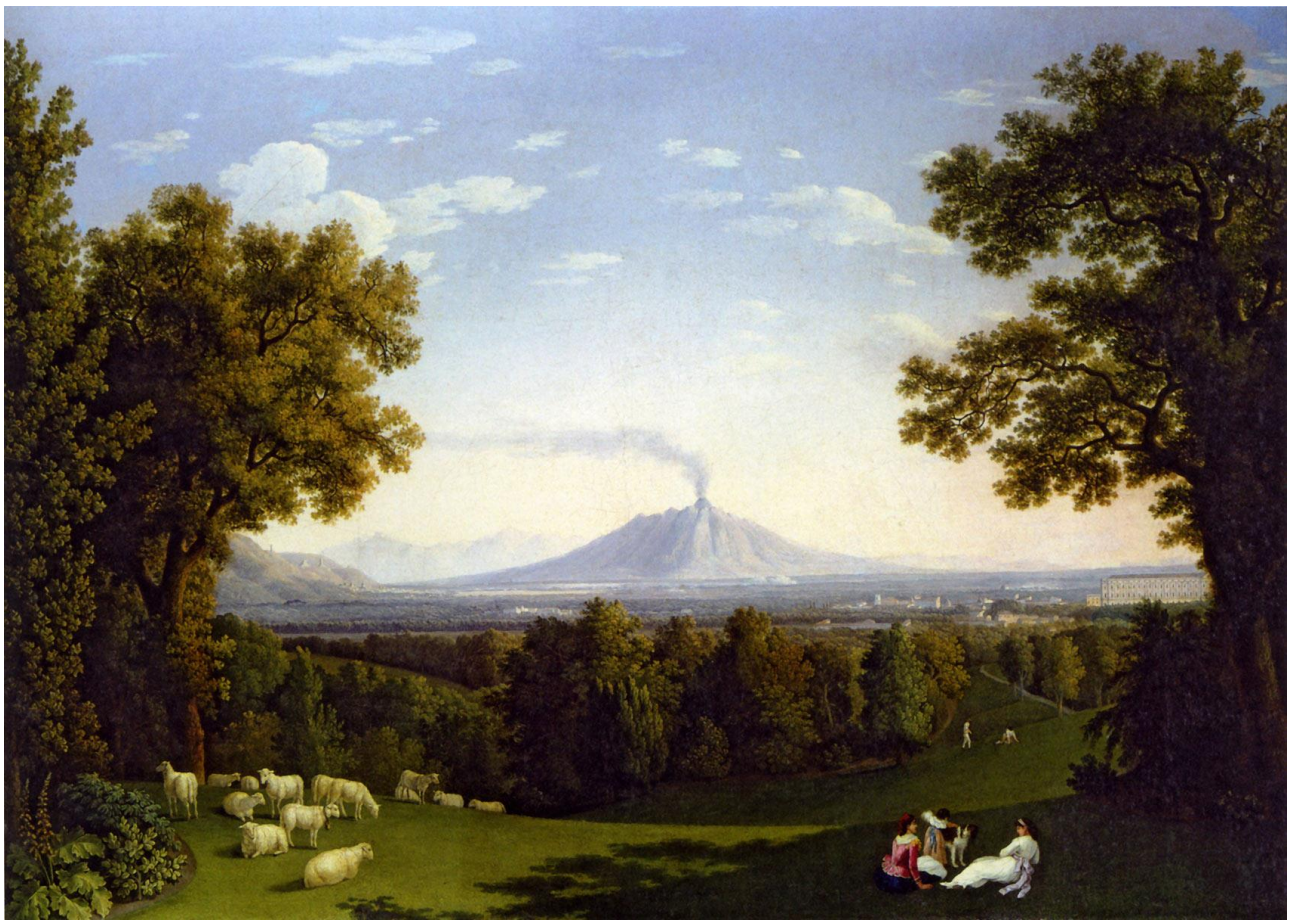

Fig. 1: Hackert Jacob Philipp, Palace of Caserta and Vesuvius,1973.

1.2.The Idea: " The rural landscape project"

The research project is the redesign of the agrarian system of Caserta (Terra di Lavoro). The project has a complex structure. This experiment with new design solutions for the development of the landscape. It is a series of exercises design made on sample areas of the territory. The result will be an atlas of models useful to design new landscapes. The proposals are always reversible and adaptable to future needs related to the growth of the territory and society. The atlas will be based on a dictionary of elements: the pre-existing and new interventions. The design of the new agricultural system is based on two main actions: the reactivation of the existing elements and the new project that brings together all the characters. The quality of rural development can be influenced by many factors.
The new focus on rural landscape centers on three key questions:

- searching for identity
- reduction of landscape deterioration
- definition of a new development model

The design of the new rural system is based on two main actions: the recycling of the existing elements and the integration of multiple characters. The integrated system will be made of green areas supporting urbanized areas, production areas inherent to the new agrarian system and a network of "elements" that will connect all the existing and future systems.
The model studied is applicable and extensible to all landscape.
Models for areas:

1. flat area
2. coast area
3. river area



Fig. 2: Areas.

The theoretical model will be applicable in the territory through the formulation of an abacus of elements divided by macro-systems.



Fig. 3: Models.

The model will acts on various systems: infrastructure system, agricultural system, production system and architectural system. A service of multiple uses:

- production
- cultivation
- collection products
- homes
- transport
- import-export
- agro-tourism
- receptive
- social
- cultural
- didactics

The actions are so many. Possible solutions have the focus to consolidate the existing agricultural activities and introduce new production systems. There will be a new agricultural landscape that will take advantage of all the resources of the place. The First actions are: strengthening of tracks of

centuratio and reactivation of farm roads. Then, the recovery and re-naturalization of watercourses, allow to create an optimal microclimate, and to increase the water supply for irrigation of fields, and in some cases real river parks.
The rural centers , numerous cottages and farmhouses in the area, forming between them a dense network in the area, are the basis for the proper functioning of the new system .

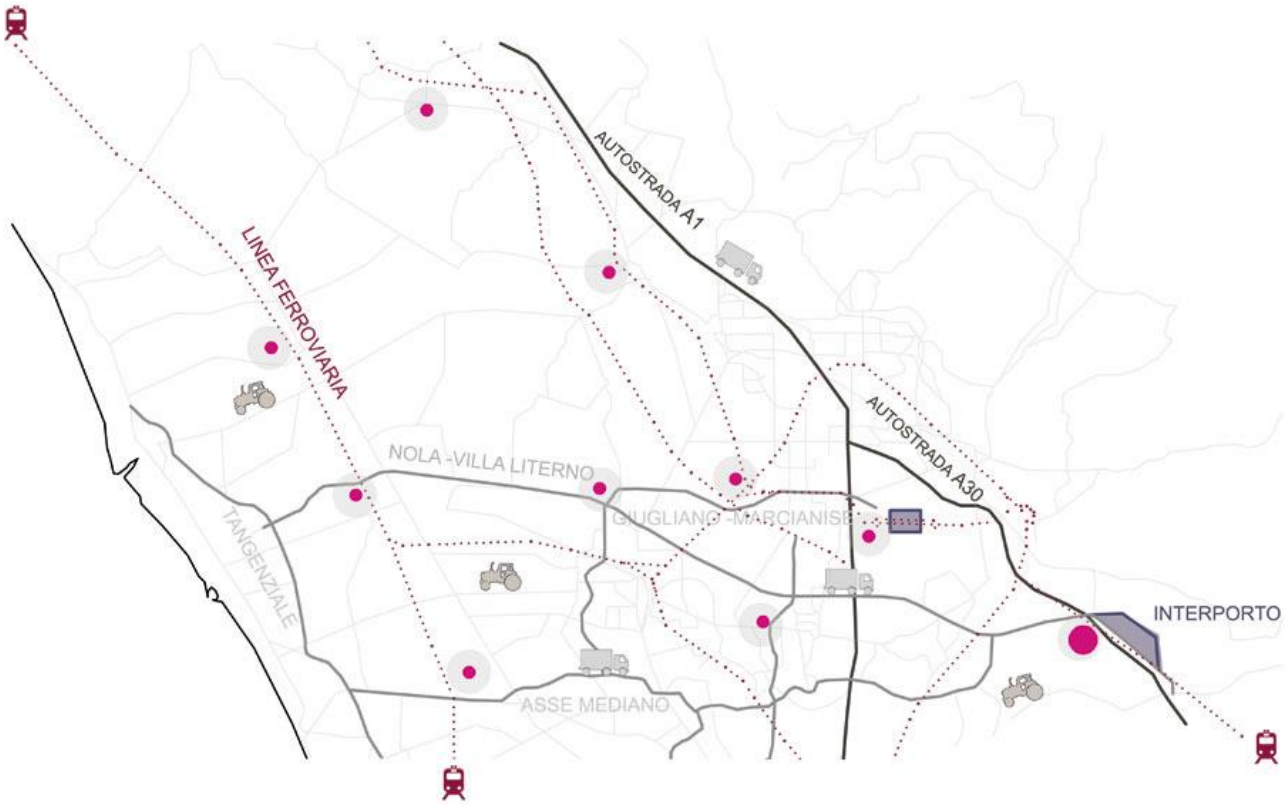

Fig. 3: Mobility

Those buildings sometimes become the place for the production and storage of agricultural products, information, education and refreshment. The centers will be preserved in their rural character and peripheral areas transformed. In highly urbanized areas the project involves the development of agricultural areas through the formation of interstitial green promenade. These green belts suburban centers will bring into connection with the surrounding agricultural mosaic. In some of those areas it will be possible the creation of new residential areas. Near the exit of the main ways of communication technology parks are planned for Renewable Energy and the points of collection of agricultural products. The production will be supported by new buildings for the manufacturing, storage, and export. The architectural heritage, the numerous archaeological sites and natural areas will be part of this project . These are also a good opportunity to initiate activities to do. For this reason it is important to restore the historical paths and insert them into the new system.



Fig. 4: Rural landscape. Terra di Lavoro.

Models Template1: The model of the flat area. A portion of the territory taken in a suburban area of the city of Marcianise, this is densely populated urban center. Here are two important elements: the urban area and the agricultural landscape. The project proposal deals with work on the edge of town. The peripheral area, abandoned and degraded, it turns into green belt. This is an area, serving the towns, where many activities take place. This is made from poplar forests, urban gardens, pedestrian trails and areas for outdoor activities. Here you can also create new residential neighborhoods and new centers for agricultural production.

Template2: The model of the river area. The area in question is near the Volturno River and the town of Santa Maria la Fossa, a small town. Here are the important elements: the river and the rural center. The project involves the creation of a River-Rural Park. The creation of this park will help to save the landslide risk areas. The recovery of the ecosystem configure a new landscape. The park is made up of areas with equipment, farmland and natural areas. This makes it possible to connect the village with the surrounding landscape. Here is the planned introduction of new manufacturing activities related to the river.
Template 3 : The model of the coast zone. The area in question is in the town of Castel Volturno, this is a run-down area characterized by illegal buildings which is exploited mainly in the summer. Here too, the agricultural landscape is still very present. In this area the main cultivation is tomato plants. The coastal strip is separated from the farm by a large pine forest. The proposal involves the redevelopment of the area and restoring the character of agriculture and tourism. A single project where we will design bathing low-impact landscaping, pedestrian and cycle paths alternating those driveways and large pine grove in the park. The poor quality of the existing building will be integrated with the creation of new cottages conceived as a hotel widespread. It will be a tourist activity in rural character.

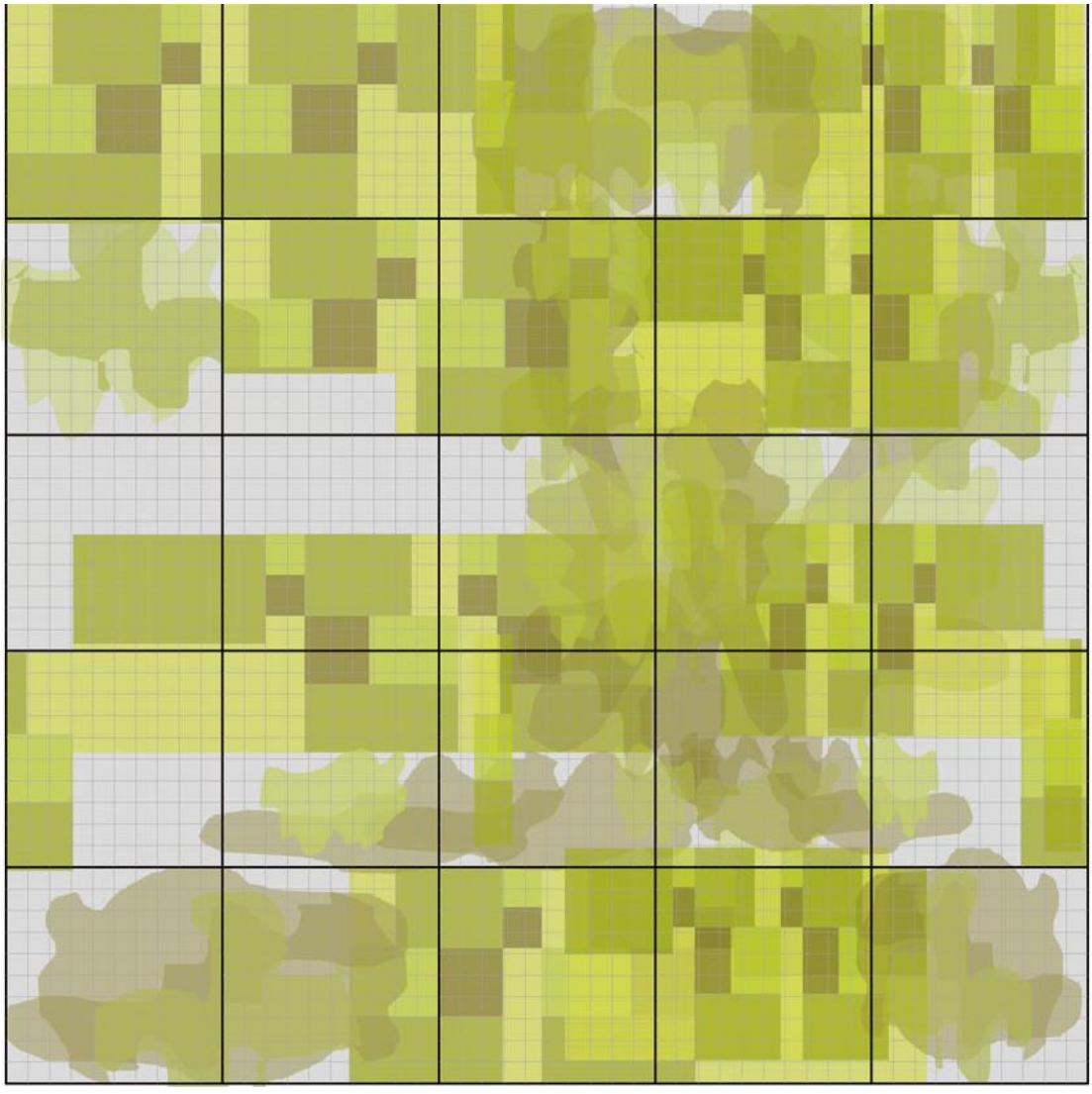

Fig. 5: Plan



Fig. 6: The model of the flat area.

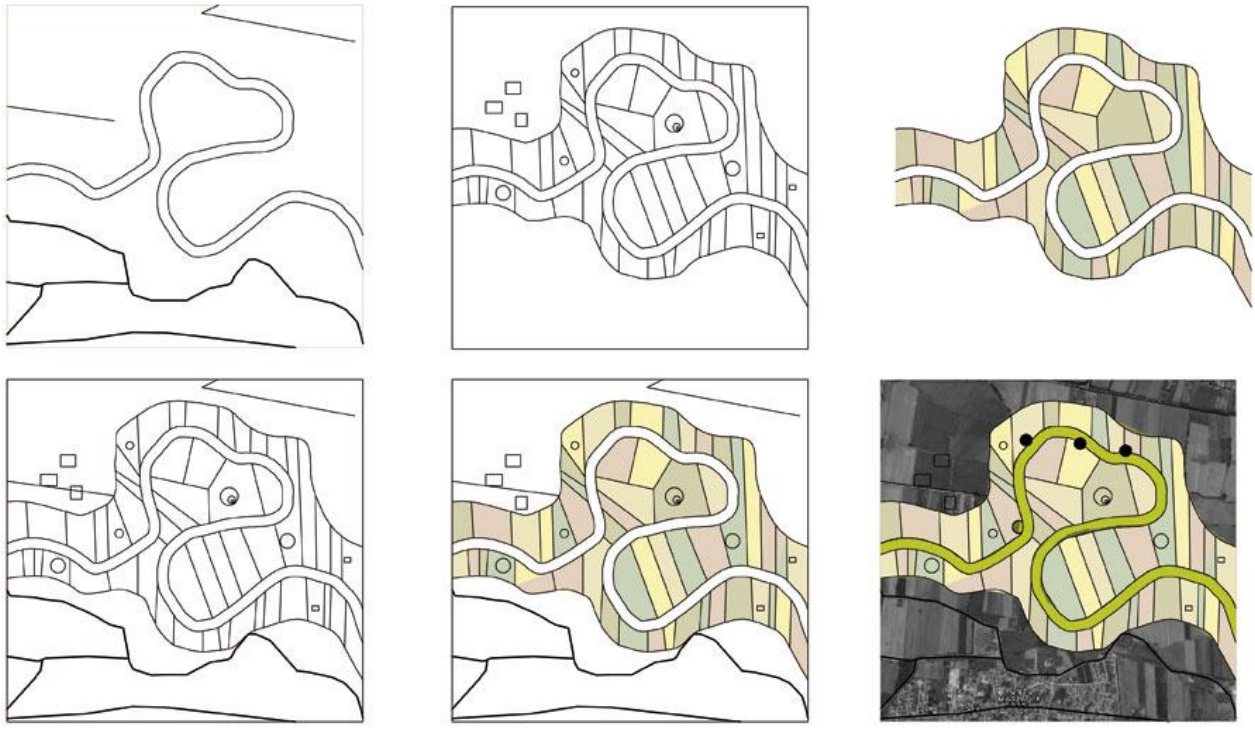

Fig. 7: The model of the river area.

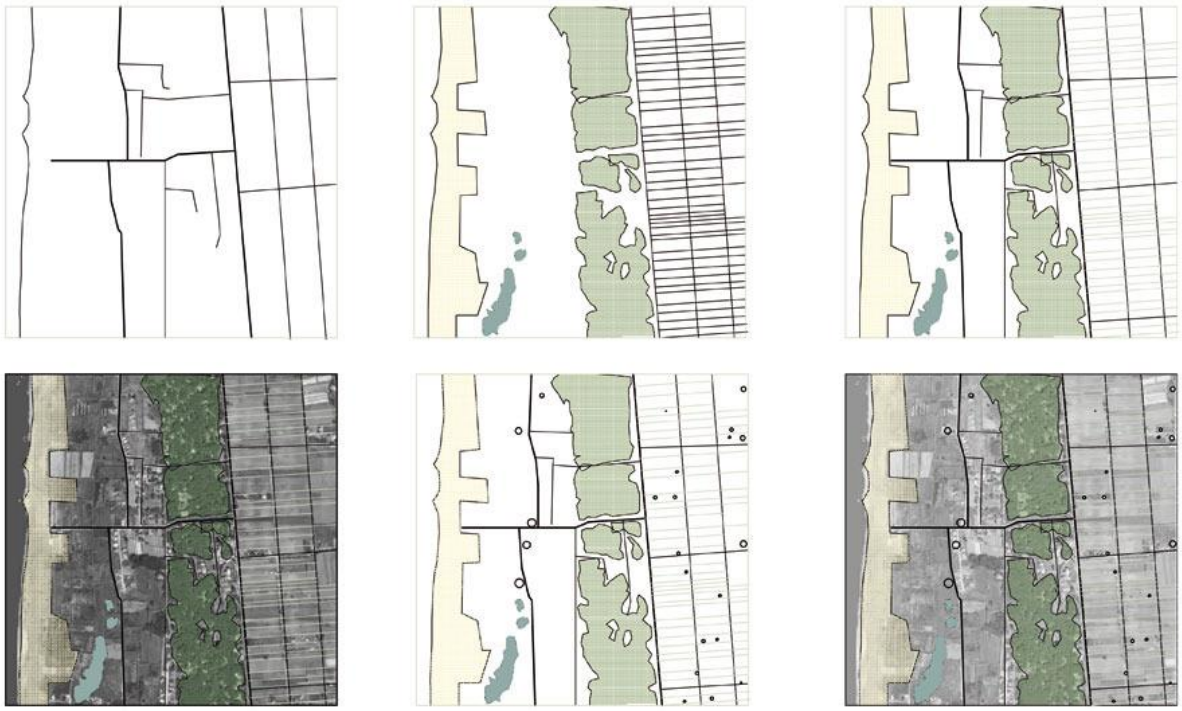

Fig. 8: The model of the coast area.

Bibliographical References

[1] SERVINO Beniamino., *La città eccentrica. Esemplificazione del sistema urbano-territoriale della provincia di Caserta nel '900,* Nuova Arnica, 1999.

[2] SERENI Emilio, *Storia del paesaggio agrario italiano*, 15ª ed., Laterza, Roma, 1961.

[3] PANE Roberto, *Campania. La casa e l'albero*, Montanino Editore, Napoli, 1962.

[4] DI VILIO Salvatore, MARINO Fiorenzo *I giorni della canapa – Storia per immagini in Terra di Lavoro*, Rogiosi editore, Napoli, 2012.

[5] GRAVAGNUOLO Benedetto, *Architettura Rurale e Casali in Campania*, Clean, Napoli,1994.

[6] STRIANO Enzo, *Il resto di niente*, Avagliano, Napoli, 1999.

XII International Forum Le Vie dei Mercanti
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Aversa / Capri, 12,13,14 June 2014

Sorrina Nova (VT): traces of an intangible city. The contribution of aerial archaeology

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Abstract
Sorrina Nova is the name of the ancient Roman settlement of the modern city of *Viterbo*. The centre was located, most probably, in the western portion of the extended promontory of *Riello*, along the road *Baths*, which is connected with the *Via Cassia*. The roman town developed after the destruction of etruscan *Surna*, that was erected on the *San Lorenzo's Hill*, where today there is the Papal Palace and the Cathedral. The reconstruction of the *Via Cassia* determined the development of *Sorrina Nova*, because it was an important connection between Rome and Central Etruria up to Florence. The fall of the Roman Empire caused a period of serious crisis, that forced the residents to return again to the *San Lorenz's Hill*, called *Urbs Vetus*, founding *Castrum Viterbii* in 773 AD. The research aims to integrate the data obtained during the surveys conducted on the ground and collected in the two volumes of the *Carta Archeologica d'Italia, Viterbo* (MILIONE A. 2002-2007), with the data achieved with the aid of aerial photointerpretation. The objective of this preliminary study is to define the location of *Sorrina Nova* and the ancient city plan.

Keywords: Lazio, Viterbo, Sorrina Nova, Aerial Archaeology, Ancient Topography

1. State of the art
The uncertain position of the city of *Sorrina Nova*, the ancient roman settlement of the modern city of *Viterbo*, is always argument of research for academics and literates; the earlier studies were continued, in the middle of XIX century, in 1849 [1], by Francesco Orioli, scientist and archaeologist, who supposed that the location of *Sorrina Nova* was on the upland of *Riello*, about 3 km from the centre of *Sorrina Vetus*, the ancient Etruscan settlement, that today stands in *Colle del Duomo* in *Viterbo*. F. Gamurrini, in the writing of *Carta Archeologica del 1881-1887*, republished in 1972 [2], pointed out with accuracy the numerous archaeological ruins on the area of *Riello*, that probably belonged to the ancient *Sorrina Nova* [3]. Also A. Gargana, as Orioli, was convinced of existence of an etruscan-roman settlement [4], that during the Middle Ages developed into the city of *Viterbo.* Later, the theories of F. Orioli were denigrated by M. Signorelli [5]. A. Scriattoli, describing the monuments of *Viterbo*, retail that, near *Palazzo Cristofori*, was conserved a fragment of epigraph, embedded in a wall [6]: the epigraph referred the name "*Sorrina Nova*" (*CIL*, *XI*, *3010*). In the 1966 e in the 1969, around the area of *Riello* [7], two fragments of marble's plate were found, a grave and an etruscan inscribed sarcophagus were found in *Poggio Giudio*. In a document dated back to 797 AD, the *Regestum Farfense* (*II*, *n*. *172*), emerges the name of "*casalem Surrinem*", not that "*Sorrina Nova*"; the town had almost lost its importance. In 1988, V. Fiocchi Nicolai [8] asserted that the ancient roman settlement was on the *via Cassia*, near the *Ponte Camillario*, about 2 km west from *Viterbo*. The archaeological surveys which were already conducted in the area of *Riello*, between 2002 and 2007 [9], had established, confirming the regress data and completing the new data, that the area was, probably, the location of the ancient roman settlement, however today the question of real site of *Sorrina Nova* has not yet been resolved.



Fig. 1: *Sorrina Nova* in *Carta Archeologica 1881-1887*.

2. The ancient viability

In ancient times, the territory of *Viterbo* was crossed by so-called v*ia Cimina* that, in historical cartography, is often the only element representing the ancient local viability. Attested by ca. fifteen inscriptions about *curatores viarum*, which are probably dated back from the I to the III century AD, the way maybe started from *Sutri*, it passed in the neighbourhood of *Lago di Vico* and then it brought back to *via Cassia*, in the North of *Viterbo*, near *Aquae Passeris*. Traces of *via Cimina* were founded also near *Sorrina Nova*; in correspondence of *Strada Bagni*, an arterial road started; it was part stone-paved and part dug in tuff stone. This road ran long a wall section near *Poggio Giudio* and then it cut the site of *Riello*: it is possible suppose that in this point, the *via Cimina* was divided in two arterial roads: the first passed near *Sorrina Nova* and arrived to the *via Cassia* in the W and the second brought back to consular road, near *Aquae Passeris*. The road that linked to *via Cassia* is now equivalent to *Strada Bagni*, this had four "*diverticula*": the first brought in *Tuscania*, the second in the neighborhood of bath buildings near *Bussete* site, the third crossed the hill of *Sorrina Nova* and the last one continued behind *Poggio Giudio* and met with the current *Strada Riello* [10].

3. Sorrina Nova: the archeological studies of site of Riello

The ancient settlement of *Sorrina Nova* is today attested by numerous inscriptions [11], but only eleven of these, dating back between the I and II century AD, mention exactly the name of *Sorrina* [12].These inscriptions give very little information regarding the organization of the roman town, which became, probably, a *municipium* in 87 BC; in these inscriptions is attested the presence of several baths, a *macellum* and necropolis. An *ordo decurionum* [13] and a *pontifex iure* [14] are mentioned and this imply the existence of political structures and worship buildings. The area of *Riello* is frequented since the protohistoric age, as the materials found at *Poggio Giudio* and *Fosso Riello* suggest; the settlement attested a continuity of life, during the etruscan and archaic age, as evidenced by enlargement of the settlement, which extended over a large part of the upland to the W of *Fosso Riello*, and over the necropolis of *Poggio Giudio* and *Poggio Giulivo*. The finding of a memorial stone, on the site where *Sorrina* was built, confirms the attendance of the area between the fourth and third centuries BC; the presence of necropolis is attested along the cliffs that line, to the W and to the E, *Fosso Riello*. During the early imperial age, in the city was build the baths and the *macellum*; the necropolis of *Poggio Giudio* continued to be used until the first century BC. The city remained alive

until the fourth or fifth century AD, as attest the attendance of the roman baths in Late Antiquity; the literary sources attest also the martyrdom of Sts. Valentine and Hilary, in 304 AD, near the *Ponte Camillario*. Towards the end of the eighth century AD, the city was abandoned and the *Regesto Farfense* mentions, in the 796 AD, only a "*casale Surrinem*", while from the middle of eighth century AD, the same literary source attests a "*Castrum Viterbi*" that correspond to the *Colle del Duomo* [15]. The city, therefore, moves again to the site of the ancient etruscan town of *Surna*.

4. The archaeological map of *Viterbo*: summary of the surveys data in the area of *Riello*.

The area of *Riello*, in order to carry out a more detailed analysis, has been divided into four micro areas, called A, B, C and D (fig. 2) with the purpose of summing the study up. Each single micro area contains all data related to the reports of discoveries and archaeological surveys conducted between 2002 and 2007, for the preparation of the archaeological map of *Viterbo* [16].

4.1 Micro area A

The south-western area is characterized by the existence of underground rooms, communicating each other through many tunnels, and various chamber tombs. Sporadic fragments of red and clear clay tiles and fragments of tableware are also attested [17].

4.2 Micro area B

The north-eastern side is bordered to the W by a tuff ridge, at the edge of which a *opus cementicium* wall was found; it was composed by small travertine blocks. Scattered fragments of red and clear clay tiles, some *opus cementicium* wall ruins, few tableware fragments, red clay ware, black painted pottery, italic and african terra sigillata, archaic and renaissance maiolica were found [18].

4.3 Micro area C

In the SW area there were many *hypogea* and many narrow passages communicating each other; these were part of a complex system of tunnels dug into the tuff, performed in etruscan times, to capture the many springs this area was full of. Several fragments of building material [19] and ceramic [20] (VI-V century BC) and numerous paving stones were found in the NW of micro area C.

4.4 Micro area D

The area covers three hectares and is delimited by a tuff ridge to SW, S and S side, by a slope to E and W side and it is reconnected to *Fosso Riello* to N and NE. The presence of shapeless blocks of tuff and fragments of travertine plates were found in all the area. Ruins of a roman building and numerous chamber tombs built in the tuff are today hidden by vegetation. The area is characterized by the presence of numerous fragments of ceramics and building materials (VI century BC-I century AD) [21].

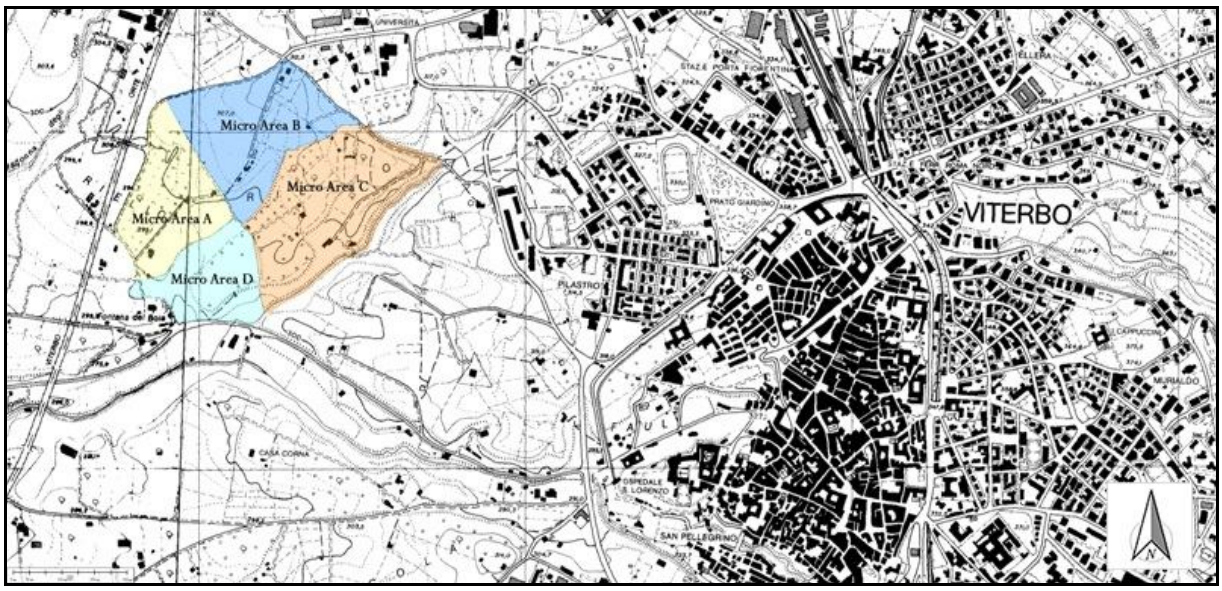

Fig. 2: The area of Riello divided in four micro areas: A, B, C and D.

5. Analysis and interpretation of aerial photos

Aerial photography is used in archeology as tool to documentation and identification of archaeological features that are not visible and are difficult to find, if not from the top. The elements, in the vertical and oblique photography, are called tracks; one or more archaeological objects “impress” the photographic plate to produce some effects on certain elements that surround it, or make it "invisible". These elements act as a mediator and make visible the hidden objects. The analysis of aerial photographs, along with a few visible persistence on the ground in 1849 and identified in 1887, and the materials found during the surveys conducted between 2002 and 2007, have identified part of the ancient roman city of *Sorrina Nova*. It was possible to reconstruct partially the topography and the system of the roman town, thanks to the reading and interpretation of satellite images, using aerial storical photos of RAF (1939) (fig. 3), satellite imagery from Google Earth (2005, 2009), ortophotos of the Lazio Region (1989, 1994, 2000, 2006, 2008) and the vertical and oblique images of Bing Maps (2013). After a careful aerofotointerpretation of individual shots, it was possible to create an aerial photography georeferenced mosaic (fig. 4), overlapping the union of sheets 345130 and 345140, in scale 1:10000, relating to the Regional Technical Map of Lazio, and this has allowed to "vectorized" archaeological visible anomalies. The frame snapped in the 2009 was basic for the correct interpretation of some anomalies and of great importance to the partial reconstruction of the urban structure. In vertical aerial photography are recognizable remains of numerous buildings and many relevant traces of the eastern sector of *Riello* (fig. 5). Of particular interest are the negative cropmarks that show, in the northern portion of the micro area C, the remains of several buildings, with NW-SE orientation: eight quadrangular rooms (ca. 8 x 7 m), an L-shaped structure (20 x 12 m) and an unusual shaped building that has all the characteristics of a burial chamber. In fact this is composed by a *dromos* (12 x 4 m) which allows access to an environment of rectangular shape (10 x 8 m) relevant to the chamber of the deceased. The anomalies of quadrangular and polygonal shape, generated by increased growth of vegetation and by a difference in darker tonal color, would seem to indicate that the structures were dug in the tuff (fig. 6). Similar examples are found in *Vulci* and *Veio* [22] (fig. 7).



Fig. 3: The area of Riello in a historical photo of RAF 1939.



Fig 4: The aerial photography georeferenced mosaic.

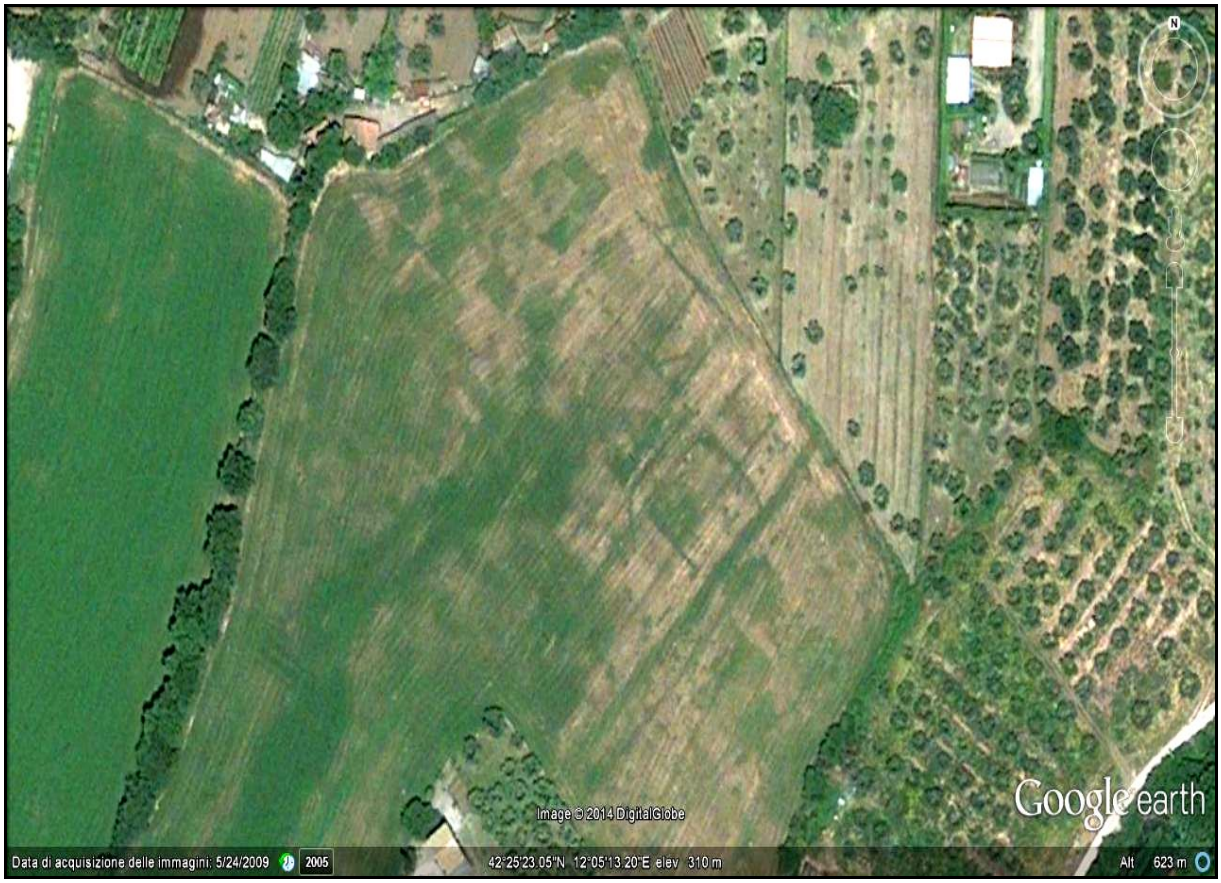

Fig. 5: Riello. Micro area C: The structures and the block identified by cropmarks.

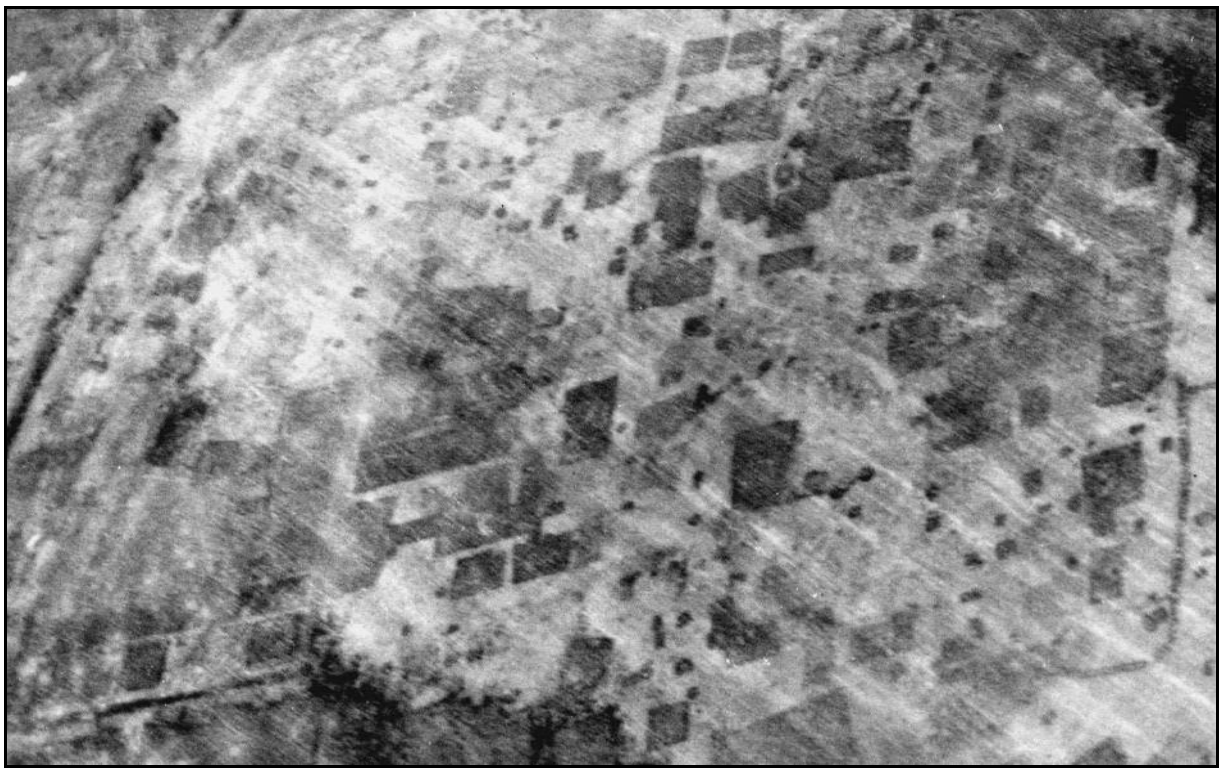

Fig. 6: Archaeological area of Vulci: the structures pointed out by cropmarks are similar to those of Sorrina Nova [23].

Immediately to the SE, negative cropmarks are visible: they are remains of two blocks, narrow and elongated in the NE-SW direction, which measure 36 x 48 m. These are divided into batches (12 x 24 m each), three on the short side and two on the long side, for a total of six, for each isolated. Other cropmarks are visible: the remains of a moat (106 x 4,50 m), oriented NE-SW, delimits the block on the SW side (fig. 6).

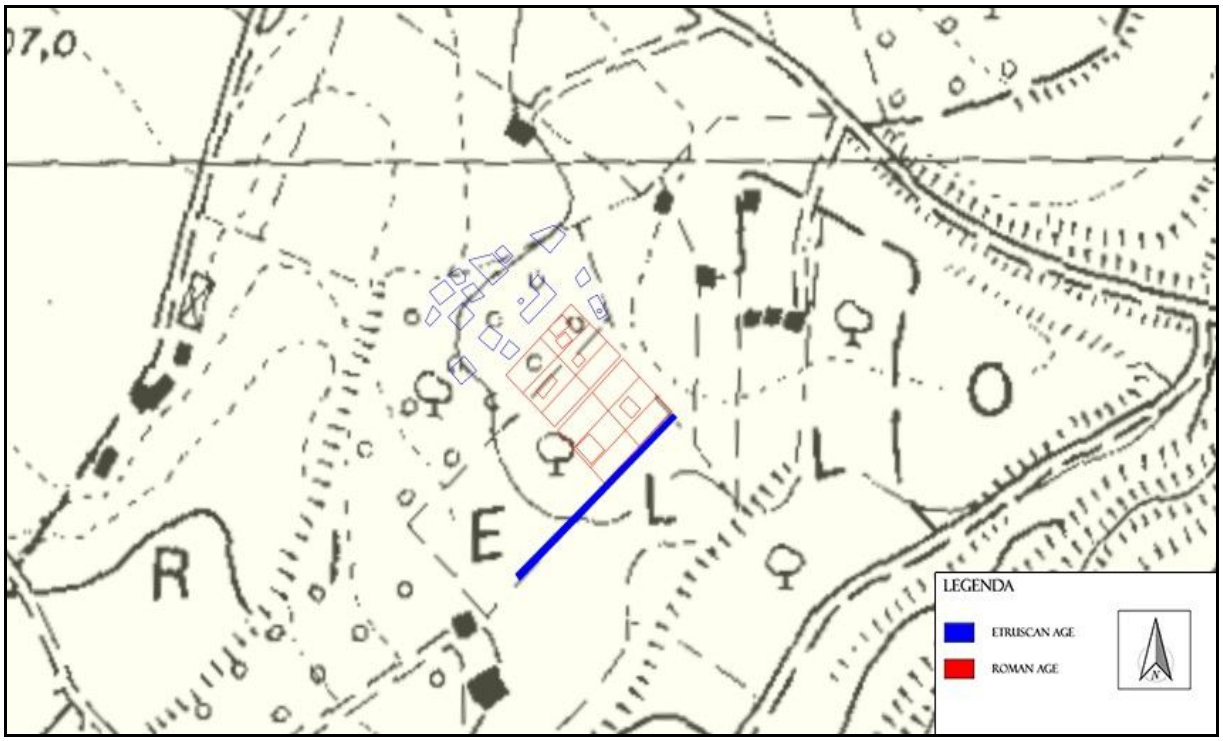

Fig. 7: The finalized cartography. The area of Riello with restitution of archaeological data. Detail of roman blocks in red and etruscan structures in blue.

6. Conclusions

The results obtained from the study of aerial photographs, along with the data deduced from literature sources and those derived from surveys, it is possible to suggest different phases of the frequentation of the area of *Riello* and, in particular, the micro area C. Obviously, this is a preliminary study performed on a narrow portion of area with high archaeological potential. The investigated section of the area, according to the data mentioned above, seems to have been occupied, in a first phase, in etruscan age, as evidence the structures built in the tuff bank and the ditch, probably belonging to an etruscan “tagliata”, whose presence is attested in the highly territory. In a second step, the area seems to be affected by the existence of a roman settlement, as evidenced by the presence of two blocks. At the current state of knowledge, the consistency of the obtained data is the first step for a series of interventions aimed at verifying future archaeological excavation of the tracks identified during the aerofotointerpretation.

Bibliographical References

[1] ORIOLI, Francesco. *Viterbo e il suo territorio: archeologiche ricerche*. 1ª ed. Roma: Tipografia delle Belle Arti, 1849. 189 p.

[2] GAMURRINI, Gian Francesco. *Carta Archeologica d'Italia 1881-1887*. 2ª ed. Firenze: L.S. Olschki, 1972, 462 p.

[3] *"In compagnia del sig. Medichini ho fatto degli studi sopra il terreno di Surrina Nova. Dalle vicinanze di Ponte Camillario si parte una via romana che doveva percorrere l'attuale dei Bagni fino alle vicinanze di Porta Faul. Detta via passava per una terma, (i bagni del Caio) la cui costruzione accenna ad un epoca tarda. Sembra che detta via si unisse ad altra che proveniva dal piano del Bullicame, ma di questa non conservasi che lungo tratto incavato nel tufo e comincia precisamente al fontanile dei Bagni di Ser Paolo. Presso questo bivio discendono altre due vie, la cui esistenza è accertata da profondi tagli e da vari selci e frammenti di selci. La prima costeggia la valletta di Riello a destra salendo il fosso; giunto sull'altura piega a d. con piccolo angolo sulla via mulattiera che conduce a Porta al Bove per poggio Giudio. Per questa via sono frequenti tombe di un periodo etrusco romano, cioè non dissimili da quelle lungo la Cassia di Sutri. L'altra via piega a manca verso l'altura di Surrina. A capo all'altura di Surrina lasciava a destra un monumento sepolcrale e discendeva ad un tratto di via antica, che da sopra il Bullicame portava e tuttora porta alla Madonna della Croce (Bivio della via di Toscanella con quella di Montefiascone). La via descritta doveva essere il decumano della città di Surrina. Tanto la via che corre sul fondo di Riello, quanto quella che percorre la via attuale dei bagni mettevano capo ad una strada, di cui si accennano l'esistenza più selci ed un continuo taglio la quale corre parallelamente alla via attuale circondaria da Faul a Porta di Bove. Ecco ora una succinta descrizione della nuova Surrina. Le tombe che vedonsi sopra il gazometro a Porta Faul debbono appartenere a quel pagus etrusco che stava dove ora trovasi il Duomo ed il giardino vescovile, cioè sulla rupe fra il fosso Arcione e il fosso di Paradosso perché sono di un carattere puramente etrusco e lontane e divise dalle altre della nuova Surrina. Queste si estendono lungo la via attuale dei bagni, su pel fosso di Riello ed in quella costa ripida e tufacea di S. Ilario, cioè alla manca dell'arcione a mezzodì di Surrina. Il carattere di queste tombe è etrusco romano, cioè sul davanti sono aperte ad arcosolio, e più di esse sono internamente divise a loculi. Vi sono però delle tombe più antiche, etrusco romane sempre, colla volta divisa a travature, ma queste sono tre o quattro. Della antica cinta di Surrina Nova niuna traccia. Dal lato del Bullicame è lasciata a picco a sud e sud-est difesa e divisa dal fosso di Riello a nord da una vallata ora detta di Ciofi. L'altura entro questi confini non è molto vasta, ma appariscono numerosi segni di fabbricato nell'altipiano attiguo in direzione di Viterbo. Il lato nord di questo altopiano è tracciato con un taglio rettilineo sul tufo corrispondente sulla valle Ciofi."*

[4] "*In due dei nostri cronisti del '400, Niccolò della Tuccia e Giovanni di Iuzzo da Cobeluzzo, in un atto del Chronicon Farfense e, quel che più conta, in alcune iscrizioni romane (CIL, XI, n 3009, 3014, 3017, 3020) si accenna esplicitamente ad una Città antica di nome Surrena esistente nel Viterbese. Alla delimitazione topografica di tale centro romano si giunge facilmente per le indicazioni dei cronisti che affermano essere stata Surrena situata in contrada "Riello". Uscendo infatti dalla Porta Faul ed inoltrandosi per la vecchia strada dei Bagni, che, in alcuni punti, per essere incassata profondamente nella massa tufacea, mostra la sua pura origine etrusca, si raggiunge a circa un chilometro dalla Città, una collina che si erge, a guisa di altipiano, sulla destra della Via. Anche l'occhio meno esperto non può tardare a riconoscere nel colle in parola la sede di una città antica, oltre che per l'abbondanza dei ruderi, alcuni di pertinenza termale, affioranti il suolo e per il grande numero di grotte sepolcrali scavate nelle colline vicine. Sul pianoro del colle che dovette ospitare la Città – la Surrina delle epigrafi o la Surrena dei Cronisti – si notano resti di antiche costruzioni."*

[5] SIGNORELLI, Mario. *Storia breve di Viterbo*. 1ª ed. Viterbo: Stabilimento Tipografico G. Agnesotti, 1965. 418 p.
[6] SCRIATTOLI, Andrea. *Viterbo nei suoi monumenti*, 1ª ed. Roma: Stabilimento Ditta F.lli Capaccini, 1915-1920. 470 p.

[7] COLONNA, Giovanni. Sorrina, In ISTITUTO NAZIONALE DI STUDI ETRUSCHI E ITALICI. *Studi Etruschi*. 1ª ed. Firenze: Rinascimento del Libro, 1971, vol. 37, p. 339-340; COLONNA, Giovanni. Viterbo, In ISTITUTO NAZIONALE DI STUDI ETRUSCHI E ITALICI. *Studi Etruschi*. 1ª ed. Firenze: Rinascimento del Libro, 1973, vol. 41, p. 551; COLONNA, Giovanni. Viterbo, Notizie e Scavi. In ISTITUTO NAZIONALE DI STUDI ETRUSCHI E ITALICI. *Studi Etruschi*. 1ª ed. Firenze: Rinascimento del Libro, 1975, vol. 40a, p. 37-45.

[8] FIOCCHI NICOLAI, Vincenzo. *I cimiteri paleocristiani nel Lazio*, *Etruria Meridionale*. 1ª ed. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana, 1988, vol. 1, 419 p.

[9] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo*. 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[10] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo*. 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[11] ROVIDOTTI, Tatiana. Sorrina Nova: una città da scoprire. In CALDERINI, Aristide. *Epigraphica*. 1ª ed. Faenza: Fratelli Lega, 2007, vol. LXIX, 1-2, p. 379. The inscriptions are cataloged in *CIL* (*Corpus Inscriptionum Latinarum*), from number 2996 to 3039 and from number 7412 to 7478.

[12] ROVIDOTTI, Tatiana. Sorrina Nova: una città da scoprire. In CALDERINI, Aristide. *Epigraphica*. 1ª ed. Faenza: Fratelli Lega, 2007, vol. LXIX, 1-2, p. 379-389. Nine are listed on *CIL XI*, *I*, (3009, 3010, 3012, 3014, 3015, 3017, 3020, 3029, 3033) and two are fragments of calendars.

[13] The local equivalent of Roman Senate.

[14] The highest religious position of an ancient roman city.

[15] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo*. 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[16] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo.* 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[17] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo*. 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[18] MILIONI, Alessandra. *Carta Archeologica d'Italia. Contributi, I.G.M. F. 137 III NE Viterbo, III SE S. Martino al Cimino, Viterbo*. 1ª ed. Viterbo: Gruppo Ricerca Fotografica, 2002-2007, vol. 2, 161 p.

[19] Fragments of red and clear clay tiles, quadrangular blocks of tuff, plates of travertine, fragments of columns in travertine.

[20] Fragments of tableware, one fragment of black bucchero, one fragment of gray bucchero, one fragment of red-painted pottery, one fragment of amphora.
[21] Fragments of brown mixture pottery, fragments of gray bucchero, one fragment of amphora, fragments of black-painted pottery, fragments of marble's plates with gray veins, fragments of painted plaster, one fragment of serpentine marble and numerous mosaic tails.

[22] POCOBELLI, Giorgio Franco. Vulci: il contributo della fotografia aerea alla conoscenza dell'area urbana. In CERAUDO, Giuseppe. PICCARRETA, Fabio. *Archeologia Area*. 1ª ed. Roma: Libreria dello Stato. Istituto Poligrafico e Zecca dello Stato, 2004. vol. 1, p. 127-143. In the area of Vulci, through the study of aerial photography, is possible to see many areas charaterized by the presence of similar structures in size and shape as those in the area of Sorrina.

[23] POCOBELLI, Giorgio Franco. Vulci: il contributo della fotografia aerea alla conoscenza dell'area urbana. In CERAUDO, Giuseppe. PICCARRETA, Fabio. *Archeologia Area*. 1ª ed. Roma: Libreria dello Stato. Istituto Poligrafico e Zecca dello Stato, 2004. vol. 1, p. 140.

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Knowledge and representation as instruments for evaluation of retrofitting in the historic cities. The Jewish *Ghetto* in Rome.

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Abstract
Approaching with method to the problem of dissipation of non-renewable energy and, in general, environmental pollution is now an imperative condition at the international level.
This issue concerns not only the new urban settlements but also the historic cities, with all the difficulties arising from the need for transformations resulting by retrofitting in the historical heritage.
In the range of the difficult dichotomy between conservation and innovation, the historical city must address the complex path of the research of an equilibrium between its own essence and the new modernity needs along with a development in line with the environmental sustainability .
We can say that now there are already many technologies and procedures applicable for this purpose in the new buildings, so the issue becomes very controllable in the event of new buildings.
Likewise, when it is possible to work in a decisive manner on the building, making necessary changes to the plant and architectural level, the action of retrofitting is a simple application. But in the case of historic heritage, how is it possible to operate?
What choices such as shares, assessments must be implemented in urban areas characterized by historical or however formal and architectural balance structured, in different historical periods?
One possible way could be the analysis of the potential transformations or, better said, analysis of the transformations compatible with the historic cities, resulting by the application of retrofitting techniques, already studied in specific disciplines.
In this direction, the "sustainable retrofit" of the historical city, becomes an element able to initiate policies for restoration and urban innovation of the historic cities, to refurbish of the obsolete housing stock and to implement the construction sector.
This paper is in the interest of PRIN 2010/PEA4H8, supported in part by the MIUR. It is part of a research carried by Engineering Faculty, civil and environmental department, of the International Telematic University UNINETTUNO about the topic of the role of the representation as an instrument for control and evaluation of the retrofitting transformation in the historical cities, principal through the survey and subsequent graphic simulation as a means of monitoring changes of the architectural heritage.

Keywords: Historical cities, survey, representation, retrofitting, architectural heritage.

1. Introduction to the issue
The historical city, harbinger of a cultural, sociologic, iconographic and mnemonic heritage, ancestrally rooted in the conscience of civilization, addresses the complex path of the research of an equilibrium between the own essence and the new modernity needs. Individual buildings or entire urban areas and pieces of city, have begun to deal with a new one (in terms of perception) and postponed requirement, established by the need to embark on a path towards a logic of sustainability in terms of functionality and energy.
In fact the Italian conurbation is characterized by a large number of urban and suburban areas, nucleus and districts of cities that express, most times, a remarkable formal language, a synthesis of morphological and architectural archetypes which have developed in the succession of ages. Many Italian and also European historical towns show a number of features, peculiarities and common traits

to each other which, although in different places, have often contributed to give a common identity and similar conurbation. The real question, in fact, for which this research seeks to identify possible solutions or at least good practices and methodologies, does not affect only heritage and historical areas of most valuable historical interest or, for better said, those areas that are already subjected or protected by specific statutory regulations.
This path is not easy, especially in the pleasant setting of formal and architectural balance in Italy and in Europe, recognized as a historical city; in fact this path cannot be abstracted by the clear definition, from a verse, of the extraordinariness of historical heritage and, from an other verse, by just as important identification of imposed -or deriving from a contemporary historical place- needs, functions, conditions system.
This paper therefore aims to highlight the main procedural issues, planning and management authority relating to regeneration in the historic city, through the reading of an urban environment taken as an example, where specific and relevant formal features.

1.2 Historic city and energetic requalification

The awareness that most of the historical heritage or however built until a few decades ago are the true responsible for a high proportion of environmental pollution and releases of carbon dioxide in the atmosphere, produced by their “lives passive", through the usual and daily use of domestic utilities and equipmenthas led to the attention of the scientific community and civil society in general the problem of retrofitting of the housing stock.
We can say that now there are already many technologies and procedures to be applied for this purpose in the new building, so the issue becomes very controllable in the event of new buildings.
Likewise when it is possible to work in a decisive manner on the building, making necessary changes to the plant and architectural level, the action of retrofitting is a simple application. But in the case of historic heritage as it becomes possible to operate?
What choices such as shares, such assessments must be implemented in urban areas characterized by historical or however formal and architectural balance structured in a different historical periods?
As we said in the introduction, the scope in the fully interests of research are represented by urban and suburban areas, nucleus of cities, districts and city of pieces that much characterize of the Italian and, in general, European conurbation that express a remarkable formal language, a synthesis of morphological and architectural archetypes which have developed in the succession of ages. It is precisely these the “essences”, the genius loci, the most salient characteristics of the conurbation of our territories, Italians and Europeans in general, so that it was not wrong to use the definition of "historical city" wanting to synthesise, in this expression, the sum of the characters and archetypes we have mentioned.This is the test, this is the place of confrontation in which explore how annul, or at least moderate, the conflictuality and criticalities resulting across the great value of cultural heritage, to be preserved as it is, and the demands, not be postponed, of a contemporary living environmentally friendly and conscious that natural resources are quickly running out.
Andreina Maahsen-Milan talks about incessant changeability of the urban scene. Changeability also determined by the ability to translate into physical elements also the formal technical and technological device, like form and matter. «*Whether it be "armed scenes", ie looms or light materials however detached from the space functional, from the main structure, or changing - screens, either physical or virtual - the urban scene wetsuit incessantly. ..... Different instead is the evaluation of what the outcome will, the sum of retrofitting energy in the overall image of the city and landscape. ..... Given as a fact the failure of any practice aimed at hampering such phenomenon, it is that the only possible way is the "virtuous use" of practices and technological devices required and imposed by sustainable planning and design onto design practice. An unresolved issue is still represented by energy upgrading of existing building heritage while there is increasing risk related to the visual pollution caused by the – so called “third landscape”*».[1]
Actually, this complex path through a delicate balance in which the conflict between conservation and innovation cannot be abstracted from that and that a clear definition, on the one hand, the extraordinary nature of the historic and, on the other, the equally salient identification of that system requirements, functions, conditions imposed by or derived from a use contemporary historical site.
How and in what way it can be considered "sustainable" if the historical place related to an ecosystem characterized by the current conditions?
How and to what extent can change the perception of the site in relation to the pursuit of these objectives in terms of sustainable energy?
It’s necessary to determine the priority of values, defining rules of conduct such as moderate, if not cancel, the resulting conflict that inevitably comes from the prelude and comply with the same, including the value of the past and expectations of the contemporary.
The identification of these "rules" and practices inevitably passes through the design of context that, as the primary instrument of knowledge and simulation, takes the value predominant in these specific transformation processes. [2]

1.3 Main problems and criticality

The issue, especially in Italy, it becomes urgent if not impelling, partly because of common sense of people and partly because the many directives (UNESCO Recommendations HUL, the Directive 2009/28/CE “20 20 2020”, Horizon 2020). But this question is not already enabled and, especially, not systematically implemented by the Italian statutory regulations that interest urban development and construction industry. Yet it seems that in recent times the attention of regulators is still paid to aspects that do not appear to address the issues under discussion, which still are of interest exclusively of scientific communities. Continuing our main interest in the representation as an efficient instrument of knowledge, monitoring and analysis of the trasformation of cultural heritage, we have sometimes researched items of interest in the urban planning area, but without satisfaction.

We would like to clarify that the scope of interest of this research is not precisely the project, (it would be in a specific field of competence of scientific sectors discipline already extensively studied with excellent results), but priority of knowledge, survey and analysis.

Thorough knowledge of the areas of intervention, in order to learn and recognize the most salient constitutive characteristics, the essences, the fundamental archetypes.

The genius loci, but also through a systematic approach, recognizing the momentous layers, influences that exist and can be found in the historical building.

Define the scope of intervention, representing the conurbation, the space complexity, the architectural composition, the compositional language, the colorimetric quality. That 's the first fundamental step of the work. Analysis of the potential transformations or, better said, the transformations compatible with areas of interest, the historical city, resulting across application of the techniques of retrofitting already, as before mentioned, notes, studied in specific disciplines and of which are we take note of the results useful for our specific research, through the modelling and the graphic simulations the most better methodologies and the best practices. [3]

2. The case study

The Jewish ghetto in Rome is a great place for our research; few roads, the subject of numerous descriptions and representations , viewed as a city within a city , always dodges from the influence of the Vatican, expression of Jewish otherness, but also bearer of roman "authenticity", even during the dramatic event of Nazism. Few streets that retain and return the ancient memory of the epochs, recognizable through the residual parts of the native urban plant or otherwise "old" in the morphological characteristics of the architectural heritage, in the archetypes constructive hidden or visible in the fabric of the buildings, the monuments, in the names. Everything in continuous relationship with a path still in place that you see the evolution of the place from the conclave introverted to a kind of organism in permanent osmosis with the outside, the full expression of the contemporary social dynamics, highly productive thanks to an uninterrupted cycle put in act by a variety of exercises and economic activities such as restaurants, bars, shops, small-capacity accommodation, crafts and much more, where the evolution has strongly reversed the proportional relationship between living - so a place of protection , limited socializing - and produce - then place open to flows "external" and the widest use .

The morphology of the Ghetto, as it appears today, the result of four basic stages of processing, three of which made for exclusive the will of the Vatican and only the last , the modern one , dictated by a planning approach .

First phase: 1555 Paolo IV imposed the construction of a boundary wall accessible by only three doors that go to delimited an area of approximately three hectares in the valley of the river Tevere.

2nd phase: end of 1500 beginning of 1600, Sisto V ordered the expansion of the area in southwest direction near the Tevere, going to be a new settlement, accessible by two new doors.

3rd phase: 1830 Leone XII imposed the closure of the insula that facing Via del Portico di Ottavia, Piazza Mattei, Reginella’s street and St. Ambrogio street in north - south direction .

4rd phase: 1800, intervention rather radical urban transformation that has given us the current morphology. [4]

It's clear that the evolution of the urban area of the ghetto into a period of about four centuries, derived solely from the application of religious dictates. This of course until you reach the conformation "modern", which saw the implementation of a project on urban development over most of the area between the Tevere and the axis of via del Portico di Ottavia, handing down to us today, such as residual areas the original system, some urban blocks upstream of the street Portico di Ottavia as, in particular, the aggregate bounded by the axes cross street of the Reginella, and so Sant'Ambrogio.

It must be pointed out that, although under the morphological and typological aspect can certainly be understood as an integral part of the system "ancient" of the Ghetto also some areas immediately surrounding the area between the Reginella's street and Sant'Ambrogio is ultimately, only to return

again the vision of the original Ghetto, intense according to the physical boundaries of strictly imposed by the Church.
This does not mean that truth in the "new" Ghetto has lost the genius loci so distinctive and peculiar; the place, although in the wider conurbation which now identifies it as an area in the historic center part of the district of St. Angelo extended between Monte Cenci, the Theatre of Marcello and Piazza Mattei, preserves the legacy of a widespread manner redolent of the original memory essence.
In addition to the architectural and cultural aspects, for the purpose of our research is necessary to take into account the high energy dispersion and consequent environmental pollution resulted from a place like the Jewish ghetto. In fact, as mentioned in the introduction, the peculiarities of the place, its location, its historicity, mainly its beauty and charm, has led to an economic process of "inversion" of the original functions. An area that for centuries has maintained a predominant feature of settlement to inhabit, although almost made it "forced" as we have said previously, in contemporary times has had a strong boost production quickly, becoming a real center of productivity, including economic, based primarily on accomodations, restaurants and subsidiary activities. (Fig. 3 – 4b)
This has determined to be able to welcome visitors and new streams of visitors to almost continuous cycle, the need to fortify the various exercises, the production equipment of its stores (kitchens, plants and equipments), on the one hand with a consequent increase in the energy requirements, for another the need to equip with thermal regulation systems increasingly powerful acts to regulate the climate temperatures, but above all to counter the rising thermal determined by its production facilities (electric motors, cookers, refrigerators, freezers, heat pumps) more and more powerful.
A sort of paradoxical vicious circle, which leads to the need of enhanced energy to be able to adjust the effect by itself procured or otherwise increased.
For this reason that the scientific communities are starting to verify that the only recourse to the type of plant technologies will not be sufficient to achieve the levels of reduction of energy dissipation that the Community directives (and common sense) dictate to the society soon.

2.2 Possible solutions
We will need to move towards more complex interventions that take into account the possibility of a practical and concrete use of natural resources; naturally obtaining a good yield deriving from natural resources need for a much longer metabolic process or, in terms Inverted, more extended quantitatively.
So the boundaries between visible and invisible, between perceptible and imperceptible, inevitably will vanish, and the society will be responsible for establishing criteria and procedures for the correct but decisive approach of retrofitting on the historic heritage, causing necessarily exterior changes but reaching to check out the original characteristics, in order to preserve the readability of the good and the place. You will have to develop the right knowledge to be able to use in our historic towns photosensitive roofing, ventilation chimneys, solar greenhouses and any other device that, in warm climates, make the most of the solar resource effectively controlling the temperature rise liabilities.
For this issue becomes a priority the role of knowledge, through the survey, the modelling and representation, as a fundamental instruments in the evaluation of the exterior modifications. [5]

2.3 Survey and representation as instrument of evaluation
Considering the solar exposure, urban structure and construction type orientation, conurbation, the dimensions and characteristics of general climatic, as the winds in summer that are prevailing direction from quadrants SW, NE and NW, with average temperatures of 23 at 31 degrees for three hours in a day, the entire area has characteristics of high energy dissipation. (Fig. 1, 2)
For a site like the one selected as a case study, the main aim so, for the purpose of upgrading the energy efficiency of action, is to moderate the thermal dissipation due to the particular exposure and climatic conditions of the area especially in relation to the type of construction, if that does not achieve of significant architectural quality particular performances in terms of transmittance. The main issue is that it does not negatively affect the view of the architectural features the district and define the right choices in this regard. A valley so of the analysis phase is fundamental the ability to simulate, through the representation of some hypothetical transformations, the possible forms in order to control the transformations and analyze the right respondences.
We have analyzed four different applications, singly and combined, and simulated through the representation of the effect of the changes on the perception of the architectural heritage.
Among these, the common element introduced is the application, upon the original roof, of an energetic roof called “TECU solar system”. It is an innovative integrated radiation-absorbing roof system constructed entirely in similar copper**.** The roofing covers a certified system of tubes in copper, through which runs a vector fluid which captures the solar energy. This latter transfers the heat to the water in a storage tank and thus to the building’s heating system. As shown in the image, the architectural perception of the building is not negatively altered.
Besides this, three other different interventions have been proposed:

1 - Transformation implemented through the utilization of trees, positioned in a front and parallel to the curtain of buildings. By the climate data, it is identified the opportunity to use caducous leaves trees, so the positive effects are maintained during the transitional seasons and eliminate almost all the unfavorable effects during the Winter. Therefore we make use of broadleaved large foliage species and in the specific of Tilia Tomentosa, (Basswood), originating from Eastern Europe that is resistant to Summer, drought and pollution. This type of intervention allows various results. The first results consist of a totally naturalistic approach. Then, taking into consideration that the area faces on the South, so trees have the effect of shading, the mitigation of temperatures, and a creation of air currents which increase the summer ventilation during the day.
During Winter, the caducous leaf trees lose their shading function. However, the presence of spin (trees with hemispherical shaped crown) allows, even without of leaves, to have a windbreak, like a wind barrier, that has still greater effect if we lower the distance among the trees. In the images is simulated the change made to the visual perception by this change. (Fig. 5 - 6b)
2 - Transformation implemented through the realization of solar greenhouses, working as thermal regulators. Solar greenhouses aim at capturing the light energy of the sun and convert it into heat energy and store it. The solar energy passes through the glass and heats the interiors. What really happens is the short wave infrared waves going in and turning into long infrared waves, which cannot escape. So they just reflect around and get absorbed by their supproundings. They reveal to be very useful during Winter season. They trap solar energy during the day, usually with benefit of south-facing placement and sloping roof to maximize sun exposure. Once the sun goes down, they are able to retain that thermal heat and use it to warm the house at night. In Summer, users can open up the double line of windows and let fresh air go in. Thus, these changes modify the visual on average perception of the site, introducing changes that, in certain territory or places, do not adversely alter the architectural and formal balance of the site. In the images is simulated the change made to the visual perception by this change. (Fig. 7 – 8b)
3 – Transformation implemented through the introduction of thermal chimneys, built upon the facades, as independent and reversible elements from the buildings. Solar chimney is a way of improving the natural ventilation of buildings by using convection of air heated by passive solar energy. A simple description of a solar chimney is that of a vertical shaft using solar energy to enhance the natural stack ventilation through a building. During the day, solar energy heats the chimney and the air within it, creating an updraft of air in the chimney. The suction created at the chimney's base can be used to, naturally, ventilate and cool the building below. (Fig. 9 – 10b)
Finally, through the representation techniques it is possible to evaluate and analyze the result of the combined application of the three interventions. [6] It's sure that this methodology introduces changes that strongly modify the visual perception of the site. This does not mean that these modifications negatively impact on the formal and architectural balance of the site, but surely they modify, also thanks to new compositional elements of the facade, the comprehension of buildings, their original characteristics and, generally, of the site. In the images, the change made to the visual perception by the introduction of these interventions is simulated. (Fig. 11 – 12b)

Bibliographical References

[1] MAAHSEN-MILAN Andreina. *Retrofitting practices to renovate the urban scene.* In: Russo Ermolli S., D'Ambrosio V. (edited by) *The Building Retrofit Challenge*, pag. 42, 2012 Alnea Editrice, Napoli.

[2] CENNAMO Gerardo Maria. *Survey, analysis and representation as instrument for control and evaluation of the transformations resulting by retrofitting in the historic cities. A sustainable energy requalification through monitoring of the changes of the architectural heritage*. International Journal of Energy and Environment, 2014, vol. 8; p. 61-68, ISSN: 2308-1007

[3] FLORIO Riccardo. (edited by) *Città storiche. Città contemporanee. Strategie di intervento per la rigenerazione della città in Europa.* Clean, 2012 Napoli.

[4] CENNAMO Gerardo Maria. *Jewish ghetto in Rome between narration and representation*. In: Città Mediterranee in Trasformazione. Identità e immagine del paesaggio urbano tra Sette e Novecento, 2014, Napoli: Edizioni Scientifiche Italiane, p. 603-612, ISBN: 9788849528145

[5] CUNDARI Cesare. *Il rilievo architettonico. Ragioni. Fondamenti. Applicazioni*. 2012, Aracne Editrice, Roma.

[6] DOCCI Mario, MAESTRI Diego. *Manuale di rilevamento architettonico e urbano*. 2009, Laterza, Bari

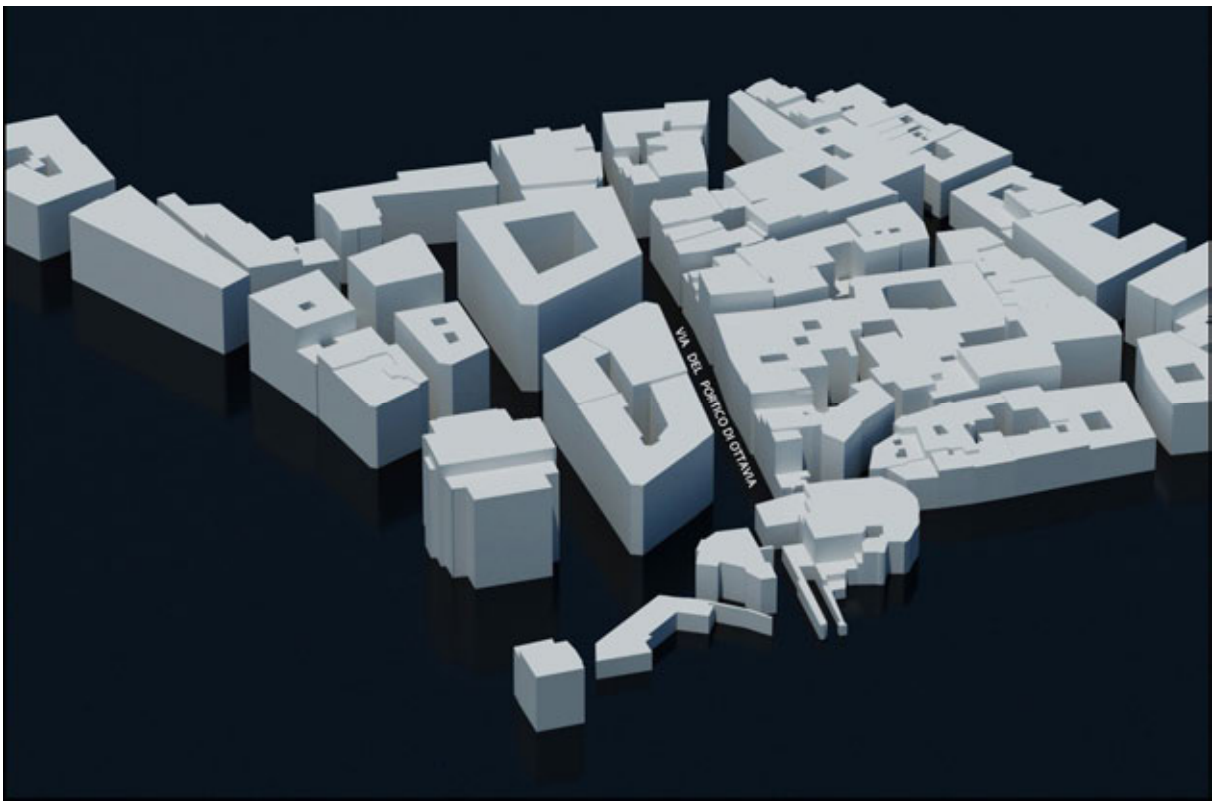

Fig. 1: 3d representation of Jewish Ghetto area. Realistic simulation of solar irradiation on the building curtain on "Portico di Ottavia" street. (on the right side). Time: 21 June 11:00 am. Facades are fully exposed.



Fig. 2: 3d representation of Jewish Ghetto area. Realistic simulation of solar irradiation on the building curtain on "Portico di Ottavia" street. (on the right side). Time: 21 June 5:00 pm. Facades are still strongly exposed. Sun exposure continues for all day long.



Fig. 3: Survey**.** Urban detailed plan of “Portico di Ottavia” street.



Fig. 4: Survey. Photoplan (*fotomosaicatura*) of the whole facades. Thus, it is also evident material and colorimetric aspects of the building curtain.



Fig. 4a: Survey. Details of the first and second blocks, from left to right.



Fig. 4b: Survey. Details of the remaining groups.

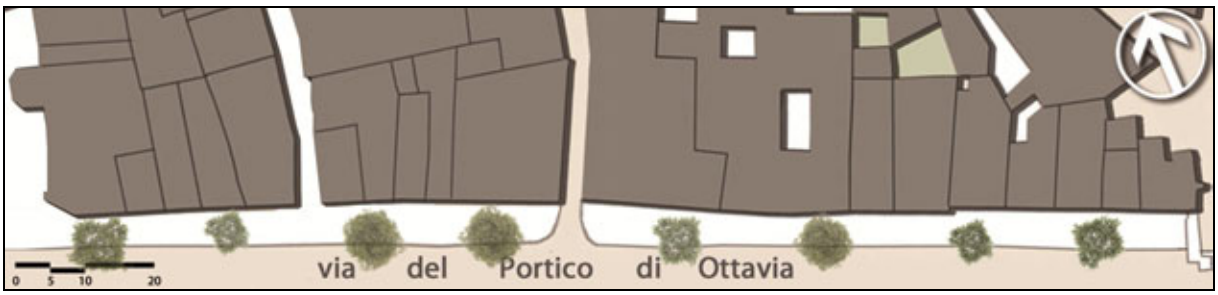

Fig. 5: Evaluation. Urban detailed plan of “Portico di Ottavia” street.



Fig. 6: Evaluation. Photoplan (*fotomosaicatura*) of the whole facades. Representation of n. 1 solution, roofing by TECU Solar System plus shielding by tall trees.



Fig. 6a: Evaluation. Details of the first and second blocks, from left to right. Representation of n. 1 solution.



Fig. 6b: Evaluation. Details of the remaining groups. Representation of n. 1 solution.



Fig. 7: Evaluation. Urban detailed plan of “Portico di Ottavia” street.



Fig. 8: Evaluation. Photoplan (*fotomosaicatura*) of the whole facades. Representation of n. 2 solution, roofing by TECU Solar System plus solar greenhouses.



Fig. 8a: Evaluation. Details of the first and second blocks, from left to right. Representation of n. 2 solution.



Fig. 8b: Evaluation. Details of the remaining groups. Representation of n. 2 solution.



Fig. 9: Evaluation. Urban detailed plan of “Portico di Ottavia” street.



Fig. 10: Evaluation. Photoplan (*fotomosaicatura*) of the whole facades. Representation of n. 3 solution, roofing by TECU Solar System plus thermal chimneys.



Fig. 10a: Evaluation. Details of the first and second blocks, from left to right. Representation of n. 3 solution.



Fig. 10b: Evaluation. Details of the remaining groups. Representation of n. 3 solution.

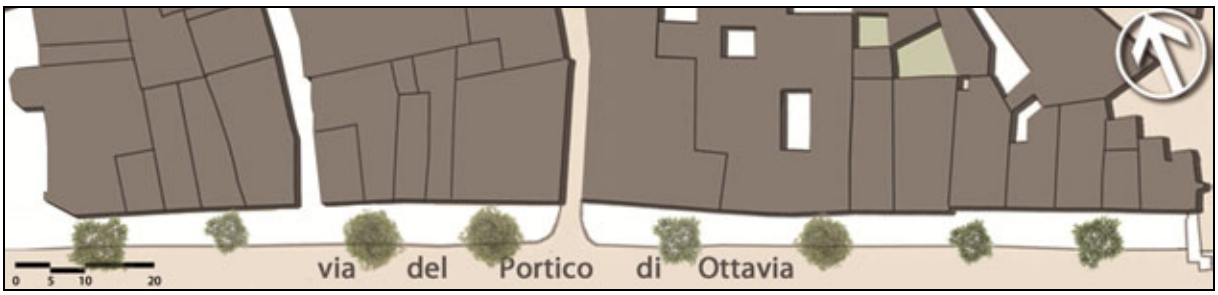

Fig. 11: Evaluation. Urban detailed plan of “Portico di Ottavia” street.



Fig. 12: Evaluation. Photoplan (*fotomosaicatura*) of the whole facades. Combined representation of the four solutions.



Fig. 12a: Evaluation. Details of the first and second blocks, from left to right. Combined representation.



Fig. 12b: Evaluation. Details of the remaining groups. Combined representation.

XII International Forum Le Vie dei Mercanti

BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT
FROM THE WORLD TO POMPEII

Aversa / Capri, 12,13,14 June 2014

TRADITIONAL MATERIALS, INNOVATIVE PERFORMANCE

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Abstract
The current regulations, which governs the energy and environmental sustainability of buildings, ratifies that the evaluation of building's environmental performances must consider its entire life cycle. Therefore, the assessment in Operating Energy (OE) is not enough; the Embodied Energy (EE), which is the total value of the energy, which a building needs, is very significant.
The choice of construction system, technologies and materials influences the EE. It often happens that technological choices that aim to reduce energy consumption during the operating phase, instead substantially increase the EE.
This paper illustrates the results of a research, which analyzed, in response to this need, the use of straw not only as natural heat insulator, but also as building material, in order to design a farmhouse located in the countryside of Pompeii. The innovativeness of the approach consists in the application of this material in Mediterranean climatic contexts, characterized by warm summers rather than by cold winters.
The straw can guarantee excellent thermal insulation thanks to very low conductivity values, and it can significantly reduce the losses due to thermal transmission.
The benefits are not limited to the reduction of energy consumption during the operation phase of the building. In fact, the straw is a construction material from a renewable source, with minimum energy consumption both in the phase of production, both in the phase of transport (mainly because the material is generally of local production), for both the phase of recovery / recycling and final disposal.

Keywords: Straw ball, Embodied Energy, Energy Performance

1. Durability, zero energy and low cost: fundamental requirements (AV)

The Energy Quality of a building is closely related to the concept of balance between levels of comfort (habitability requirements), consumption of energy and management costs. A new era of buildings and design seems to be starting, responding to increasingly higher standards of performance. The awareness of society to the energy and environmental problems is growing ... the European prospects appear lighter. The need for eco-friendliness, innovation and competitiveness is becoming the long-awaited opportunity to broaden the cultural horizons of the professional, more and more oriented towards an "aware environmental friendly design". It reflects renewed management models of the creative process - constructive that is no longer just tied to compliance with the minimum requirements of the law, but it is susceptible to the recommendations in order to improve the performance characteristics required by common good practice and to increase the comfort requirement and the environmental compatibility.
One of the possible strategies to pursue in order to "force " the industry to respond with an offer of eco- oriented and bio-compatible goods and services, is to orient the market acting on the ecologically thrust qualification of the demand. Only a virtuous circle of influences that originate from below (civil

society) can obtain the evolution of behaviours that allow us to improve the quality of life and to have less waste of resources.
According to this approach, the design is a system of integrated technology solutions based on the fulfilment of three requirements: durability, low cost and zero energy.
Some traditional materials, as straw, were used for thousands years in order to construct buildings. Today these materials are repurposed as innovative construction materials, low-cost renewable material. The straw is a humble material but rich in quality. In fact, it is characterised by simple technological details, sustainable construction processes and lower embodied energy in manufacturing.
The research investigates technological, energy and environmental benefits of using straw bales as building material, according the current regulations, which governs the energy and environmental sustainability of buildings and ratifies that the evaluation of building's environmental performances must consider its entire life cycle (ISO 15392:2008 and ISO 21929-1, ISO 21931-1 etc.).

2. Energy and environmental sustainability of Straw bales as a construction material (MC)

The international standard ISO 21929-1 establishes a core set of indicators to take into account in the use and development of sustainability indicators for assessing the sustainability performance of buildings. One of the indicators proposed by ISO 21929–1 is “Amount of non renewable resources” that includes:

- Consumption of non-renewable raw materials
- Consumption of non-renewable energy

Straw is an attractive building material for both indicators.
The standard states that total amount of non-renewable material resources consumed and the total amount of non-renewable primary energy shall be assessed on the basis of life cycle assessment method and/or information modules following the basic principles given in ISO 21930 and ISO 21931-1.A renewable material is one that can be replaced by natural processes at a rate comparable or faster than its rate of consumption by humans, rather than a finite resource that is depleted through use. Straw is available wherever grain crops are grown, so it is widely available in rural areas, and is annually renewable.
Moreover, straw it is considered an agricultural waste product. Once the edible part of the grain has been harvested, the stalks often become a disposal problem for farmers, and in many parts of the world, they are burned in the fields (causing a great deal of air pollution). By using the straw instead of eliminating it, we reduce also environmental impact of air pollution.
As regards the second indicator, straw’s excellent thermal insulation properties reduce consumption of non-renewable energy using for heating and cooling of buildings. In fact, U Values of walls of 45-55 cm made with straw bales typically fall between 0.13 and 0.19 W/m^2K (depending on the overall method of construction). Therefore, houses constructed with straw do not require further insulating layer to comply with requirements imposed by the legislative framework for the implementation of the Directive 2002/91/CE (D.Lgs 192/2005 and D.P.R 59/09).
Therefore, the assessment of consumption during Use-Phase of the building is not enough. In fact, the total amount of non-renewable primary energy of a building (valuated according to the life cycle assessment) is made up of two components: operating energy and embodied energy.
Operating Energy is the non-renewable energy requirement of the building during its life from commissioning to demolition (the energy used for heating, cooling, lighting, hot water…).
The Embodied Energy is the non-renewable energy required for building construction (for extraction, processing and manufacture of building materials, for their transportation to building site, for installation and final demolition).
The choice of construction system, technologies and materials influences the Embodied Energy.

3. The straw house: describing construction technology (LDS)

This design has a clear architectural bioclimatic matrix and the specific technological choices are the use of straw and bio-brick. The farmhouse project is located in the Pompeian countryside, a place rich in history and traditions. Pompeii is a town in the province of Naples, situated in the lowland, 14 metres above sea level, between Mt. Vesuvius and the Lattari mountains. According to DPR 457/78, Pompeii is placed in climate zone C, with 1.131 degrees day. In fact, the climate is temperate (mean annual temperature of 16.2 °C); August is the hottest month of the year with an average temperature of 24.1° C, while the coldest month is January with an average temperature of 9.3 °C. The project

involves the construction of a country house with vertical wall plugs made of straw bales and bio-bricks.
The used straw bales have the following dimensions: 35x45x85-120 cm, and a density of 90-120 kg/mc, directly coming from the field to the construction site. Therefore, the straw bales are “zero kilometre” material, which does not require intermediate processing.
Generally, straw bales walls have a thickness about 45-55 cm, included interior and exterior plaster. The straw bale, in order to be considered a efficient construction material, must provide some significant benefits:
- to be dry;
- to have internal moisture contents in the order of 12 % -15 %;
- to be well compressed;
- to have a fairly uniform size.
The construction of straw house is technically very simple; it includes a wooden frame, which is anchored to the ground by upside-down “T” section foundation beams, made of reinforced concrete, which also include the pillars of the structure.
The construction is very fast compared to traditional houses. Once the wooden frame structure is realized, wooden planks are set out in a vertical direction, in an appropriate section and at a distance between 60 to 100 centimetres, in both sides of the structure, from outwards and inwards to form a containment cage, otherwise called “double backbone technique”.
This technique was created in Canada thanks to the work of a group of researchers who studied straw house built with the techniques from the natives as well as constructive methods from Nebraska. Looking for a combination of the different construction techniques, the research group founded in the 1990's an association called GREB (*Groupe de Recherches de la Baie écologiques*), which gives its name to the GREB construction technique, changed by the American Ballon-Frame.
Since then, the building system has spread to Europe, especially in France, where hundreds of buildings have built.
This technique involves a double wood framework, used in order to contain the straw bales. These two elements, combined with the GREB plaster, are the only ones to have a structural value, and from a thermal point of view, they ensure the complete reduction of thermal bridges.
In Italy, the GREB construction system is not widespread because the current law does not attribute straw a structural value. In our country, the construction materials with structural capability include reinforced concrete, steel, masonry and wood. Thus, the GREB technique cannot be used in all of its applications but is used simply as an infill system. The same system has also been adopted for roofs.
In a GREB system, the plaster has an important role. It must be:
- long lasting
- stiffening the system, as support,
- protecting the straw from water, fire, animals and insects
- ensuring smooth, breathable walls.
The characteristics of the composition are:
_ 4 volumes of sawdust (for lightness and hygroscopic adjustment of the wall);
_ 3 volumes of sand (for roughness and adhesion of fine plaster with lime);
_ 1 volumes of lime (for the compression resistance, sound insulation, water vapor permeability);
_ 1 volume of cement (for its resistance to compression and rapid setting).
The plaster realized provides good breathability to the straw and reaches a thermal conductivity of λ = 0.2 W/mK.
The sawdust, in particular, is a very useful element since it favours the migration of water vapour through the plaster: It participates in the hygrometric regulation, is a hydrophilic material and promotes the breathability of the walls. Moreover, it is used to obtain acoustic wellbeing, too.
The role of the plaster in the “vertical wall” system is relevant and significant because it determines the technological feasibility of the use of straw as an infill.
The plaster is prepared in-situ. After making the wooden frame, the double frame containing the straw bales, having anchored OSB panels to it (which will act as a mould), the plaster is cast creating a layer one each side about 5 centimetres thick. It takes between 12 to 24 hours to set the system. Before casting and laying the panelling, any water piping and electrical wiring should be installed in order to reduce the construction time (unlike traditional practices where they are laid after the infill has been completed). This limits the amount of waste material as well as reduces construction time and costs.
Once hardened, the fine plaster is mixed, using clay as a material naturally present in the raw earth, mixed with fiber (chopped straw or sawdust of a certain size).
Vertical closings made in this way, with a thickness of 50 cm (including 5 cm plaster on both sides) guarantee an excellent performance in terms of thermal and acoustic insulation, breathability and fire resistance.



Fig. 1: A model of straw house (De Simone L., Dell'Aversana V. and Cantone D. designers)

4. Operating energy of a straw bales house in Mediterranean area (AV)

The architecture of the South Italy, like that of most of the Mediterranean basin, has favoured the use of massive construction systems, which consist of thick stone walls with small openings and open spaces such as control elements and climate mitigation.
In relation to the specific characteristics of the climate of southern Italy, the environmental control constructive model was predominantly conservative, based on integrated solutions responding to selective criteria, which are particularly useful for the mitigation of summer temperatures. The traditional (especially what is spontaneous, without architects!) compact and massive construction system was motivated by climatic reasons. Therefore, in a past where the use of plants in order to ensure comfort conditions to the confined space was not possible, the wellness was guaranteed by the building's shape, that had to be compact in extreme climates and pleated in temperate climates.
The technological analysis illustrates that compact types of construction characterize the Mediterranean architecture, with small and deep openings, light and reflective colour (white / sand).
This system was empirically repurposed to minimize solar gain in summer without compromising the heat gain in the winter season.
The environmental conditions dictate, therefore, rules, templates, and fees to build architecture that otherwise would not have capability to meet the welfare needs of its direct beneficiaries.
The straw ball house is located in Mediterranean area, in a climate zone C, characterized by hot summers (more than 26 ° C); for this reason, a good thermal insulation is not sufficient. The high thermal insulation ensures adequate conditions of hygrometric comfort in the winter season, with significant savings in fuel consumption on energy costs for heating. In order to ensure adequate comfort conditions even in summer, it is necessary to verify that the wall has adequate constructive characteristics of Transmittance and Attenuation in order to reduce the summer heat load and an appropriate phase shift that postpones the input flow in order to allow for the nocturnal dissipation of heat.

Therefore, it was necessary to verify the performance of straw bales wall in terms of thermal inertia.
The thermal inertia represents the material's capability to accumulate heat, as opposed to changes in temperature and flow of thermal power that occur in variable thermal conditions (external temperature, sunshine, etc..).
The thermal inertia depends on the density of the material but also by its specific heat. The straw is characterised by a low density (approximately 100 kg/m^3), but also by a high specific heat (1400 J / kgK), compared with other building materials. For this reason, a wall made of straw bales has good heat storage capacity.
The simulations, carried out with the software *Gemavap*, give these results:

- Thermal Transmittance U = 0.1492 W/m^{2}K
- Phase Shift about 15 hours
- Attenuation coefficient of 0.16.

This allows affirming that the straw is an interesting building material, from the point of view of energy efficiency in operational rating, even in places located in the Mediterranean area, even if they are characterized by hot summers. The curtain wall of straw bales in fact guarantees a good control of temperature and humidity conditions in the summer too.

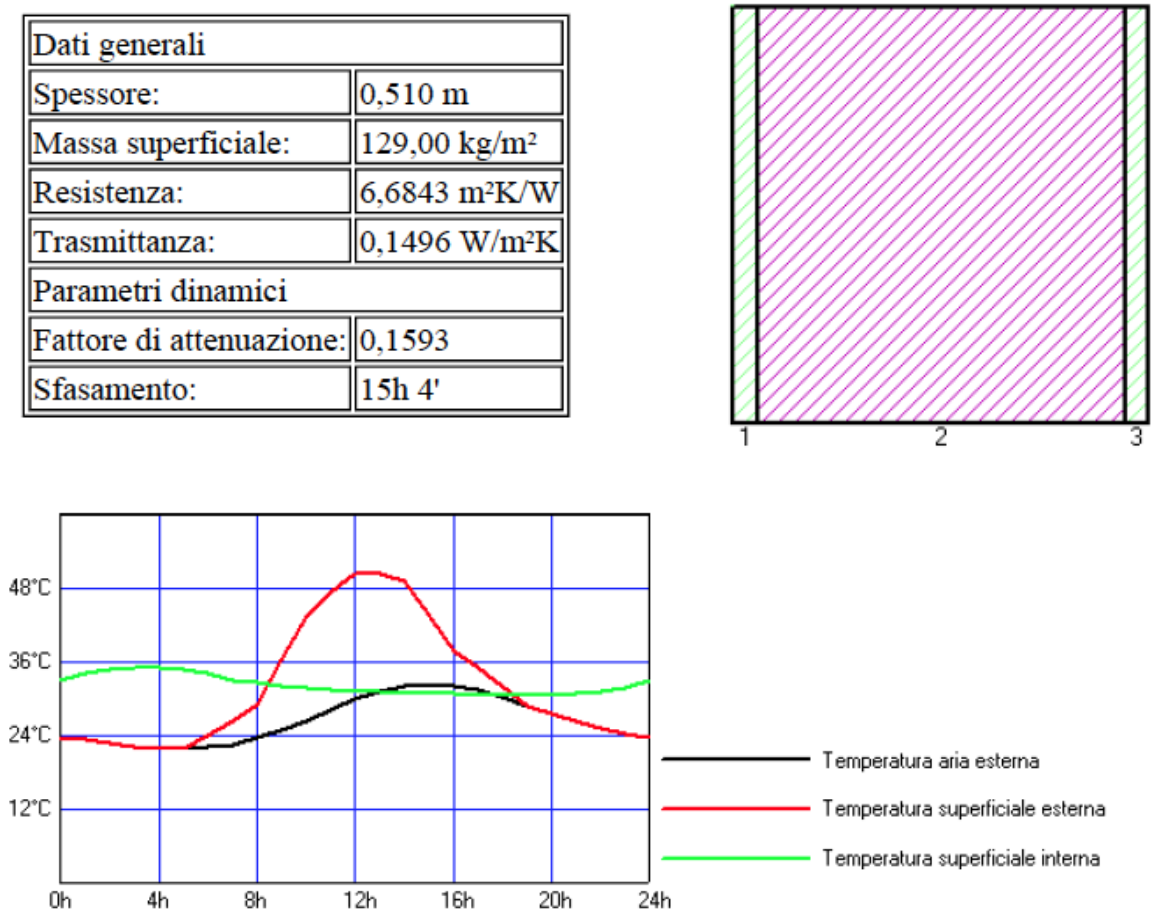

Fig. 1: Results of simulation carried out with the software *Gemavap*.

5. Embodied energy of a straw bales house in Mediterranean area (MC)

The project aims to minimize the total amount of non-renewable primary energy, not only Operating Energy but also Embodied Energy: the benefits of choosing a wood construction system and straw bales for building walls are not limited to the reduction of energy consumption during the operation phase of the building, but also during the entire life cicle.
The choice of building materials in very important: the materials with higher embodied energy require more resources and cause more waste, affecting the environment in a negative way.
For most building materials, the major environmental impacts occur during the initial processes. From this point of view, the straw bales have a low-embodied energy.

Straw is a construction material from a renewable source, with minimum energy consumption both in the phase of production, both in the phase of transport (mainly because the material is generally of local production), for both the phase of recovery / recycling and final disposal.
Very little energy was used to manufacture the product (sunlight was the main energy source for growing plant). The only energy needed to make a straw bale is in the bailing process.
Analyzing energy consumptions used to transport building products from the factory gate to the building site, we can say that they are a function of the transport method, of the distance travelled and of the material weight. Straw bales are generally of local production, and are lightweight. In the specific case, straw bales are widely available in rural areas of Pompei.
As regards the phase of recovery / recycling and final disposal, straw bales homes can last over 100 years if properly maintained. Moreover, straw bales are 100% biodegradable. Therefore, they have not disposal problems: when the time comes, the straw bales can be plowed back into the earth.
The Inventory of Carbon & Energy (ICE) is an embodied energy and carbon database for building materials [4]. The embodied energy data provides the energy consumed to make a building material.
In the ICE database the embodied energy of straw is 0,24 MJ/kg. Instead the embodied energy of a common Brick is 3,00 MJ/kg, twelve times higher of straw.
Straw bale walls are typically coated with a thick layer of plaster that is the main structural element, but is also the component of the wall that has the highest embodied energy. In the ICE the embodied energy of plaster is of 1,8 MJ/kg.
Therefore, the research examined the material composition of plaster, in order to determine the most optimal proportions to reduce the embodied energy of this material.
We can say that straw bales construction is an environmentally friendly construction method. Straw is a natural and renewable material that has low-embodied energy, and represents an interesting area of research for the construction industry.

Bibliographical References

[1] SATTARY, A.,THORPE, D. (2012). Optimizing embodied energy of building construction through bioclimatic principles. In: Smith, S.D (Ed) Procs 28th Annual ARCOM Conference, 3-5 September 2012, Edinburgh, UK, Association of Researchers in Construction Management, 1401-1411

[2] ALLEN Edward, IANO Joseph (2011). *Fundamentals of Building Construction: Materials and Methods,.* 5ª ed. John Wiley & Sons,. 1008 p. ISBN 978-1-118-17419-7.

[3] OFFIN Maria (2010). *Srtraw Bale construction: assessing and minimizing embodied energy,.* Thesis for the degree of Master of Environmental Studies, Queen's University, Kingston, Ontario, Canada.

[4] HAMMOND H, JONES,C. (2008) *Inventory of Carbon and Energy (ICE)* Version 1.6a - Summary. UK,University of Bath, Department of Mechanical Enginerring

[4] HOLTZHAUSEN, H. J. (2007). Embodied energy and its impact on architectural decisions.in AAVV 3rd international Conference on Sustainable Development Planning, 25-27 April 2007 Algrave, Portugal, pp. 377-385.

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SMART AS INTELLIGENT

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Abstract

The transformation of the built environment requires more and more frequently the use of an intelligent management system that is able to offer multiple and simultaneous responses on the issues about the quality life of modern citizens : Economy, People, Mobility, Governance, Environment and Living.
This paper pointes out some results of a research aimed to highlight , through the comparison of international experiences , the adaptability of smartness concept to a Mediterranean context area characterized by a great cultural value.
There are several models of reference : some examples of sustainable neighborhoods in Europe, the smart street and the smart building in Northern Europe and the Action Plan of Copenhagen, Vancouver and London.
The results achieved from the systematizing of these different study cases shows how the concept of smartness applied to the urban context isn't inclined to assert itself as a template to be replicated in a serial manner in all geographic areas.
However, it is possible in every urban reality read the specifics of the area in terms of strengths and weaknesses; aim at the creation of networked integrative superstructures; focus the propulsion nodal centers of growth and ensure the continuity of the system through the collection of data and information used in short, medium and long term.
In this sense Smart City is an opportunity for the city as a whole. Besides the tantalizing prospect of the access to funding available for the public authorities , it represents a real opportunity to open up to international experiences becoming the protagonist of the transformation.

Keywords: Smart City, Sustainable Neighborhoods, Intelligent management, Connected system

1. Analysis method

The most recent European and National announcements in energy, mobility and life quality put the smartness concept as a top priority objective into the strategic planning of interventions and as essential requirement for the characterization of urban regeneration operations.
But it's not enough to define as *smart* an intervention or a strategy to realize it as that; more often are declared aims which are not translated in actions, especially when it's about operating in built environment.
It's due to the diffusion of the use of the smartness term, which has permeated every cultural sector, in the most cases very superficial and sometimes equivocal.
As it's known we talk about "intelligence applied to the urban reality" since Nineties, when the *urbotics* concept prefigures a daily routine (home, school, work, transports and spare time) controlled and managed through electronic devices.

But, undoubtedly, the affirmation of the "*Smart*" approach takes place in 2006 thanks to the diffusion of the International research "European Smart Cities" from which, for the first time, are pulled evaluation instruments on the attitude of being smart of forty medium size European cities.
The study, even if it's developed into the economic sector, faces up the theme through the rating of categories and thematic requirements but at the same time extremely mutually dependents as: Economy, People, Mobility, Governance, Environment and Living.
This multifocal vision is transferred into the transformation experiences of the built environment, in which smartness, is developed as a digital infrastructure characterized essentially by two particular features: the connection of the effects on a temporal scale and the central position of the user.
Its definition can be read in the progressive adaptation of the urban sustainability concept applied to an environmental awareness and to a connection of social and economic sources of the area.
Therefore, the research goal is to define how the urban system conceives the smartness concept.
This study points out through the use of some examples:
- the organization of the structure derived by the urban action plan (Vancouver, Copenhagen, and London);
- the intervention sectors pointed out from the examples at the settlement scale (Eco Vikki, Kronsberg, BO01);
- the integration perspectives of a smart system through urban punctual interventions (Amsterdam World Smart Capital).
The results of the research point out that the screening of areas, the analytic individualization of strength and weakness of the site as well as the potentiality and the vulnerability of the areas analyzed are the fundamental elements for the correct realization of a smart project.

2. Urban Action Plans: a strategic view of smartness

Cities are the places where is concentrated the most of the worldwide population [1] and for this reason since the mid of Nineties they have been singled out as a point of reference, essential for the economic development and the conservation of the human and social resources capital that gravitates round them.
A lot of cities in Europe and in the whole world distinguish themselves for the introduction of smart topics in strategic planning actions, and also as innovative approaches to local problems.
In the research were studied some examples of cities as Vancouver, Copenhagen and London which empirically translate the concept of smartness through an integrated organization of times and modality of interventions realization.
For the city of Vancouver it's created the Greenest Action Plan in 2009, a plan directed to reach goals of increase and improvement of inhabitants' life qualities according to two temporal sequences: goals in medium-term, achievable within 2020, and goals in long-term, achievable within 2050.
The plan is shared in 11 action themes: Sustainable economy; CO2 Emission reduction; Building energy efficiency; Sustainable mobility; Zero Waste; Green areas access; Reduction of environmental footprint; Reduction of water consumption; Improvement of air quality; Local food promotion; Governance and Participation.
The Greenest Action Plan allows to reflect upon two distinctive aspects of the outcomes organization:

1. The temporal scanning of the programmatic goals, for which are established times and costs of investment.
2. The bottom-up logic for the localization of actions, are shared in development districts (neighbourhood by neighbourhood).

This logic, also present in the United States plans of Chicago and Portland, identifies strength and weakness o fan area but above all actively involves the local community which proposes, realizes and controls the established goals by the territorial planning.
The reference model of the Vancouver city is the advanced Copenhagen - it has always been an international reference point on issues of sustainability and environmental awareness - which in 2009 develops its Strategic Plan and the annexed Urban Climate Adaptation Plan.
The objectives of this plan are established on the time scale. Copenhagen aims to be a Carbon Neutral City in 2025, but what emerges from the analysis of Climate Adaptation Plan is the following of continuous improvement objective, intrinsic in smart dynamics.
The actions prospected in the plans, in fact, are rated on a scale of expected impacts and associated risks, in order to create a reference database useful to ensure the feasibility (especially economic and environmental) and the effectiveness of future interventions related.
A very peculiar case, but representing another key aspect of the organization of a smart structure, is provided by the Great Authority of London, through the Action Plan of 2000.

The action plan aims to regenerate, through a the development of an interventions system, the fragments of a city that shows, differently from the two cases examined previously, many of the issues arising from the uses complexity from the needs of a dynamic and multicultural reality.
Also in this case the shares are held in independent territorial units, consisting of municipal districts, and given the spatial extent and sometimes even from urban villages.
What is interesting from an analysis of the plan is the process of local resources screening, which is analyzed to collect information about:
- the energy performance;
- the maintenance of buildings;
- the potential and social vulnerability;
- the characteristics of the settled population;
- the indication of the economic and cultural sources attractiveness.
The survey, as done, identifies the site condition as a necessary element to elaborate effective policies focusing on the main fields which leading the transformation.

URBAN ACTION PLANS

NAME	YEAR	GOLAS ON TIME SCALE	MAIN GOALS	ACTIONS' AREA
Vancouver Greenest Action Plan	2009	Medium term 2020 Long term 2050	11	Neighbourhood
Copenaghen Climate Adaptation Plan	2009	Medium term 2025 Long term 2050	6	Single case
London Climate Change Plan	2000	Short term 2010 Medium term 2025 Long term 2050	5	Municipality/district

Fig. 1: Urban action plans comparison grid

3. From sustainable to smart neighborhood

If on an urban scale, can be specified the program objectives and guidelines, when it's reduced the range of investigation to the district is also possible to evaluate the smartness of design choices and technological solutions.
The neighbourhoods are a place for experimentation and dissemination of innovative technology solutions and best practies, which have become common use through the design experience of the European Framework Program 5th and 6th.
The neighbourhood small scale is ideal to identify areas for application of urban smartness, by encompassing the complexity of functions and dynamic cities, while remaining manageable in terms of size - for number of people and dimensions - and informative - for data collection.
The analysis research phase was carried out by selecting some European sustainable neighborhoods chosen depending on available information (e.g. readability of the planning phases) and technological solutions.
There are evaluated 23 European sustainable neighborhoods, classified according to:
- settlements typologies,
- designed intervention categories,
- performance requirements,
- renewable energy sources used.
This cross-reading was accompanied by some critical considerations that led to the comparison between three particularly significant neighbourhoods: Eco-Viikki in Helsinki, Kronsberg in Hannover and B01 in Malmo.
These districts have adopted some tools to support the strategies triggered in the design phase, from which it can be deduced some of the key aspects of the territorial approach to smartness: the evaluation of interventions, the operational involvement of the local community and the dissemination of results.
Eco-Viikki, is the oldest within those identified, allows to read in the construction of the PIMWAG tool, the dynamics of transparent check of the expected results. With the so-called PIMWAG method, in fact, it is identified a real rating scale that indicates the coherence between the design aspects in the elaboration phases, and the effective implementation of the same. The method identifies a reference

scale and a valuation range on five essential topics such as: pollution, natural resources, health, protection of biodiversity and food production.
The case of the Kronsberg neighbourhood is related to the EXPO 2000interventions, according to specific quality standards, both in the planning phase and in the buildings and open spaces realization: *City as Garden City as Social Habitat*. Among the sustainability goals for Kronsberg, that stands out for innovation and long smart view is the KUKA project - *Kronsberg Umwelt Kommunikations Agentur*.
The KUKA agency was established by the Municipality of Hanover firstly to coordinate and then to follow until the end of whole operation Kronsberg.
The batch processing has been oriented to a multitude of operators, to transfer them all the ecological concepts of optimization, to inform users and to make understandable the project objectives and, at least, to create transferable outcomes. The centrality of user is the key of an efficient internal communication system to the district - with an interesting documentation centre and a rich production of information on the use of the buildings.
Even more advanced is the experience of the Bo01 district of Malmo, which is structured according to the objectives set out by the Quality Programme Bo01-City of Tomorrow. This tool enables the creation of tested models. Best practies aimed at the dissemination of results.
The document, drawn up by the design team of BO01, in agreement with the City of Malmö and builders, defines the quality targets to be achieved during the planning and implementation phases, the objectives related to the environment, the provision of technological systems, the urban and architectural design, but also the social services and to the citizen.
The preparation of this document not only ensures the realization of the actions defined in the design phase, but in this way sets of best practies that become the benchmark for new settlements of the same type.

4. Amsterdam: smart nodes for smart cities

The city of Amsterdam represents the most innovative tangible application of a smart management system adopted on building and urban existent heritage.
The works organization on cities follows the principles and dynamics that put in practies sustainable urban basics pursuing a goals expressly smart: the policies, undertaken in 2009, aspire to realization of the first World Smart Capital.
The smartness project implementation for Dutch capital pass through five key themes of analysis: living, working, moving, social policies and open data access, developed in good forty-two projects, actually half-realized, especially focused in three suburban zones : Nieuw West, Zuidoost and Ijburg, respectively at West, South and East of Amsterdam city centre .
The ensemble of these punctual projects allow the participation of specialized companies and qualified investors able to support all phases of models application and results survey, trough computation and evaluation of project validity and dissemination of derived practies.
The close partnership between companies and workers permit to realize project of transversal positive effects, from residential and work sectors to the mobility system.
The projects on residential sector include the application of management and monitoring systems of house energy demand (and so application of home automation and regulation software for control and indication of consumption indicators and also indications for energy and money safety) and also wider initiatives about whole neighborhoods.
It's possible to mainly characterize two typologies of applications, the first on a large and medium scale, further divided in technological orientations an in social and educative ones, and the second on small scale of housing and building interest.
City Zen it's an extremely innovative project localized in Nieuw West district. This project uses for the most part the investments directed from Smart City program, and it's supported by fifty percent European funds.
City Zen it's a *Smart Energy Test Area* of international interest - the biggest in Europe - where are tested well advanced technological solutions and the results derived allow the application of system based on interaction of renewable energy sources and diffusion of that knowledge to communities.
Essentially the project is based on the realization of a combined system for photovoltaic and solar panels home integrated, from these it will be possible to monitor constantly the achievement test on district scale and also to save energy for extraordinary needs.
Besides this, the project consider the realization of a storm water drainage system, used to produce bio fuel as power source for public vehicle, in addition the project is realized with the collaboration and participation of local community, also in requalification of building heritage.
The project is aimed to involve the most of people in order to generate shared vision of the processes and expedite the know-how of new urban practies.

Another interesting project is about the alternative mobility, and it is developed in Utrechtsestraat, for this reason defined as the first Amsterdam climate street.
In matter of this street, very interesting in urban dynamics for centrality of commercial destination is developed an integrated system of vehicular and alternative mobility, that integrates renewable sources in nodal points - bus, bike-sharing and car sharing stops.
But this project involves also some aspects about the street destination including the waste collection, by compactator devices, and the street cleansing with storm water reuse.
The distinguishing feature of the project is undoubtedly the punctual localization of intervention operations: the strategic integration in fact depends on the deep knowledge of surrounding built environment in order to evaluate the produced effects according to the benchmark.
Then the intervention is effective , beyond well-advanced technologies, because it's closely related to the context and in accordance with requirements of user: so the goal is not to define an univocal answer to a current problem but is oriented to create a inclusive and integrated system of solutions.

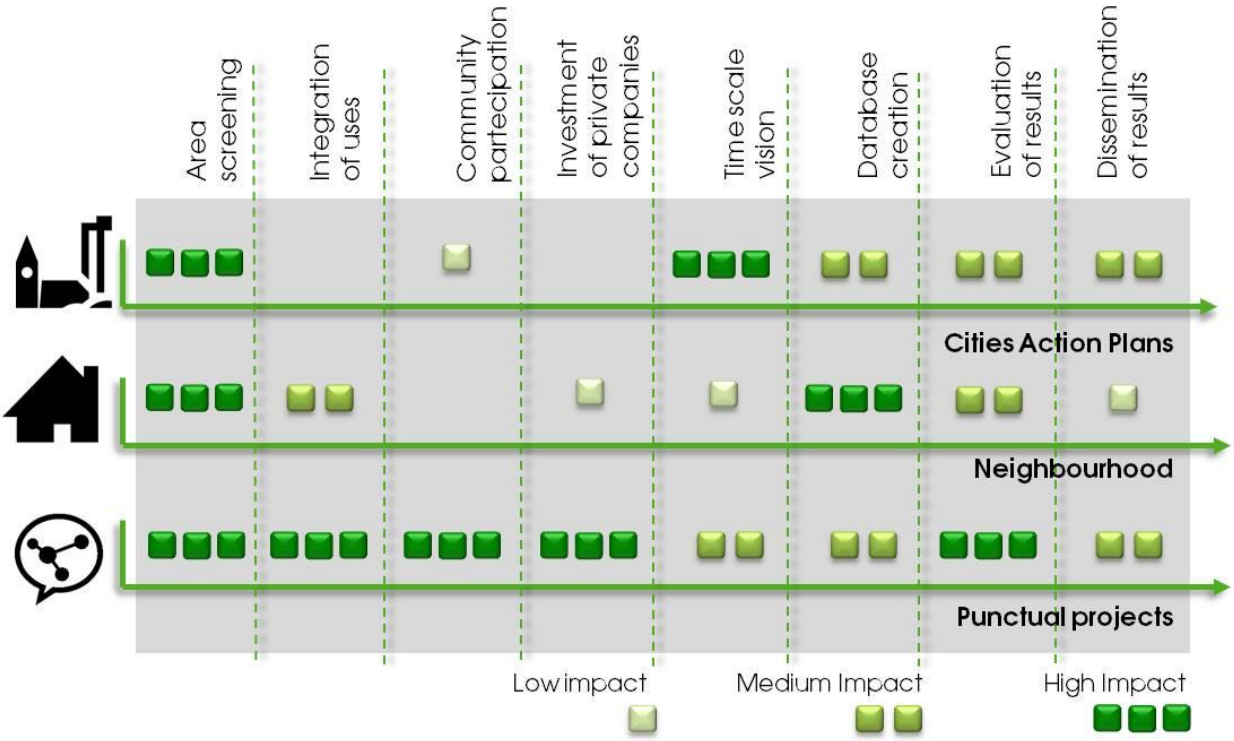

Fig. 2: Impact of main characteristic of smart development on urban different scale.

Conclusions

It' sure that smart cities and smart neighbourhoods' start up are both an opportunity to achieve European funds and to plan new urban demand about sensibility and awareness of the sites.
The most recent best practies teach us how the local characters are converted in smart design requirement, as we can see in Oulu, in Finland, where the municipal authority is creating a smart clean-tech district, according to urban advanced orientation, and also in Heidelberg, where the local community is developing a whole Passive-haus district.
These examples represent the natural evolution of the local awareness about technologies and their potential application in daily life, focusing the territory in terms of current and future needs.
As we can see the most of study case selected are located in the Northern Europe, and also the neighbourhoods are realized as new cities development district, beginning from scratch or redevelopment of brownfield sites.
But our Mediterranean reality it's different from these cases firstly for climatic conditions, secondly for the cultural and historical building heritage where the project might to be developed.
So the real challenge about smart city system applications is the creation of a tool to read the strengths and weakness of peculiar sites, to improve and control the actions specially on the built environment, very far from a model serial clone.
In this way we can note some Italian interesting initiative such as Smart City Med, that is aim to create a cluster between local authorities and enterprise to boost local development specially through the

improvement of cultural heritage knowledge, preservation and economic development specially trough tourism enhancements.
Therefore this dynamic research theme is becoming basilar in urban planning and also in application of landscape policies.
But there are some methodological open questions: about the durability of the system, in fact as it's so recent that we can't quantify the chances of effective operational time in order to seek the innovative technologies; and about the gap between the real knowledge of the sites and the tools to evaluate the favourable conditions to operate in.
Gérard Magnin, Executive Director of Energy Cities give us a perspective to answer to these questions : "The technologies we need already exist today. The question is how will we use these technologies? Will we be open-minded enough to incorporate these technologies into our lives?" [2]

Bibliographical References

[1] UN-Habitat. *State of World Cities 2008/2009 - Harmonious Cities*. Londra: Earthscan 2008, ISBN: 978-1-84407-696-3

[2] https://www.youtube.com/watch?v=wl4W4GbHr70

[3] GIFFINGER, Rudolf; FERTNER Christian; KRAMAR Hans; PICHLER-MILANOVIĆ Nataša; MEIJERS Evert. *Ranking of European medium-sized citie. Final Repor.* Vienna: Centre of Regional Science University of Technology, 2007

[4] CANNAVIELLO, Monica; VIOLANO, Antonella (a cura di). *Certificazione e Qualità energetica degli edifici*. Milano: Franco Angeli, 2012

[5] AMIRANTE, Maria Isabella (a cura di). *Effetto città stare vs transitare: la riqualificazione dell'area dismessa di Napoli est*. Firenze: Alinea Editrice, 2009

[6] MARTINCIGH, Lucia. *Strumenti di intervento per la riqualificazione urbana. La complessità dell'ambiente stradale*. Roma: Gangemi Editore spa, 2012

[7] BRONZINI, Fabio; MARINELLI, Giovanni*. Domotica, risparmio energetico,e partecipazione per la ricucitura sistemica dei vuoti urbani e la governace delle frange insediative*. *Proceedings of XV Conferenza Nazionale SIU- Società Italiana Urbanisti.* Pescara: Planum, 2012, Vol.2, No. 25.

[8] *Journal of US-China Public Administration.* MARINELLI, Giovanni; PANTALONI, Monica. *Sustainable Urbanism, "Domotics" for New Public Space: An Urban Project for the Jiangning District, Nanjing, China.* Rosemead: David Publishing Company, 2013, Vol. 10, No. 4, p. 415-421, ISSN 1548-6591

[9] http://www.smart-cities.eu

[10] http://www.cityprotocol.org

[11] http://www.energycities.com

[12] http://www.europeancommission.com

[13] http://www.miur.it

[14] http://www.vancouver.ca/GreenestCityActionPlan

[15] http://http://www.mobilityplans.eu/

[16] http://www.conventofmayor.com

[17] http://www. amsterdamsmartcity.com

[18] http://www.a21italy.it/indicatori1.htm

[19] http://www.sustainable-cities.org/indicators

[20] http://smartcitymed.landing.forumpa.it/

[21] http://www.ricercasit.it/

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ECO-FRIENDLY MATERIALS AND TECHNOLOGIES: the added value of urban transformation

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Abstract
The analysis of the urban sustainability's processes is at the center of the current debate about the future development of the city. At building scale, legal standards and regulations were introduced in order to aim the substantially enhancing energy efficiency and environmental impact of buildings, while at the urban scale, with regard to the Italian landscape, there are no specifics regulations on this issue. Currently, the Institute for the Innovation and Transparency of Procurement and Environmental Compatibility (Italian acronym: ITACA) is studying a tool for decision support (Protocol ITACA) in order to evaluation of urban open spaces. It can be a very useful tool for the eco-friendly technological design of "non-places" of the city, thanks to targeted analysis, specific criteria and appropriate indicators as land use, mobility and bio-climate. The sustainability, a multicriteria assessment tool of building's sustainability (especially energetic and environmental performance), introduced in 2004, allows defining the quality range of urban complex design and proposing solutions for the own development, with a smart and sustainable view of urban regeneration at European level. Therefore, Public Administration, businesses, citizens and investors have greater assurance and the urban transformation work becomes attractively. The approach of Ithaca is valuable, as it analyses the criteria of sustainability in a systemic way, or considering alternative designs in all their possible implications for environmental, economic and social issues, taking into account the life cycles of materials and works, the interactions with the land and with the markets.
The paper illustrates an experimental design of some urban wreck or unused areas for which the choice was the playground's use.

Keywords: Sustainability, Urban space, Protocol ITACA, Playground

1. Urban Metabolism: the creative transformation of open spaces (AV)
The city is the habitat of modern man and the urban ecosystem is the complex network of interactions between citizen and built environment (abiotic component), in which flows of matter and energy (urban metabolism) are generated. The contemporary city manages these metabolic fluxes basing on its energy -environmental, socio-infrastructural and economic-functional genetic code.
Since today the city is the main collector of material and energy resources and the mainly responsible of carbon emissions on the planet, the major challenges for the urban future include reducing the ecological footprint of cities and fighting for the closure of cycles of urban metabolism on a local scale. (Toledo Declaration, 2010). [5]
The city governs its mechanisms of production, growth and regeneration in synergy and sometimes in contrast both with the surroundings either with its internal residual spaces. [4]
In all cities, there are some worthless anonymous areas, urban spaces of “social diversity “that do not have the warmth of lived, crossing points that could be reabsorbed into the urban metabolism and might become useful spaces. The architecture can help giving quality to these places, in order to make them points of attraction for socializing, public equipment for leisure.

A lively debate has been created about the redevelopment of these urban residual sites and the importance of turning a need into an opportunity: to redevelop converting the current urban "non-places" into playgrounds, vital and comfortable places, useful to the youngest segment of the local community , where children playing can also learn the best practices of environmentally conscious behaviour.
The design experimentation led to the choice of creative keys to open a gate to other dimensions: cultural, social and ecological field.
It is well known that a city is sustainable if is capable of managing "creatively" economic competition, social cohesion and preservation of its natural and anthropic territory, by implementation of strategies and actions that successfully reduce the discrepancy between desirable future scenarios and current conditions in dynamic evolution.



Fig. 1: B.A.B.A. Design: converting the current urban "non-places" into playgrounds (Caso R. and Cicatiello A. Designers)

From the socio-cultural point of view, rehabilitation of degraded urban areas gives back to the city some places that are useful for the conduct of activities in the service of the citizen. If this regeneration occurs with a prior assessment of the needs of weaker social classes or categories of people most in need, the added value will have contributed to the growth of social capital of the community.
From the ecological point of view, every residual urban space, if it was been appropriately designed, can help to reduce the disorders of the urban ecosystem, becoming a core-area of the urban network.
The connection between the built areas, expertly designed, can help reduce the microclimatic urban phenomenon of the heat island , thanks to the refreshing effect of the vegetation, it helps to regulate the water balance, allowing greater permeation of rainwater into the ground; it reduces the impact of noise and pollution.
This environmental infrastructure allows relating and connecting different areas with some presence of naturalness or sociality, where it is possible to integrate the development processes of the local communities with the natural processes. The objective is to recover and connect all those urban wrecks and dispersed areas. In this way, those are being ripped to decay and become support to an overall widespread diversified urban quality.
In this project, the concept of environmental culture is associated with the concept of environmental quality and the ecological regeneration not only satisfies the physical, technological and functional requirements, but also includes a process of growth of the knowledge of young citizen user who learns environmentally friendly behaviour playing.
According to this approach, the design of the open space is not only the use of appropriate technologies. It requires a strong analysis and understanding of the relationship between space and technology, the need for complex training and integrated planning processes to achieve sustainable results.
For example, "Baba" (*Baby Area: Big Adventure*) is a design that has transformed a residual urban space in a game area: colors, fantasy, adventure and sharing are the key words of this playground.
The five "stripes" including the games are divided by themes:

- Orange stripe: to learn the flat geometric shapes.
- Red stripe: to learn how to play with numbers. The bowling has tracks like meters for measuring distances; the puzzle indicates the odd and even numbers; the "game of the week" shows the metric system.
- Green stripe: to teach that sport is "all live peacefully", as the team activities encourage collaboration and sharing.
- Yellow stripe: to learn the vowels between slides, tubes, tunnels, wheels and climbing.
- Blue stripe: to play between the planets of the galaxy.

An innovative concept of area for recreation and socialization that shapes a grey corner of the city making it an eco-compatible colourful space where everyone can play and learn.



Fig. 2: B.A.B.A. Design: young citizen learns environmentally friendly behaviour playing. (Caso R. and Cicatiello A. Designers)

The decisive challenge in designing urban spaces of good quality is to combine all the significant requirements: the needs of the weaker sections of the population and the needs of a creative and innovative design that interprets the characteristics not only the place but also of its future users. However, this is not enough! After realizing the transformation and investing resources, we should verify the productivity of investment by checking if the conditions assumed by the project are really actuated. [2]

The ex-ante evaluation of the scenarios is more reliable if the data used for evaluation are truthful. The use of decision support systems can help the designer to verify the technological choices and the public entity to verify the programmatic choices.

Within the heated debate about the future development of our cities, according to the principles defining the premises for a sustainable urban development and smartness, the lack of national guidelines on such an issue is evident. On a building scale, if binding rules have been introduced aiming at improving both the energy and environmental efficiency of buildings, on an urban scale, about the Italian panorama, there are no rules. In order to fill such a gap, the Institution for Innovation and Transparency in government Procurement and Environmental Compatibility (ITACA), is carrying out the *Protocol ITACA Urbe* , based on the methodology focused by the iiSBE (International Initiative for a Sustainable Built Environment) in cooperation with the Urban Morphology Lab: a

specific multi-criterion system for the analysis and evaluation of sustainable urban areas (SBTool Neighbourhood).
The *Protocol ITACA Urbe*, introduced in Verona on October 2013 at the Smart Energy Expo, is an evaluation system of urban and landscape quality of the interventions in the urban areas, mixing evaluations of architectural and energy type with sociological analyses, verifying its feasibility in relationship with technical rules and building regulations in force.
The central role of the city established by the European policies (Leipzig Charter, 2007), as well as the place from which they can start for the economic recovery and the development of innovation, created the need to elaborate a *Protocol ITACA* on an urban scale able to monitor and, as a consequence, limit the indiscriminate use of the soil, degradation of the public urban heritage, unchecked urban expansion and scarce quality of suburban areas.
After the first phase when the aim consisted in creating a friendly attitude in each private citizen on the value of an "environmentally friendly behaviour", acting on the improvement of the energy-environmental performances of the private building heritage, the following step is the systemic control of the energy-environmental quality of the urban eco-system, carrying out a tool able to analyse and rationalise the whole effects deriving from the transformation of the public space on a wider scale. Such a tool may be useful to the public subject both in the ex-ante evaluation phase in order to orientate the planning of the urban renovation towards sustainability, and in the on-going evaluation phase in order to determine the coherence of planning and designs with strategic indications, and in the ex-post evaluation phase in order to monitor the efficacy of the interventions made.
Guidelines and Indicators will support designers in their own choices and, as already happened for the residential *Protocol ITACA*, this method won't be useful only to verify the choices made in order to get a certificate and/or a class of merit, but also a supporting tool to the design in order to help making appropriate choices, that is a quality design. [7]
Thanks to the development of this specific tool, aiming at the evaluation of the environmental sustainability on an urban scale, able to orientate and monitor, in performing terms, the interventions of the urban transformation, an important chance for our Country will be played: that one of the rehabilitation of the existing urban tissue. All that through a process of sustainable development based on criteria not only of urban type, but also of environmental, social and economical type.

2. Protocol ITACA "Urbe": a new tool improving territories and developing innovation (LM)

Protocol ITACA is an instrument that is presently relevant to the building scale. In case of estimates on urban scale, such as projects of urban recovery or new district constructions, it would be valuable to use a specific instrument whose evaluations are based on appropriate indicators. International iiSBE is developing an instrument to evaluate sustainability on territorial level, suitable for the specific features of any city or neighbourhood. The system uses criteria, which allow examining complex problems. The definition of the overall set of criteria and indicators will probably concern the following aspects:

- social and participative dimension
- economic and financial practicability and sustainability
- landscape compatibility of the intervention with the context
- mobility, accessibility and connectivity
- quality of public spaces
- quality of the project proposal: energy, environmental, urban and architectural.

To build this multicriteria tool, which estimates every indicator and its own weight, it has been executed a plan divided into different phases:

PHASE 1_This phase, defined as "the state-of-the-art" stage, is the one in which it has been built a frame of reference both at European and national level. Everything has been arranged through accurate analysis and the examination of the Italian Region documents, and the open database information, which can be used for this Protocol.

PHASE 2_Phase 1 data have been analysed in a critical way and they have been reinterpreted according to the present needs.

PHASE 3_In this phase, an evaluation system has been arranged based on the most suitable multicriteria methodology.

PHASE 4_It has been analysed the compatibility of the instrument with the current regulations in order to prove its validity.

PHASE 5_The Protocol has been tested in different urban areas used as samples.

PHASE 6_At this last point, it has been written the definitive *Protocol ITACA Urbe*.

This definitive Protocol has been realized to be used, first of all, as a tool to help evaluation activities. However, it is also meant to be an instrument for both "ex post" monitoring and "ex ante" evaluation of urban regeneration plans and programmes.

Protocol ITACA is an open tool as it has been built considering open data banks. Nevertheless, at the same time, in turns out to be both flexible, as it is applicable to different urban scales (building, urban block, neighbourhood, district, city), and totally integrated with the context, as its indicators have been particularly created for Italian cities. Indeed, it can also be used as a guideline tool for both urban and territorial planning. Another feature of *Protocol ITACA Urbe* is that it is a public tool as it has been defined and shared by Italian Regions. For these reasons, if wisely used, it can significantly help to raise the project quality as it provides criteria and guidelines useful to answer to public notices and announcements.

3. Indicators system (LM)

The great innovation of the National *Protocol ITACA "on urban scale"* is that it allows to execute environmental, territorial and energy evaluations on different scales, from the block to wider areas, becoming a useful quantivative support tool in the Strategic Environmental Evaluation. In connection with this, it's a good thing to highlight that Torino City adopted the Protocol ITACA on urban scale to approve the Variante 200. Obviously, every building which is part of the project has to conform to the indicators, observing a minimum score established into the Protocol ITACA.

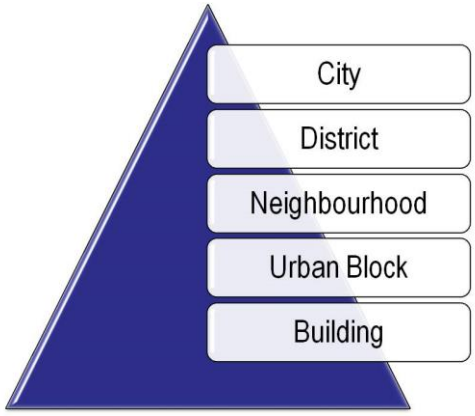

Fig. 3: Evaluation fields

The analysis is carried out on interconnected scales: building – block - neighbourhood. The urban scale criteria constitutes an instrument able to analyse complex urban problems, helping to find the most suitable solutions.
The instrument is used in the following phases [6]:

- *overall urban planning;*
- *executive project of the intervention areas;*
- *realization;*
- *monitoring during the construction.*

In particular, the urban field is considered the overlapping of six layers:

- *interactions: man and his own activities*
- *transports: street networks*
- *building shapes: fragmentation*
- *reliefs and topography: limits and opportunities*
- *land use: flows and settlements*
- *full and empty spaces: air flows, penetration of solar radiation, pollution dispersion, air temperature.*

There are no appropriate evaluation tools for analysis on block or urban scale, nor it it is possible to employ the instruments now used for building analysis. On this purpose, scientists are working to find specific indicators able to represent urban problems in a suitable way. Each indicator is expressed in a logic function, which can calculate, according to its typology: intensity, diversity, distribution, morphology, proximity, connectivity.
In this way, the use of the Protocol ITACA allows to obtain indications regarding the most convenient measures of urban regeneration and development, giving the possibility to better understand the effects of both project and political choices.
For its application in a specific geographical context, the evaluation tool, which has been created to encourage sustainability and to give economic aids, must be measured and contextualized considering local peculiarities like weather conditions, executive procedure, technical rules, regulations, etc.

Methodology is based on the interconnection between two research grids: one of spatial analysis and the other of sustainability. The first one includes aspects [6] like:

- *Diversity (mix of activities)*
- *Intensity (urban concentration, occupation, energy, CO2 emissions, etc.)*
- *Proximity (distances between one's own places, transport availability, recreational areas, etc.)*
- *Spatial distribution (concentration or dispersion of activities, parkings, etc.)*
- *Morphology (shape factors of buildings, blocks...)*
- *Connectivity (street interconnections).*

The second grid, regarding sustainability, includes the following topics [3] :

- *Economy*
- *Bio-diversity*
- *Energy*
- *Culture and well-being*
- *Social equity*
- *Water administration*
- *Mobility*
- *Waste*
- *Land use*

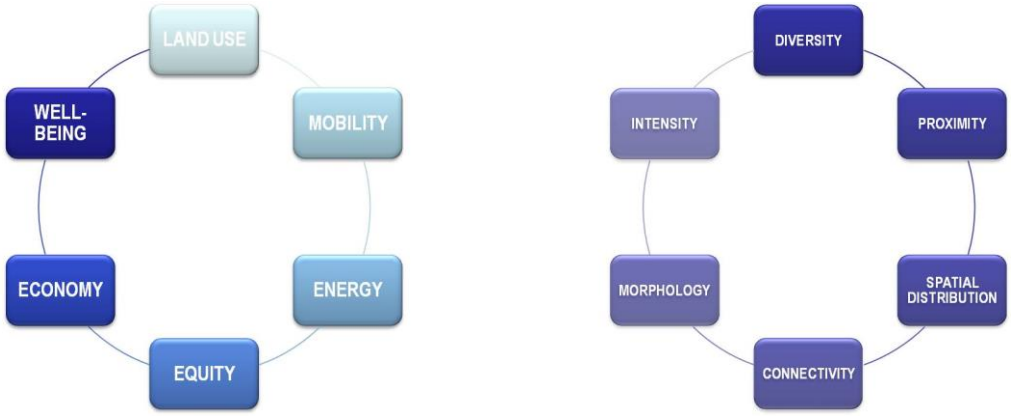

Fig. 4: Grid 1_Space analysis and Grid 2_Sustainability analysis

Topics like mobility improvements and accessibility on urban or metropolitan scale, urban regeneration and the project integration with the infrastructural, insediative and environmental network are connected with the evaluation of service efficiency. However, it is also important to consider the relevance of all the social benefits resulting from the project and the environmental and landscape compatibility of the suggested interventions.
In this way, the tool allows to obtain a global vision of the city sustainability level, or of a part of it, and of the better strategies useful to face up to the future challenges.
The result of the evaluation is a sustainability score: global and partial (according to the topic areas), able to express the social, environmental and energy qualities in the urban areas.

4. Game rules (AV)

Among the strategies of action considered as a priority, therefore, that one to "*Create and ensure public spaces of high quality*" emerges in order to attract the industrial investments with a high know-how, skilled and creative human resources tending towards a "Baukultur". It proposes to create attractive spaces orientated towards direct, indirect and potential fruiters and, why not, future fruiters (in the viewpoint of the intergenerational equity principle), but with actions aiming at preserving and valorising the historical-architectural heritage with a high cultural and environmental standard (Europe 2020 Strategy).
In fact, our cities have got unique cultural and architectural qualities, astonishing tools of social cohesion and excellent chances of economical development. They are centres of knowledge and sources of growth and innovation, but they can't carry out their function as an engine of the social progress and the economical growth (as described in the Lisbon Strategy) unless they can keep in balance the pressures coming from different parts: the social sphere needs equity and legality; the environmental sphere needs protection and safeguard; the economical sphere, that governs all systems inappropriately, should be limited to verify efficiency. Particularly, the economical progress shouldn't be linked with the exploitation of resources definitively, stimulating knowledge, excellence and innovation economy, making the endogenous development stronger and diversifying the local

production systems and, at the same time, arranging the labour market adequately through both education and a continuous workers' training (Toledo Declaration, 2010). [5]
If these presuppositions happened, they would ensure an urban growth and such a level of life quality that would be changed into competitiveness, attractiveness, creativeness and wellness.
Management tools, like *Protocol ITACA*, are useful to make friendly designing choices, according to the principle that a proper and a clever usage qualifies the space.
Starting from such principles, the design experimentation made, based on the demanding-performing approach, put at the centre of the decisions children from 2 to 6 years old. Planning and realization of a playground in an urban non-place addressed to mainly preschool end-users, has been interpreted as the occasion to give environmental knowledge. The whole design is based on the principle of an eco-friendly behaviour: from the choice of materials to the choice of the types of games, as children learn when they play.
Anyway, the type of destination of use put a series of ties, having as main aim that one to ensure the safety of the end-user /fruiter. In such a case, talking about safety, it is necessary to make a difference between safety of the child and safety of the game. The former concerns mainly of the use of the game, and the safeguard of the risks coming from either wrong or dangerous behaviours, while the latter concerns of resistance to the deterioration by consumption and/or weathering, safeguard of the integrity of its parts from vandalism and its maintenance. Therefore, we can deduce that the right design of the playground, while the safety of the game depends mainly on the appropriate choice of the materials ensures the safety of the child.
In fact, in order to carry out the design of a playground, the architect must respect not only specific regulatory and legal requirements, with a reference to the building and safety, but also the test of the criteria of eco-compatibility, recycling and renewal of materials to be used being real ties for the technological choices.
Expecting the definitive version of the *Protocol ITACA* for urban spaces, it has been used the National *Protocol ITACA* for schools (2011), because it fits better to the evaluation of the environmental performances of a playground for children, with the opportune corrections, of course. All criteria allowing a right evaluation of the sustainability of an urban space design have been analysed and selected with a friendly attitude, not considering the criteria foreseen for the evaluation on a building scale. The valuable macro-criteria are: Site Quality, Resources Consumes, Environmental Weights and Service Quality.
In particular, the National *Protocol ITACA 2011* for Schools considers, within the evaluation area "consumption of resources", four evaluation criteria for the used materials:
B.4.6 Recycled/ recovered Materials; in fact, in order to limit the consumption of raw materials it is necessary to foresee either the reuse of recovered materials or the use of recycled materials;
B.4.7 Materials from renewable sources, having a meaningful percentage of material of either vegetal or animal origin; their use tends to reduce the consumption of non-renewable raw materials;
B.4.9 Local Materials, whose local supplying allows shortening the distance that components must make in order to get to the intervention site, contributing to reduce the emissions produced by such movements. Loads from the movement of raw materials from 150 to 300 km are considered as *environmentally acceptable loads*;
B.4.10 Recyclable or removable; the chance to reuse or recycle parts of a building at the end of its useful life-cycle in a differentiate way allows to collect a meaningful quantity of materials able to have new functions in the future, minimizing the necessity to use new raw materials.
In accordance with the trends of the present market, the sustainability criteria in the design phase impose to consider the **Life-Cycle Assessment** of each material to be used, so considering the whole process: from taking the raw material to the production cycle, up to the realization of the product and its disposal.
Protocols including a certificate of the materials used in architecture in the evaluation of the performances of sustainability of the building are several and consider the different phases of the life-cycle of the material divided into four main issues:
- Origin of the material
- Use of recycled materials
- CO2 emissions in the working phase
- Pollutant emissions and possible disposal of waste.

The final judgment is not an aggregate judgement, but it is indicative of the design performances in comparison with the single categories of evaluation criteria.
For example, in the design of the "ECO-VOLCANO"(Corselli S. and Graziano G. designer), the Goal of this game is to teach children how make correctly the separate collection of rubbish in order to keep clean and healthy our Earth. Children have to pick up the balls inside a pit situated in the middle of the volcano, and put them inside the cones placed on the top of it on four sides. Each ball have a different colour that represent a different type of waste: green for paper, blue for glass, violet for plastic waste and brown for the organic waste. Each balls had to be put inside the cone of the same colour. Under

those cones, there will be a ramp where ball will slide again to the center of the volcano in order to restart the game. At the same time, children develop the ability to associate colours but also knowledge about recyclable materials. In addition, the whole game is made of environmentally friendly materials: Heolzhof Playlastic layers cover the steel structure; cones and balls are made of recycled plastic materials. All choices are maximally consistent and the result of the Protocol ITACA evaluation is positive:

- Site Quality: 5.00 A
- Resources Consumes: 3.15 B
- Environmental Weights: 1.08 D
- Service Quality: 2.94 C

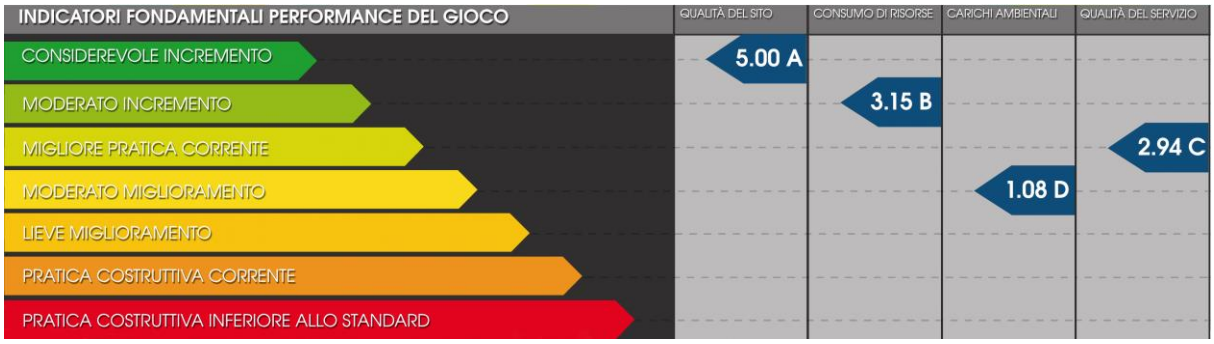

Fig. 5: Protocol ITACA evaluation

From such an application, it has emerged that the *Protocol ITACA* is an excellent tool supporting the designer's decisions, with the aim to make easier the design choices.

5. Conclusion (AV)

In conclusion, the technological design experimentation has confirmed the methodological validity in leading the technological design as an "action of research" that, through more or less complex models and tools scientifically supported and shared, interprets phenomena and/or problems concerning of the sphere of the human habitat, underlining the links of cause-effect in order to make decisions.
A catalogue of more or less performing solutions is offered thanks to the creative act of design, maximally answering to the needs determining it, more or less adequate to the surrounding conditions that become "game rules". The Leipzig Charter is offered as a platform in order to establish these "game rules", that can be extremely shared and accepted, so that from strategies they can /must become signs, actions, material … "appropriate habitat". [1]

Bibliographical References

[1] AMIRANTE M. I., *L'evoluzione della ricerca per le tecnologie ambientali*. In: Gangemi V. (Ed by). Cultura e impegno progettuale. Milano, Franco Angeli, 1992

[2] CANNAVIELLO M., VIOLANO A., *Certificazione energetica e ambientale degli edifici: il Protocollo ITACA*. In: Cannaviello M., Violano A., Certificazione e Qualità energetica degli edifici. Milano, Franco Angeli Editore, 2012. pp. 324-338

[3] CAPITANIO Claudio, Il Patto dei Sindaci e l'Edilizia sostenibile: il ruolo strategico dei Regolamenti Edilizi. http://www.solarexpo.com

[4] CLEMENT Gilles. *Manifeste du Tiers paysage*. Paris, Editions Sujet Objet, 2004

[5] TOLEDOINFORMAL MINISTERIAL MEETING ON URBAN DEVELOPMENT DECLARATION, Toledo, 22 June 2010

[6] MORO Andrea (2012), Il Sistema Protocollo ITACA - iiSBE Italia, http://www.minambiente.it

[7] VERDE F., VIOLANO A., *Protocol ITACA: a decision tool for an energetically efficient building management*. In: Ventre A. G. S., Maturo A.,. Hoskova-Mayerova S, Kacprzyk J. (Eds), Multicriteria and Multiagent Decision Making with Applications to Economic and Social Sciences, vol 310 Studies in Fuzziness and Soft Computing. Berlin Heidelberg, Springer-Verlag, 2013. pp. 289-299

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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"Local" in the Space of Reconstruction of Meanings. Ingushetia as a Phenomenon of "the North Caucasus Identity"

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Phenomenon of "the North Caucasian Identity" by the example of the Republic of Ingushetia

In 2012 the first stage of the research on the topic of "local" started on the basis of Samara State University of Architecture and Civil Engineering: "Global and Local Identity in the System of Visual Cultural Codes of Design (by the example of the Republic of Ingushetia)". In 2013 the research was continued but this time within the topic which maximally reflects exclusiveness and importance of applied character of this work and also the opportunity of its phased realization: "Local Identity" in Formation of National Strategies and Universal Codes of Project Culture (by the example of the Republic of Ingushetia)".
Taking into account the special character of the material under study, we decided to include "tribal" community of Ingush people with other highland peoples into the focus of our attention. With those who managed to "retain" their identity and make it the object of interest not only for authentic bearers of the cultural code but an important factor for regional, economic, innovative development. With those who preserved their history, their memory and found an original way of intercultural communication and broadcasting of these "value receptors" outside. With those who did not lose their uniqueness while living in transcultural space of contradictions, in the megaurbanized world, in migration flows and the endless cocktail of cultures, traditions, "blood" and language. With those who made philosophy and culture of their "small homeland" a world asset.

Keywords: Ingushetia, "Caucasian Civilization", collective identity, local and global, syncreticity

1. Introduction. Local identity in transcultural space

Problems of "big" and "small" nations is currently becoming a complex intersection of deep contradictions of civilization in the global space, which has absorbed and diluted many value factors such as uniqueness and complexity of cultural, social, ethnic and confessional codes. The possibilities to discern "a similar one" from "a different one" and the dialogue on the level of fine vibration of meanings are beyond a historic, cultural and anthropologic model. The space of politics and tough "rules of the game" in the global economy field often irreversibly eliminate the diversity and uniqueness which the presence of "the little" in "the big" gives the humanity.
This problem has recently become particularly critical in the territory of the former Soviet Union which used to be integrated. That is true not only for the borderlands of modern Russia (the Caucasus and Far East) but also for major centers where conflicts based on nationality acquire a regular character. The object of our research is the Republic of Ingushetia that is located in a dangerous region of the North Caucasus. On one hand, one can see all signs of internal commuting, on the other hand, there is unlimited expansion of neighbors. Flashpoints of tension are growing, conflict situations are turning into "combat" operations. These result in escalation of internal and foreign policy situation and inevitable search for the peaceful doctrine for settlement and prevention of possible provocations. That

is certainly not only a problem of one country but also a common global trend of the last decades. Similar scenarios happen practically everywhere with a various degree of aggressiveness and irreversibility.

A famous Russian film director Alexander Sokurov gives the following characteristic to the existing situation: “Russia is the only big country where feudal public structures coexist with democratic ones. It is necessary to work not on the blending of different cultures. The state has to solve another task: the establishment of a noble and respectful distance between cultures… One can not force different ethnic groups to move from one territory to another so sharply and cause a clash between them practically forcing ethnoses to have a war with each other. Many efforts have to be made to keep people in the Caucasus. To provide them with decent work so that there will not be those aggressive raids to the other nations’ territories where people with a different lifestyle live. This is a task of a state level. In case it is not solved the process will start with a wave of mutual hatred and end up with a civil war. A true national policy is not a celebration of blending but a celebration of mutual distance and mutual preservation of cultures in their nonaggressive, humane state. That is only one problem. And how many are there?” [12, p. 97]

The nature of demographical and ethnic “vibrations” is complicated and mixed. However, it is possible to make an attempt to solve this growing welter of contradictions and further conflicts on the basis of humanitarian and cultural discourse and establishment of primarily:

- internal dialogue through reconstruction of deep and temporal codes;
- formation of the principles of “soft esthetics” as the space for intercultural communication in contrast to aggression;
- detection of differences through positive competition;
- actualization of cultural codes of identity, verbal and nonverbal, intercontextuality, religiousness and secularity and others.

2. Main reference of the territory: “The Place from where the Horizon is Visible”

The North Caucasus is one of the few historic places where unique monuments of acient traditional culture remained. They are of genuin interest from the point of vew of highland peoples architypes and philosophy in a complex set of landscape and biospheric, geographic, cultural and genetic, social and political factors. According to philosopher Khazhismel Tkhagaposev, Coaucasuan mountain area “serves as a factor of “compression” of space which causes an immense diversity of sharply different natural, climatic and biospheric zones (from severe continental to subtropical) and creates preconditions for coexistence and interaction of various types of cultures, ways and forms of man’s existence”. [8, p. 8]

Several official data:

- Kabardino-Balkaria, Ossetia, Ingushetia, Chechnya belong to the area of the Northern Caucasus.
- The Republic of Ingushetia is the “smallest” regional and “peaceful” highland part of Russia. Part of the state boundary of the Russian Federation with the Republic of Georgia goes along its southern territory.
- The territory of the republic is 3.6 thousand square kilometers. It stretches 144 km. from the north to the south and only 72 km. from the west to the east. [13]
- According to the data of the National Statistics Federal Service its total population was 442 255 people on January 1, 2013. Altogether 71 nationalities live in the republic, the Ingushes make up over 80%, the Chechens are the second in number, and the Russians are the third. [11]
- Autonomy of the Republic of Ingushetia dates back to July 4, 1992. [13]
- According to the Russian Federation Life Quality Rating carried out by the RIA-Novosti TV channel in 2013, the Republic of Ingushetia is in the “red zone” of regions which are traditionally dependent on federal support due to the lack of economic basis and mineral resources for independent development, which leads to low level of its own income. However, in contrast with its territorial neighbors that also have a negative dynamics of main indicators the Republic of Ingushetia managed to rise two positions up in the rating in 2013. [14]

3. Syncreticity of cultural and historic multilayerdness and invariance

Despite the fact that systematic and detailed study of history and cultural heritage of the Caucasus is usually connected with the end of the eighteenth century (the beginning of colonization of the South of Russia and the Caucasus, active military, administrative and resettlement actions) some sources mention the Caucasus as a “distant geographic province of Ancient Greece”. Back then, Gomer, Gerodot and Strabon tried to comprehend mythological experience of these places.

The first mention of the man presence in the territory of the Caucasus was at the end of the Paleolithic Era – the beginning of the Neolithic Era (500 thousand years ago). Three thousand years B.C. the

Caucasus “becomes the source of paradigmatic cultural and technological innovations” for Southern and Eastern Europe, Western Asia and the Volga River region. [8, p. 13] Cultural communications with Ancient Greece became a crucial point in the history of the North-West Caucasus especially in the sixth century B.C. (centralized system of government, active trade, new quality of construction, including monumental urban structures, coinage, intensive migration of steppe nomads and others).



Fig. 1: Archive photo, Fatima Kudusova “Family and Family Life of the Ingush”. A married couple in national costumes [6]
Fig. 2: Photo: Dmitry Belyakov. Elders
Fig. 3: Photo: Dmitry Belyakov. Elders

A special place of Caucasian culture of the Early Iron Age holds the appearance of original “historic and cultural encyclopedia” – “Nart Epos” that absorbed and reflected in an amazing way the mythological ideology of practically all representatives of the Caucasus from the peoples of Dagestan and Georgia to the Ingushes, the Adyg-Circassians, the Karachais and others. The world of spirit and mode of life of the ancient times, pagan customs, rites, norms of urban etiquette, poetry patterns and rhetoric are presented in the Epos. It undoubtedly “has not escaped and could not escape different cultural and historical accumulation, topics and images of distant from each other cultures of the East and the West alternated in the world: Hittite-Hurrian, Indo-Iranian, Ancient Greek, Turkic-Mongolian. Figurative and narrative parallels with the Avesta, the Rigveda, Kalevala, Russian epics are found in it, which reflects that complex cultural interweaving that is characteristic of the region’s history". [8, p. 14-15]
Ancient history of the Caucasus is incredibly rich and diverse but unfortunately it underwent irreplaceable losses as a result of mass migrations and Russian colonization, soviet “integration”, internal discord and attempts to “erase” the memory about ancestry and customs in its newest history. It does not allow to reconstruct an objective picture and carry out a full-value analysis. For instance, the tragedy of the Ingush people which happened in the twentieth century was connected with mass deportation.
Although the format of this article can not go into details of a complex history of the issue under study, it is worth to emphasize the multilayedness and multifunctioness of various research devoted to the Caucasus and Ingushetia. We can see two key approaches “from outside” and “from within” in available factual material and extended base of sources which make up the platform of subsequent scientific paradigms.

We owe the view “from outside” mostly to the members of academic expedition of the end of the eighteenth the beginning of the nineteenth centuries which participants were military and civil officers who often had European background (I. Georgy, I. Gildenshtedt, P. Pallas, U. Klaprot, M. Engelgardt, L. Shteder, P. Butkov, S Bronevsky, I. Blaranberg, F, Leontovich and others). [2] This view has an imprint of collision and penetration of worldview positions, civilization models, perception of Caucasian identity in the context of a wide spectrum of eastern cultures.
The view “from within” is characteristic of the first Ingush and Chechen researchers (Ch. Akhriev, A. Bazorkin, U. Laudaev). This view is invaluable, it is built on deep understanding of material and its mental interpretation. Keeping this “from within - from outside” duality in the focus of attention undoubtedly enriches and complicates the system of valuation opinions which are inavitable in any arthor’s interpretation.
Starting from the 1940s ideological pressing effected the formation of scientific concepts which resulted in concentration of a number of researchers on ethnogenetic approach and the loss of the integral picture of regional specificity.
Over the last twenty years the national issue has sharpened in Russia and inevitably causes a new wave of interest to this topic, to the sources of highland peoples, their sovereign rights, cultural identity and its heritage.

4. Ethnicity as a key sociocode of “Caucasian civilization”

The Caucasian mountain range is a peculiar symbol of an integrated world, the integrated territory for the ethnic group called “the Caucasians”. At the same time it is a dividing line of civilizational and cultural deep collisions in two spiritual spaces: Christianity and Islam. The devision of what used to be a harmonious pagan picture of the world into the two religions could not go through painlessly for the North Caucasian ethnoses, that is why it continues to reflect religious and cultural syncretism and polyethnicity of the civilization matrix of the highland peoples.
As historian Victor Chernous notes: “The peoples of the North Caucasus were involved in the periphery of ancient eastern, antique civilization, and afterwards Byzantine-Slavic and bivectoral Islamic (Sunni and Shiite) to a different extent. In other words, from the moment of the tranfer to civilization the Caucasus has played a role of a contact zone for several regional civilizations instead of becoming a place for development of a mutual Caucasian one (which does not deny influence of other civilazation circles on the South and North Caucasus)”. [10, p. 153]
When talking about ethnicity as the key sociocode of “the Caucasus civilization”, the researchers compare a special role of etiquette of such distant cultures as Japan and the Caucasus which demonstrate surprising similarity in clannish and social way of life, functioning and communication with outside world and foreign cultures. They differ in organicity of cultural verbal and nonverbal codes which form an integrated field of meanings and behavior but at the same time they identify themselves in the line of other cultural paradigms.
It is important to understand the syncretism of a culture through the absence of “a boundary between routine, practical, communicational, religious and artistic forms of activity – they are inseparably connected, unbroken in real manifestations; within the framework of a syncretic culture art is also not structured (in types, genres and etc.), it is also syncretic. Within cultural syncretism art (myths, songs, dances, games) is also involved into the life flow and performs utilitarian functions: ritual, symbolic-communicational, practical and cognitive and etc.” [8, p. 47] Continuity of an everyday myth that became a “living tissue” of a culture is that school of life which retains its “pattern”, structure and plasticity. We can see here a succession and a perpetual internal vibration of complementary elements of the etiquette. There is a special intimate character and incredible openness to the world where “…the sources of the most syncretic culture of Caucasian ethnoses, its arsenal of images and meanings, formats of ethnic psychology, that is mental characteristics and archetypes of ethnic cultures of the Caucasus, date back to the Nart Epos, where the etiquette formation processes started” [8, p. 48]
Plasticity of syncretic cultures, which at the first sight seem to be close, evidently demonstrates astounding viability in most contratictory and crucial stages of the mankind. Hidden reserves of creative energy, which have been brought to perfection and integrity by polishing over thousand years, are concealed here. “New” time sets “new” forms of expression. Traditionally researchers studied such types of tribal and intertribal communication as myths, dances, songs, games, music harmony, language. Nowadays semantics of expression is incredibly complicated due to development of information and media technologies. It migrates freely from one genre to another, goes beyond bounderies of styles and creates unexpected dialogue forms, synthetic and interdisciplinary conglomerates from any scenarios and technologies. New formations are born in a natural way mixing and “taking in the wind of change”, cultures and types of communication. Open borders of countries and integrated information space also have inevitable influence on the speed of broadcasting and perception of any information.



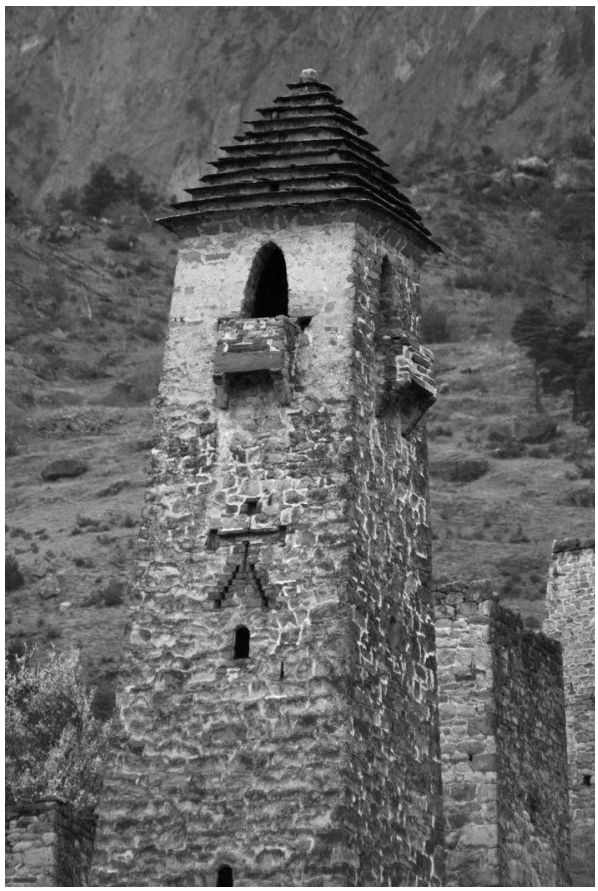

Fig. 4: Christian church, Tkhaba-Erdy. Stone carvings
Fig. 5: Christian church, Tkhaba-Erdy. The bas-relief of the western wall. Assinsky ravine
Fig. 6: Clannish towers

Here arises a most important dilema for working with the cultural heritage, local identity and its mental core: preservation and conservation or development and openness? Or attempt to hold both and strengthen them through preservation? Which dicision to consider the right one and which way to chose today? The ethnoses themselves are often not involved in these. The modern world has transformed and assumed this privilege which used to be exlusively genetic.
We see the relevance of this kind of statements most clearly in the national theater, music and cinema of the countries which have been considered intimate, closed, incomprehensible for a long time, and today these countries present the form of dialogue that finds easily a common language with all the world. Appropriateness, symbolism and universality but at the same time complexity and multifaceted nature of such type of communication does not need translation. It is syncreticity that makes intercultural communication with foreign cultures go naturally.
These are some examples: Ki-duk Kim (South Korea): “Hwal” (2005), “Spring, Summer, Fall, Winter... and Spring” (2003); Takeshi Kitano (Japan) “Dolls” (2002); Sergei Paradjanov (Georgia) “The Color of Pomegranates/ Sayat Nova” (1968), “Shadows of Forgotton Ancestors” (1964), Tengiz Abduladze (Georgia) “The Tree of Wishes” (1976) and others. All the above mentioned films are the world’s treasures. They do not lose their ethnic strength and expressiveness regardless of time, place or audience. Global comminications broaden opportunities of cultural exchange and “soft esthetics”.
The “sculpting in time” concept that was introduced by the great Russian film director Andrei Tarkovsky with regard to the cinema reproduces most accurately the meaning of art of communication in general: with the world, history, time and a man in the world, in history and in time.

5. “Local” in the space of reconstruction of meanings

How to revive and discover potential of deep meanings of ancient Ingush people? How to reconstruct syncretic codes in new cultural reality? Which meanings will the space of contemporaneity be filled with due to cultural intervention of identity that was opened once more time?
It should be admitted that a communicative space “is very important for interpretation of sociocultural processes which take place in the territory of local identities. A communicative space is a virtual formation where concepts, discourses and ideas find place. They have different sources of origin,

express differently directed interests and set different programs for constructing the future. A communicative space consists of a collection of individual, personal spaces but at the same time they reflect a common space and are formed under its direct effect and influence". [5]

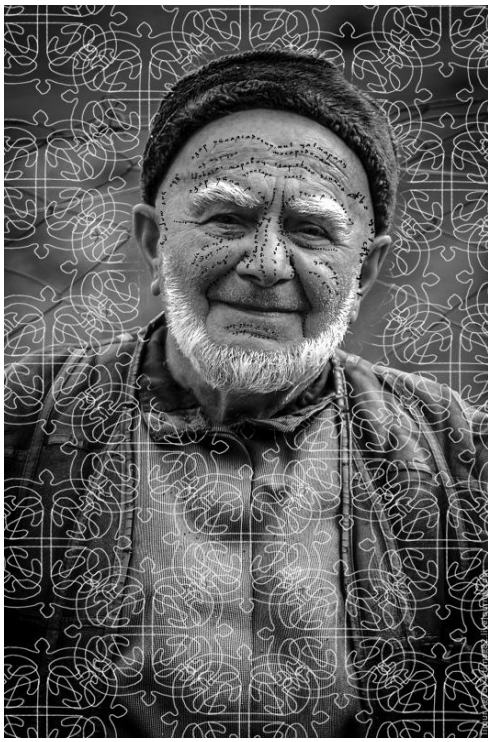



Fig. 7: Author by poster: Zarema Kalimatova, Highlanders 1.
Fig. 8: Author by poster: Zarema Kalimatova, Highlanders 2.

It is very important that nowadays the study of "the Caucasus Civilization" nature, of its mental core is reaching a new conceptual and methodological level. Duality of perception "from outside" and "from within" is expanding due to the sum of new meanings and possibilities which globalization process offers us. Typical to academic research conservativeness gains the character of a discourse included in a common field of humanitarian values and its polemic nature. If we look at the topics of research works of recent years devoted to identity of Russian regions, including the Caucasus and Ingushetia, we will see a number of trends which are important for our research and its project nature: "ethnoculture as the basis for formation of Ingush people national awareness". [Dzarakhova, 4]: "local identities in the context of sociocultural dynamics of Russian Region" [Dzyakovich, 5]; "ethnoconcepts of Ingush culture" [Zyazikov, 9]; "modern transformation of ethnocultural identity: universal tendencies and Russian specific character" [Shubin, 7]; "dynamics of Ingush culture" [Agieva, 1] and others.
Unfortunately, there are practically no possibilities to actualize cultural codes in real life of Ingush people with project means. On one hand, this fact can be considered as unwillingness of the "locality" to go through another deconstruction of the well-established notions about the position and role of the people in their own national history, or an attempt to preserve the established way of life unchanged. But it is already impossible to avoid external influence. Up till the present time one or another form of colonization went in a forcible way and the break from the past was inevitable. Nowadays there is a potential and desire of new generation to influence the projection of their future themselves. Besides, this can go in a natural and delicate way by means which are available for a "common access" and which have proved their consistency from the point of respect and piety for traditions.

6. Conclusion

Phenomenon of the North Caucasus cultures is insufficiently explored and up till now it is an unclaimed part of multicultural Russia project history. Ingushetia as a small locality in complicated processes of newest history of "a big nation" formation has a chance to get an effective instrument for preservation of cultural traditions and their increase by means of reconstructed visual and plastic codes.
Taking into consideration a specific character of our research and its mission – to detect tendencies and contradictions which serve as a driving force for development of the Republic of Ingushetia and

perception of its collective identity – there is much work ahead on development, theoretical and empirical basis for increasing the role of "local identity" concept in project culture and it unique communication code in a transcultural space. The research tasks are constantly defined more precisely in the process of the work, they are expanded and become a serious basis for:

- examination of opposition "global/ international" and "local/ national" in a project culture;
- study of the role of national project schools (architecture, design, art) in the system of global communications;
- exploring special features of cultural interventions at the level of semiotic and semantic codes, formation of style;
- analysis and actualization of new formations, possible project scenarios, visual and plastic games and intrigues, ciphers and decipherments by the example of the specific highland culture.

In order to coordinate the work on the territory of the Republic and gain official support, a cooperation agreement was signed between the University and the Ingushetia government.
The agreement is aimed:

- to organize a number of meetings with representatives of ethnic, cultural, scientific and educational communities as well as with political and economic spheres of the republic in order to develop a mechanism for promotion of an international cooperation idea and establishment of a permanently working research group;
- to hold a series of field studies in the territory of the Republic to detect Ingushetia's 'value receptors" as a representative of the North Caucasus identity;
- to prepare and hold a series of discussions on the topic "Local Identity" in the territory of Ingushetia with international experts and to form a partner network;
- to establish a working group to make an event ethnic map jointly with the Ingushetia government, international and regional project centers, centers of culture, design, architecture and modern art, foundations and representatives of political and business spheres;
- to hold a series of project seminars on establishment of the first national project center of the Republic of Ingushetia;
- to plan, prepare and launch Ingush Biennale of Design and Art "Khi Nana" devoted to national strategies of "small nations".

If our research and attempt to realize the planned steps will result in formation of a basic concept of "Ingush national design" and become one of priorities of the national cultural strategy, we will consider the work successful. We also hope that the Republic of Ingushetia will become an initiator and active partner in promotion and popularization of the "small nations" topic and discussion on the problems caused by globalization not only in multinational Russia but also around the world. It will also facilitate the development of interdisciplinary and multicultural connections beyond the bounds of the country and the Republic.

References

[1] AGIEVA, L.T. Dynamics of Ingush Culture. Dissertation for Candidate of Sciences in Philosophy/ Rostov-on-Don, 2005.

[2] ALBOGACHIEVA, M.S.-G. Ethnography and History of Ingush nation in Written Sources of the End of XVIII – the First Third of XX Century. St. Petersburg: Nauka, 2011. – 180 p., il.

[3] DOLGIEVA, M.B. Social Thought of the Ingush in the Second Half of XIX - Beginning of XX Centuries. Dissertation for Candidate in Historical Sciences/ Nalchik, 2002.

[4] DZARAKHOVA, Z. M.-T. Ethnoculture as a Basis for Formation of National Self-consciousness of the Ingush. Dissertation for Doctor in Historical Sciences/ Makhachkala, 2007.

[5] DZYAKOVICH, E.V. Local Identities in Context of Sociocultural Dynamics of Russian Region. Dissertation for Doctor of Sciences in Culturology/ Moscow, 2011: http://www.dissercat.com/content/lokalnye-identichnosti-v-kontekste-sotsiokulturnoi-dinamiki-rossiiskikh-regionov.

[6] KUDUSOVA-DOLAKOVA F.I. Family and Family Life of the Ingush (Ending of XIX - Beginning of XX Centuries). Rostov-on-Don, 2005.

[7] SHUBIN, U.A. Modern Transformations of Ethnocultural Identity: Universal Tendencies and Russian Spicificity. Dissertation for Candidate of Sciences in Culturology/ Moscow, 2011.

[8] TKAGAPSOEV, H.G. Caucasian Culture: Special Features of Genesis and Tendencies of Development: Monograph/ H.G. Tkhagapsoev. – St. Petersburg: Asterion, 2008. – 224 p.

[9] ZYAZIKOV, M.M. Ethnoconcepts Ingush People Culture. Dissertation for Doctor of Sciences in Philosophy/ Rostov-on-Don, 2005.

[10] Traditionalism and Modernization in the North Caucasus. Editor-in-chief V.V. Chernous/ Southern Russia Survey of the Center for Systemic Regional Research and Forecasting, Institute for Retraining and Professional Development (IRPD) of Rostov Sate University (RSU) and Institute of Social and Political Research (ISPR), Russian Academy of Science (RAS) Issue. 23. Rostov-on-Don. Publishing house. North Caucasus Research Institute (NCRI) of High School (HS). 2004.

[11] Federal Service of State Statistics: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/afc8ea004d56a39ab251f2bafc3a6fce

[12] Journal, Business Management, issue 11.01.2013, p.92-107: http://www.businesspuls.ru/magazins/2013/11/index.html#92

[13] Official website of the Republic of Ingushetia: http://www.ingushetia.ru

[14] Quality of Life Rating of Regions of the Russian Federation, Moscow: RiaRating/ Ria Novosti Group, 17.12.2013: http://vid1.rian.ru/ig/ratings/life_2013.pdf

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The role of sustainable technologies in the design

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Abstract

The energy management and the environmental impact of a building is one of the weaknesses of the construction sector, for which there is a growing awareness to identify operational rules to reverse the trend of the ever-increasing power consumption and, at the sometime, to monitor the targets set by the international Conventions.
The bio-architecture is earning consensus on an ever-increasing scale, such as cultural approach to the project in order to solve these problems, including the principles of sustainable development, and especially as a technological approach, also facilitated by the local and national regulations that promote more and more the virtuous buildings in terms of energy balance.
Today designers have access to a wide range of techniques and products to satisfy the needs dictated by standard use of the building organism, bringing attention to a rebalancing between the incoming and out coming energy flow. The target is to minimize power consumption by exploiting the available technologies and, at the same time, to maximize the energy produced by renewable sources.
In the technological design process, the designer must know the site and select appropriate solutions, based also on the needs of the user.
The contribution will discuss the technologies offered by the market that best meet the energy performance requirements, a minimum environmental impact and a maximum integrability in the Mediterranean area.

Keywords: sustainable technologies, bioclimatic architecture, Mediterranean area, building envelope systems.

1. introduction [1]

The persistent economic crisis, which manifests itself most clearly in countries bordering the Mediterranean basin, it is a valid reason to reaffirm the need to pursue behaviors aimed at providing a rational use of energy resources, favoring the use of renewable energy sources (RES) rather than those destined, over time, to run out.
The economic and environmental benefits of this approach are now recognized but not always the action of governments and public and private institutions is aligned to a virtuous energy conduct. In fact, although for decades it has been affirming a diffuse environmental conscience, concrete measures implemented in the Mediterranean countries, and particularly in Italy, continue to maintain a substantial detachment from the legal provisions.
There are economic and cultural factors that still hinder the affirmation of alternative models and innovative of energy production and use, and this is even more evident in the construction industry.
In our sector, the conscious energy achievements, although rising, are somewhat isolated and disorganized and, ultimately, the projects fail to give a widespread assortment of bioclimatic and sustainable building.
In Italy, at least two factors which are closely interlinked, influence the diffusion of energy-conscious design, the first relates to the objective difficulty of applying the principles of sustainability and energy saving to the extensive existing assets, while the second is related to the relatively low production of a new building that is

[1] In this work, a collaboration between the two authors, Antonio Bosco is engaged in paragraphs 1 and 2, and Giuseppe Cacciapuoti in paragraphs 3 and 4.

smaller compared to the activity related to the restoration and renovation of historical heritage, or at least consolidated.
The construction industry, although aware of these difficulties, and therefore careful in proposing solutions and oriented products to the recovery and upgrading the energy efficiency can't be by itself a driving factor in affirming the principles of modern sustainable design.
New products and technologies are widely accepted and considered by the designers, but especially in small and medium-sized operations, are often opposed by operators linked to the old ways of building.
Designers must take on the task of educating builders and sensitize the users compared to the benefits and opportunities offered by the new available technologies, indicating with clarity and precision the economic and environmental benefits determined in the medium and long term, by the use of products often more expensive than the ordinary ones.
Professionals and scientists of building technology must take another responsibility, to better identify the needs of well-being related to the particular climate of our peninsula (Mediterranean climate) and, therefore, the resulting specificity design necessary to satisfy them optimally .
For too many years, the climatically careful project has been related, even in Italy, to principles and solutions created in very different climate areas from the Mediterranean, often more attentive to the conduct in winter conditions, outlining in fact, a partial solution to the question of internal environmental well-being of our regions.
Actually the variability and complexity of the phenomena associated with the Mediterranean climate have placed the need to outline approaches and solutions specific to that environment that take into account both the need for winter and summer, without neglecting the specific requirements of the interim periods that characterize the temperate climate.
For these reasons the bioclimatic design needs to address, in the Mediterranean area, problems more complex than those posed by extreme hot and cold climates. The external conditions variability forces the designer to define the correct calibration of the technical and structural measures to be taken to ensure the appropriate level of humidity and thermal inside wellbeing.
In our regions the choice of solar energy systems, both active and passive, can't be separated in any way from the valuation of the local conditions of exposure and orientation, but these should be evaluated together with the absolute necessity of attention to the contextual conditions. In fact, both in the new project and in the already existing interventions, we can't ignore the importance of landscape and environmental values that, under no circumstances, can be contradicted.
For this reason, the adoption of new materials and latest technologies must be continually confronted with the values and must induce the designer to define sustainable approaches in terms of landscape. This approach should be valid both in the context of interventions operating at an architectural scale and in those that involve changes to the urban or regional micro-scale.
Changes in architectural profiles of the buildings and the modification of optical and tactile quality of the surface buildings of the adoption of solar technologies, must be calibrated with respect of the quality of the environment you are going to enter, offering solutions that take into account the current type-morphological balances existing.

2. The role of sustainable technologies in the design

The huge amount of energy derived from fossil fuels, combined with technological progress has made possible the great work done so far, through the use of innovative materials and equipment. In the past the architecture has been gathering the products of progress, progressively losing sight of the problem of the relationship with the environment, focusing almost exclusively on the possibilities offered by technology systems and realization of construction.
Since the Seventies, with the development of environmental ideas, the first real pollution problems, and the evidence of the problem of energy supply linked to the availability of fossil fuels, it was necessary to verify whether this condition concealed complications.
One of the effects of these new impulses is a new focus on the nature of the architectural project and on the limited availability of resources.
At the centere of the design strategy there is a simple and effective idea: using natural resources in a much more productive and profitable and better way for both and humans and the environment. The aim is to reduce the global energy consumption, increased by 45% since 1980, of a percentage, of 70% of 2030.
Today more than the half of the energy consumption is associated with industrial activities and functioning of buildings; it becomes necessary, for this reason, to adopt sustainable energy strategies able to meet the ever-increasing consumption.
The main objective of these strategies must be the respect of the environment accessible through the adoption of new design solutions, the optimization of construction techniques and the implementation of systems of new generation plants, which should make possible the drastically reduction the use of nonrenewable energy resources.

A building consumes energy throughout its life cycle, from the retrieval of raw materials for the production of building materials, up to the time of its disposal.
The most critical step coincides with the life of the building, in fact, considering a horizon of 50 years of use, it is noted that heating, summer cooling, lighting and hot water production affect, for over 90 %, on the total energy consumption of its entire life cycle.
Energy efficiency is the quickest, cheapest and cleanest way to reduce energy consumption and to achieve the level of GHG emissions required to satisfy the objectives of the Kyoto Protocol.
Savings can be achieved either by changing the process so that are secured less waste or using technologies that transform energy from one form to another more efficiently.
Sustainable architecture is a cultural approach to the project that indicates a systemic view of the report "function-man-nature" and proposed buildings capable of limiting the impact on the environment.
According to this approach a good design must consist the following factors:

- control of energy use to identify potential savings and dysfunctions, particularly in restructuring and recovery;
- installation of equipment and low-power systems;
- installation of equipment for the production of energy from renewable sources;
- optimize the use in the long term through improved the insulation of the building (roof insulation and ventilation, walls, windows, etc. ..);
- continuous monitoring of energy savings through a continued commitment to supervision and maintenance.

The designer must be aware of the multi-disciplinary nature of these problems, especially in interventions on the existing building, involving different skills that pertain to architectural design, to environmental and land, to history, to restoration and energetics, without forgetting the importance of economic and environmental impact assessments.
Special attention must be given to the effect of the environmental and functional project arising from the adoption of innovative technologies in the field of plant engineering and construction, by use of new materials.
The progressive affirmation of the principles of eco-compatibility requires a deep review of the conventional building process in synergy with the progress of technological innovation.
The reduction of energy consumption and environmental compatibility are essential parameters in dealing any process of transformation of the territory.
Also, if you think that most of existing buildings in Europe has more than 20 years, we understand that the rehabilitation of this heritage can provide relevant insights for finding design solutions "energy-aware", coming to assumption an energy saving up to 30%, resulting in a lowering of the operating costs of the building organisms.
Following these reasonings it can be said that the creation of a professional profile of scientific-technological content and managerial-management for the integration of innovative technologies in construction allow for a strengthening of the skills needed for the project and ensure, for the future, a highest quality level of the entire building system.

3. Energy strategies for building envelope

Designing an energy efficient building requires two aspect, that are analyzed separately but are held together by a strong link:

- the building envelope, which is a set of elements that enclose the heated rooms;
- plants, which convert the energy.

The desire for low energy consumption buildings is increasing by both construres and buyers. Marketers and advertisen mostly offers false properties, masking them whit only solar energy panels. Which in reality, they produce more energy than what is actually required for the property and used by the owner. But, due to incorrect design choices, the problem of decreasing energy demand stays unsolved.
The heat demand is for residential space heating and production of hot water, while electricity demand is mainly used for lighting and power supply systems.
While maintaining the same levels of comfort you can drastically reduce the energy exchanges through efficient measures to make the buildings envelope.
Other interventions concern the replacement of utilities thermal systems with renewable sources such as solar thermal or use of heat pumps and condensing boilers or other more efficient equipment, or for the illumination measures that direct towards better technology for lighting (lamps high efficiency).
Are of particular interest, the actions relating to air conditioning, insulation and lighting of the interior, which give immediate returns through the application of existing technology.
It is generally thought that isolation during colder season the importance of insulation system superiors those of warmer seasons but in reality they both posess the same importance.
The reduction of energy consumption involves the design choices and the energy needs in both winter and summer has to be taken into account.

During the winter, the energy balance of the building must take into account the losses and gains in terms of free energy contributions, although in the Mediterranean The question must be considered carefully in order to avoid counterproduction in the summer which is the season with more demand of energy and higher energy consumption.
You should also carefully consider the contributions due to radiation on opaque walls and window areas and, at the same time.
An efficient energy comes from using relevant technologies for the building envelope. Today, designers have a wide range of products and techniques at their disposal to meet these needs. Considering the lost energy, about 80% of the heat or cold passes through the walls, roof and floors. The remaining parts of the dispersion is due to uncontrolled air currents generated by poor sealing of doors and windows.

3.1 Roofing

The roofing are the critical element of the housing: in summer, during the hottest hours, are the areas most exposed to the sun, almost perpendicular to it.
For this reason they must be designed with particular attention to the problem.
For pitched roofs, it is very effective adoption of the ventilated roof that, in the Mediterranean area, produces the greatest benefits in hot weather when the problem is to minimize heat gains, avoid overheating and optimize the circulation of fresh air.
In warm climates, therefore, the effectiveness of summer thermal performance can be achieved through the adoption of ventilated roofs or the design of the stratigraphy of roofing to high thermal inertia.
Ventilated foof provide the roofing seconded by insulating layer, creating a cavity that allows a uniform flow of air to circulate from the gutter up to the top; the cavity, carefully studied, ensures the ventilation of the roof and the micro ventilation of the undermantle.
The resulting chimney effect promotes the dispelling humidity, across the top of the roof and then the healthiness of the mantle, reducing maintenance costs.
The ventilation increases and enhances the features of the insulating layer, expelling heat from the top. Monitoring carried out, show that the only ventilation reduces the temperature in the spaces below of 8-10 ° C.
The stratigraphy with high thermal inertia, are able to accumulate heat for several hours before it is transmitted to the interior, and attenuated phase-shifted in time.
A massive design solution is given by the green roofs and the roof gardens. In this type of roofing, the insulation and the hygrometric comfort vary by stratigraphy adopted.
Green roof is a passive cooling system to reduce the thermal load.
In summer, the green roof protects the building from direct solar radiation, and the overall performance is better than winter, in fact, the substrate in any condition of thermal humidity provides significant benefits to the internal environment, functioning both as thermal insulation, which as a heat extractor, or as a combination of the two possibilities.
The surface temperature of the layer of vegetation assumes a value equal to that of the air temperature, while below, the various components have a temperature gradually lower.
In addition to the function of sealing, noise attenuation and thermal insulation, green roof solution also offers aesthetic advantages, and a fundamental ecological contribution, because it increases the availability of green in urban areas and reduces the "urban heat island" .

3.2 Outer walls

Against overheating in summer of the building due to the excess of direct solar energy that crosses the outer walls, you mu st use the walls with high thermal inertia or ventilated; adequate shielding to impede the penetration of sunlight and the glare in summer and, finally, design strategies which facilitate natural ventilation.
You can, for example, to fill performance gaps, using screening elements usually present in buildings (balconies, porches, window sills) or additional accessories such as climbing plants, green walls and brise-soleil able to increase the insulating characteristics and selective of the walls.
In addition, through a proper study of orientation, solar and shading paths, you can increase the performance efficiency of facade systems both opaque and transparent.
The vertical closures transparent, glass is a material that has significant potential for use but at the same time, significant critical issues.
For the purpose of thermal control shall be assessed the level of insulation of the glazing system, its ability to counteract the heat transfer by conduction, convection and radiation from the higher temperature to the lower one, in reference to the thermal transmittance (Ug).
The transmittance of the simple plate glass, is greater than 5 W/m2K, but can be reduced, up to values less than 1 W/m2K, using the following technical solutions:

- double glazing: double or triple layers of glass separated by an air cavity. Double glazing counteracts the transfer of heat by conduction and convection. The performance improves with the

increase of the thickness of the interspace, which can vary from 4 to 20 mm, and replacing the air with noble gases such as Argon and Krypton;
- low-emissivity surface coatings: on the surface of the inner pane of the double glazing, are placed film-forming metal layers (such as silver or tin oxide), improving by 50% its insulation characteristics, effective in opposing the transfer of heat by radiation (in the specific case, the dispersion of the radiative component of the heat produced by the internal heating);
- solar control: the solar control glass is a product with high technological content designed to allow the passage of sunlight through a window, operating at the same time the reflection on the outside of most of the solar heat. In this way, the interior spaces are bright and much cooler than normal glass;
- low-emissivity surface coatings and / or spectral selectivity. On the surface of the outer slab or on its opposite face are placed thin metal layers or dielectric, effective in select visible radiation and rejecting most of the infrared radiation, counteracting the heat transfer by radiation, in the specific case the thermal load due to the solar radiation;
- photochromic glasses in dynamic performance (transparency varies, due to the particular chemical composition of the glass, from bright to dark, depending on the variation of the external light intensity).

The most effective solutions to be adopted will depend on factors such as exposure and orientation, which guide the designer's choices depending on the local conditions and performance levels to be achieved.
With regard to the specific requirements that the vertical opaque borders must satisfy, there are various options of isolation, both related to the technical solutions to be adopted that related to the different materials available.
Use technologies for energy control applicable to opaque closures allows us to:
- reduce heat dispersion produced by the internal heating sources;
- isolate, damping, phase shift, protect from summer heat outside;
- to prevent uncontrolled surface and interstitial condensation;
- Insulate from noise.

The insulation requirement is satisfied with both and creating mono-layer walls, in great depth, and realizing stratigraphy that providing specifically insulating materials, ie components with very low thermal conductivity.
The use of multi-layered walls helps compared to the massive walls, to more easily achieve very low U-values; but this solution does not guarantee protection from overheating in the summer as effectively as structures with high thermal inertia.
A very effective technique, and performance, that of constructive simplicity, especially in the building renewal, is the thermal coating. It is possible, in adopting this solution, to consider intervention techniques that differ in the position and the way in which the insulating layer is applied: inside, outside or in the cavity of the wall. Each of these possibilities implies the adoption of different materials and application methods that determine both advantages and disadvantages.
The internal insulation allows you to get the most primary energy savings because there are no constraints on the size of the thickness of the insulating elements, except those from the greater or lesser reduction of living spaces.
In this type of solution, the biggest drawback is related to the failure correction of thermal bridging and the danger of condensation, which may necessitate the use of a waterproofing membrane.
This system excludes from heating the mass of the perimeter walls, speeding up the achievement of the comfort temperature.
The second method of intervention (intended to walls with cavity) is represented by the possibility to fill the cavity using insulating materials such as clay, vermiculite, granulated cork, cellulose fiber or glass wool.
Alternatively, you can use expansive foam or polyurethane urea.
The advantages of this technique are the cheapness and simplicity, since these materials can be inserted in the cavity from the inside by small openings in the walls.
Also in this case it is not possible to eliminate any thermal bridging.
In general, this solution allows to achieve a long duration of operation and the drastic reduction of the economic burden maintenance.
The external coat system involves the application of a heat insulating layer, consisting of panels of appropriate thickness, and an external layer for protection and mechanical strength.
In historic buildings a strong contraindication to adopt this system is the loss of the projections and thresholds on the front.
The ventilated wall is a constructive dry solution, that it provides designers a solution for the fulfill the requirements for thermal and acoustic insulation and protection of the building against the combined action of rain and wind.
Installation of the system, both for new buildings and for renovations of buildings, gives considerable advantages in terms of durability and energy efficiency of the wall, especially in the case of high buildings detached or heavily exposed.

This system determines an cavity air between the wall and coating creating a "chimney effect" that triggers a natural ventilation that removes heat and humidity for a high living comfort.
The ventilated walls can reduce, in hot weather, the heat load on the building due to partial reflection of solar radiation by the coating, to the ventilated air gap and to application of the insulation, resulting in a significant reduction of costs conditioning.
Conversely, in the winter season, ventilated walls retain heat with savings in terms of heating.
A variant of ventilated walls are the green walls (or vertical gardens), these offer a natural protection by noise pollution and smog in addition to energy savings.
Green walls can be made in large panels or modules that can be assembled, which integrate with the characteristics of the front and ensure the functionality of windows and doors.
It is evident the limit of the applicability of the last two technological systems on buildings of historical and artistic value.

4. Plant efficiency

For the plant engineering solutions we must consider that the energy efficiency of thermal plant is linked to the individual components and then to the production system (boiler), distribution, emission and regulation system and control.

4.1 Radiant panels

Heating environments, by radiant panels, seats underfloor takes place by radiation through a flow of hot air, which is propagated from the bottom upwards, generated by a heat source placed in the floor screed.
To generate this flow is necessary to create two areas in the same living that they have different temperature.
Specifically, with floor heating (zone A) we create a temperature difference compared to the roof (zone B), which generates an upward movement of hot air and a downward motion of cold air. Initially the volume of cold air is greater respects the hot air, and then the heat exchange will be faster and with less expenditure of energy.
The continuous application of radiating force will gradually increase the volume of the hot zone, because the downward flow of cold air meet increasing resistance and the system will tend At a point of maximum efficiency that can be maintained with a minimum energy.
In systems with underfloor heating the particular location of the radiant panels and the transfer of heat by radiation generates a temperature stratification that is closer to the ideal situation of thermal comfort.
The heat distribution is uniform in all the spaces, as opposed to a traditional system, where near heat sources are concentrated high temperatures.
With traditional systems of heating the floor is cold to touch; contrary, the radiant floor has a warm and pleasant temperature that can be maintained in a uniform and constant throughout the period in which the system is in operation.
The use of heating in the floor leading to energy savings of about 35% compared to conventional systems, the heating screed uses fluid at low temperatures (30 ° - 35 ° C) with an operating temperature of the surface of 22/24 °, allowing operating economy and energy savings.

4.2 Self-energy

Of great interest is the self-produced energy from renewable sources to meet the energy needs that requires the management of the building.
In recent years the production from sources such as solar, microeolic, and geothermal power has increased significantly, both for the convenience of the exploitation of these technological opportunities, facilitated also by government incentives, and for the growth of public awareness on environment problems.
A building system with valid energy strategies, with high plant efficiency and supported by self-generated electricity, is at the base of the zero impact buildings.
For this important technological resource, we will stop to analyze, in a critical manner, the necessary attention connected to how use and application in value places.
The Mediterranean countries, and particularly Italy, they have a landscape heritage of great value and use of technologies for the production of energy from renewable sources may submit a critical element with respect to the alteration of the places.
Their landscape impact can depending on the type, extent and location of the facilities.
The modification of the places that can result from the adoption of these systems must first be assessed by means a careful analysis of connotative character of the landscape in which it operates.
This means, for example, recognize the presence of spots and scenic routes, the significant visual reporting between the place of intervention and the context and the changes made to them following completion of the intervention.
In general, the location in the historical centers, such as proximity to scenic routes, viewpoints and sensitive visual, it is critical especially in hilly areas where it is prevalent the "top view".

It is also very delicate the interference with areas of high naturalistic value or subject to restrictions of protection, and placement in agrarian landscapes with historical and traditional value.
The main impacts on the landscape of power plants from renewable sources can be traced back to the visual intrusion due to the chromatic character of the collectors, their shape and reflective surface that, in general, are in contrast with the morphological, material and color character and cause the loss of the existing value of the architecture on which you operate.
Any operation that modifies the configuration of a site must configured as landscape design ie starting from a careful consideration of the relationship that the system is to establish the context.
Layout, design, materials and colors, work and accommodation of the areas must be the result of an organic project that respects the existing structures and give added value.
Just for the negative impact on the landscape that the use of such technologies can have in some urban or rural areas, we must use caution on the project, using the best and most viable solutions that the market offers us, bearing in mind also the critical of using of some techniques in certain contexts and, if necessary, to give up any benefits, however bridging the shortcomings with other methods that involve the renunciation of them.
It should be noted, in conclusion, that the interventions in the field of plant must be directed to the rationalization of their use on the basis of user needs that change during the day and seasons and depending on the conditions of use of the living and job environment.
In this sense, the new technological frontier is directed to energy efficiency of the plant based on automation (building automation). This sector relates to the ability to manage devices that consume energy in order to optimize the performance, in terms of "how to use".
The most significant technological initiatives included those for the management of "stand by" electrical appliances, the timed management of those thermal plants, and the automatic control of lighting systems directly related to the presence of humans in the environment to illuminate.

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Earthen houses in the Draa Valley

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Abstract
Travel literature takes us in Draa Valley, in the South of Morocco, through fascinating and mysterious tales. The Oued Draa starts from Tizgui Falls, on Anti-Atlas, to the Atlantic Ocean.
Between Agdz and Zagora are grouped a variety of rural settlements. People of this valley are called imazighen, the noble, the free-born, they are Berbers who have not succumbed to any dominance.
Follow travelers in their tales and descriptions brought us to draw a detailed map of the Draa Valley.
Arab travelers, Roman historians, French artists, popular magazines or accredited tourist guides all have a common denominator. The geography of these places is drawn by water. Water combines a landscape made of a few elements: the water, the oasis, the architecture. These elements are repeated in their uniqueness, in their essence. They had the ability to accommodate many human groups. The environment, the building material, the technique are mixed and repeated, for centuries, in the same way and without change.
The building of the architecture, as well as the building of the oasis, is the result of actions marked by time, specific, experimented. Few innovations, only the verification of consolidated events. Kasbah, tighremt, agadir, ksar are the mark of a landscape constructed by invoking the saying: "can is able to resist the time for the time that it can resist". Surveyed and drawing architecture and landscape of the Draa Valley means savegarding an ecosystem in a poor state of survival.

Keywords: Earthen Houses, Architecture, Survey, Cultural Heritage,

1. Earthen Architectures: form and character

Ruin is the term that Western culture attaches to the material heritage in degradetion.
Ruin is a work that inhabits a landscape and its establishes a series of relationships that are modified in relation to its degradation and to the dynamics asset of place itself.
In the Draa Valley in southern Morocco a series of works in ruins are part of a landscape completely built by man. The tape, fluid and sinuous of the palm grove, which marks the course of the river, is the work of skilled and scrupulous agricultural activities.
Urban settlements, ksour, are the work of communities socially developed. This is not spontaneous architecture. But the result of high cultural background.
Architectural grammar and vocabulary of ksour highlight the origins and influences of ancient Mediterranean civilizations, with clear influences of Islam and Middle East features.
“Le ksour marocaines ne sont jamais des amoncellements confus de maison. Il se composent par grandes masses, par constructions puissantes et vastes bastions et leurs murs restent très élevés” [1]. Ksour are villages built in clay. This kind of architecture can not resist at the time.
It is sensitive to the time and man.
Its dissolves under the rain and for lack of constant maintenance.
Ksour are urban settlements that are repeated in the landscape as unique settlement pattern.
They are placed at regular distances and create a network easily recognizable in the region.

The distance is that of the pertinence of the fields, in turn governed by the irrigation systems. They are cities whose shape is defined by a drawing and whose functions follow urban layout.
“Le ksar avec son artère axiale coupée à angle droit de voies secondaires, ses impasses semblales aux derbs des villes musulmanes, n’est donc pas, par sa forme, une agglomeration rurale” [2].
Ksour are enclosures marked by high perimeter wall with corner towers.
A main access gate, a space of connection between the semi-exterior and interior; a large public square, the market and assemblies places; Mosque and annexes; the shopping area; the shops of artisans. These spaces are all located near the front door.
The road structure is minimal, a main axis starts from the gate and one or two transverse axes which distribute districts. The streets are narrow and covered to ensure climate protection. In this subdivision the houses are arranged next to each other simply juxtaposed.
The rule of proximity fulfills the requirement of the occupation of the smallest possible space. The neighborhoods are so distinctly separated from each other and arranged in ethnic hierarchies: neighborhood of Jews, nobles, slaves, etc.; and each one occupies a privileged position according to the mosque, to the gate, or near the gate that connect to the fields of grove palm.
The house in the ksar is still a unique type that repeats itself. The courtyard type.
It finds its origins in an ancient past of Mediterranean influences. The courtyard house in its becoming ruined shows the microcosm of synergies between the elements which generated it. Inside the abandoned villages, "perspective view" and "isometric view”, full scale, describe the form and the function of architecture. Fragments resistant to time show up as sculptures, as unique objects, still able to communicate their being architecture.
The image of the "ruin" refers to the character of the architecture. To the essence of its construction. To the function of the work that one time was necessary for a family to live there, for a community to express their social values. And now, in its becoming ruin, the house, denounces its “value” which belongs to all. In the ruins emerge characters of architecture. Its concrete form, the technique of building, the structures. The link with the origins, the place, the language of the building.



Fig. 1: Ksour of the Draa Valley. Google Earth view.

The relationship between architecture and construction is strictly linked to the site. This connection is given by two prevalent conditions: the shortage of building materials and climatic conditions.
The construction of a house, a tighremt or a ksar is the result of the small availability of the building material. Earth, water, palm trunks.
The relationship between architecture and construction is a formal and space relationship. The physical and structural characteristics of building materials influence the size of the space and consequently its shape. Palm trunks determine the length of the floors; pisè determine the size of the walls and the height of house floors. In the earthen house exist correspondence between the characters of the form and the characters of building.
"The elements of the construction are converted in elements of the architectural language" [3].
The core of the courtyard, the rooms that are arranged around, the open spaces of the terrace. These three components create the space. The spaces of the house are not longer visible. The syntax of forms is conjugated from the "ruin", from what remains.
From what that time retains and the man has not yet taken away. At the time resists the most solid structure. The columns of the courtyard and the walls of the upper floors. These are built with adobe, brick clay and vegetable fibers.
The use of brick allows for the creation of decoration. These are still visible in the courtyard and on the walls of the terraces. Geometric friezes that alternate horizontal appeals; the columns of the courtyard are often lightened to cut corners and recesses in the trabeation or arches. The techique of pisè is used for the construction of the walls of the ground floor. The mixture of wet earth compacted and assembled for horizontal bands overlapped is the first to be leached, and then the first subject to collapse. The wood used in the construction of the floors is immediately taken away and used in new construction.
After the survey, just the drawing returns the shape of the house. The composition of the space. The relationship between open spaces and built-up areas. The drawing returns the character of the architecture.



Fig. 2: Ksour of the Draa Valley. External walls and towers.

The inherent relationship between the inside and exterior of the house.
The type of house, the courtyard house, which is repeated within the ksar, defines spaces whose main matrix is to be found in the geometric shape of the square.
The houses grow in height around a central courtyard.
The section connects the spaces between them. Explains how the space of the courtyard connects vertically all the other spaces of the house, through the passage of light.
On the lower floors the light is soft, slow to arrive. The rooms are well sheltered from the sun and heat. It is the ideal place to preserve food and to shelter animals.
On the upper floors, two or three, the light gradually materializes the space. There are places for food preparation, the living room and bedrooms. At the top, the terrace, the main place of the house. The space becomes polyvalent. It is useful to all living functions.
The link between the court and the terrace sets up the character of the house.
Spaces connected and organized according to the same formal unity closely linked to the function rural dwelling. The house of a ksar disclaims the character of their function in relation to the ground and the sky. The lower levels are linked to the street, the palm grove, the work; those higher ones dedicated to the functions of living.
“It is more correct to speak of tradition rather than history because tradition is inherent in the concept of the principle of continuity, not as an ideological choice but a necessity”. (A. Monestiroli)

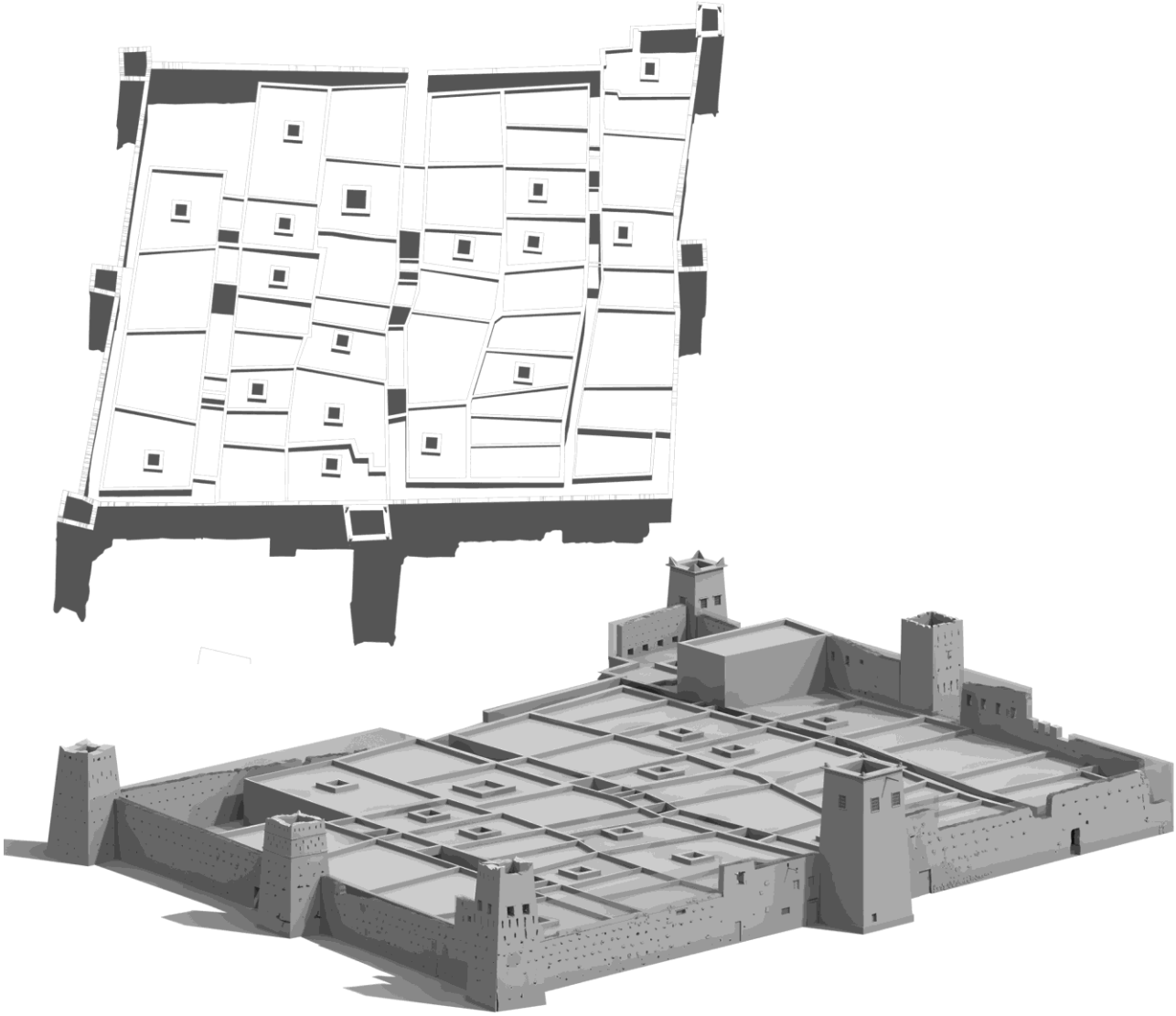

Fig. 3: Ksour Ait Iassa.

Survey and draw the earthen architecture of the Draa Valley means doing those simple act of knowledge useful to give value to the tangible heritage of a community.
It means to build documents of knowledge and checking of the status of cultural heritage.
It means to describe the identity of places in modification. Document a process of harmony between history, technology and reality; return images that can give recognition to places depleted and consolidate the expression of communities that are struggling to survive.
It means rebuilding the palimpsest of a territory through the existing documentation into a archive in the open sky.
The systematic study of earthen architectures in the Draa Valley allows you to bring order and recognizable places; it allows you to have knowledge of the quantity and quality of tangible heritage, to identify actions useful to the protection and enhancement.
Survey and representation are used as tools able to re-establish a connection between site and architecture, between new places and new communities.

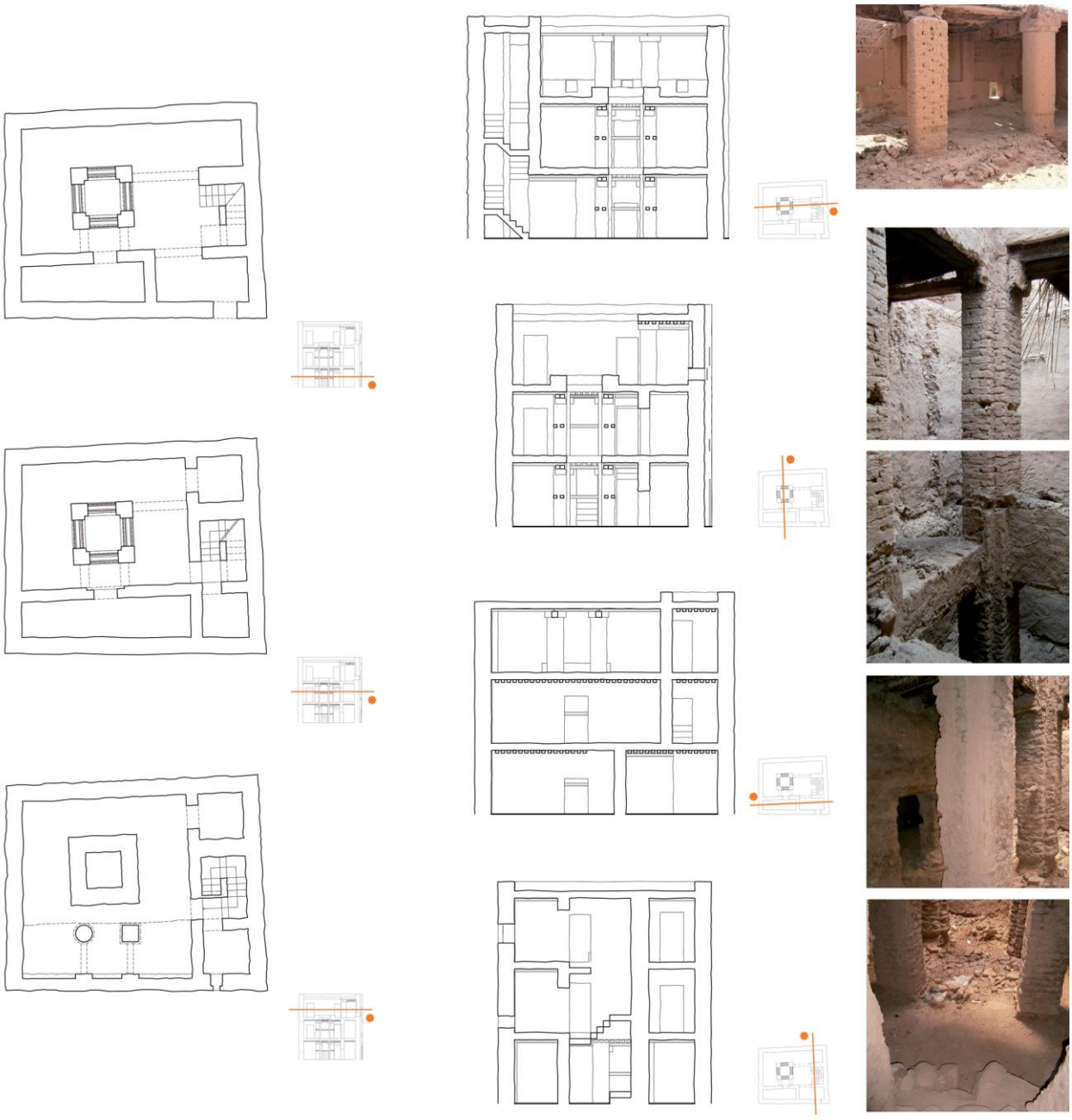

Fig. 4: Earthen House in the Ksar of Do Mougni. Plan and section.

Bibliographical References

[1] TERRASSE, Henri. *Kasbas Berbères, de l'Atlas et des Oasis*. 1ª ed. Paris: Editions des Horizons de France, 1938. p. 56.

[2] TERRASSE, Henri. *Kasbas Berbères, de l'Atlas et des Oasis*. 1ª ed. Paris: Editions des Horizons de France, 1938. p. 58.

[3] ARMESTO AIRA, Antonio. *Tecnica, lingua morta*. In MOCCIA, Carlo. *Architettura e Costruzione.* 1ª ed. Firenze: Aión, 2012, vol. 1, p. 10.

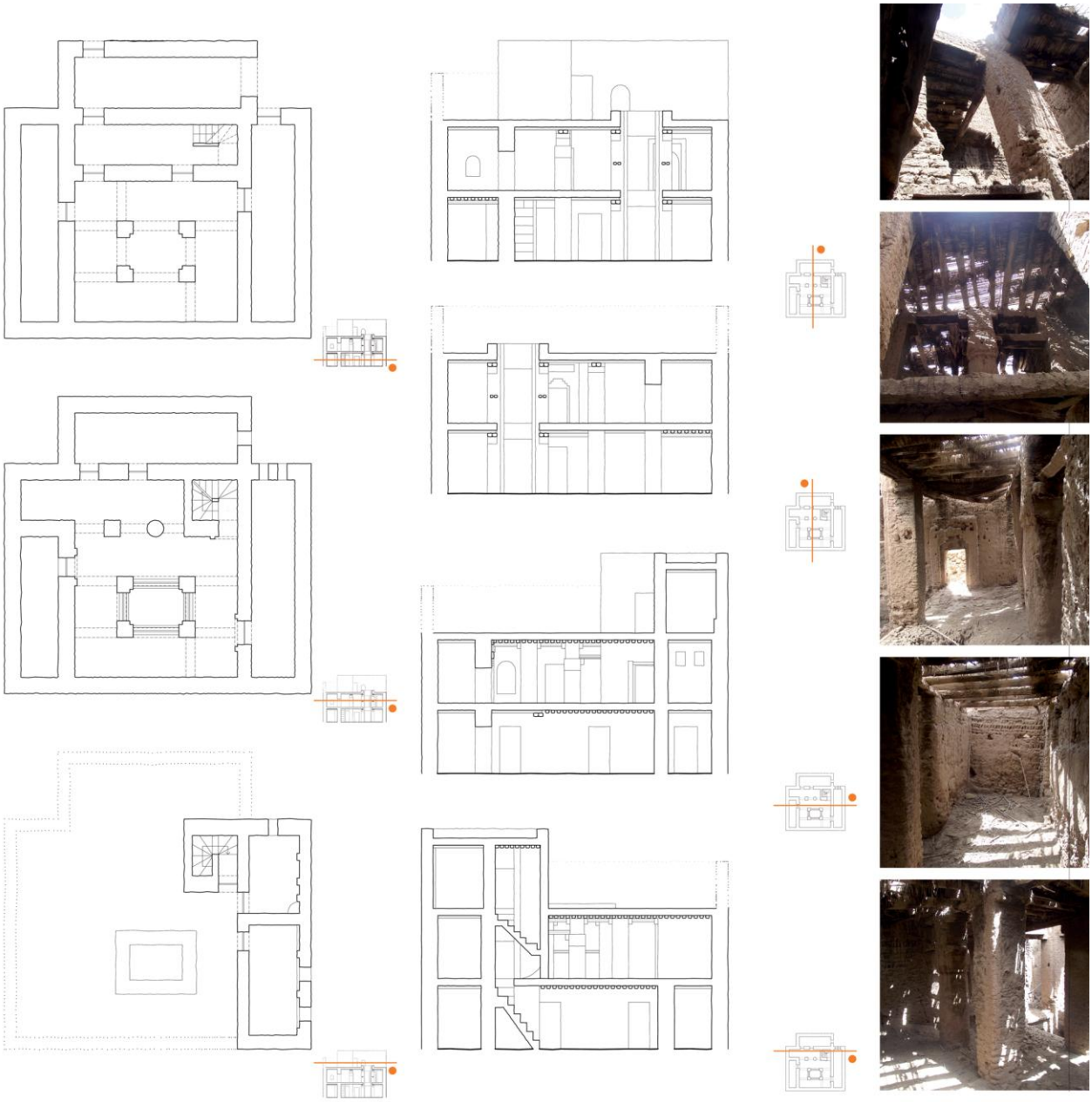

Fig. 5: Earthen House in the Ksar of Do Mougni. Plan and section.

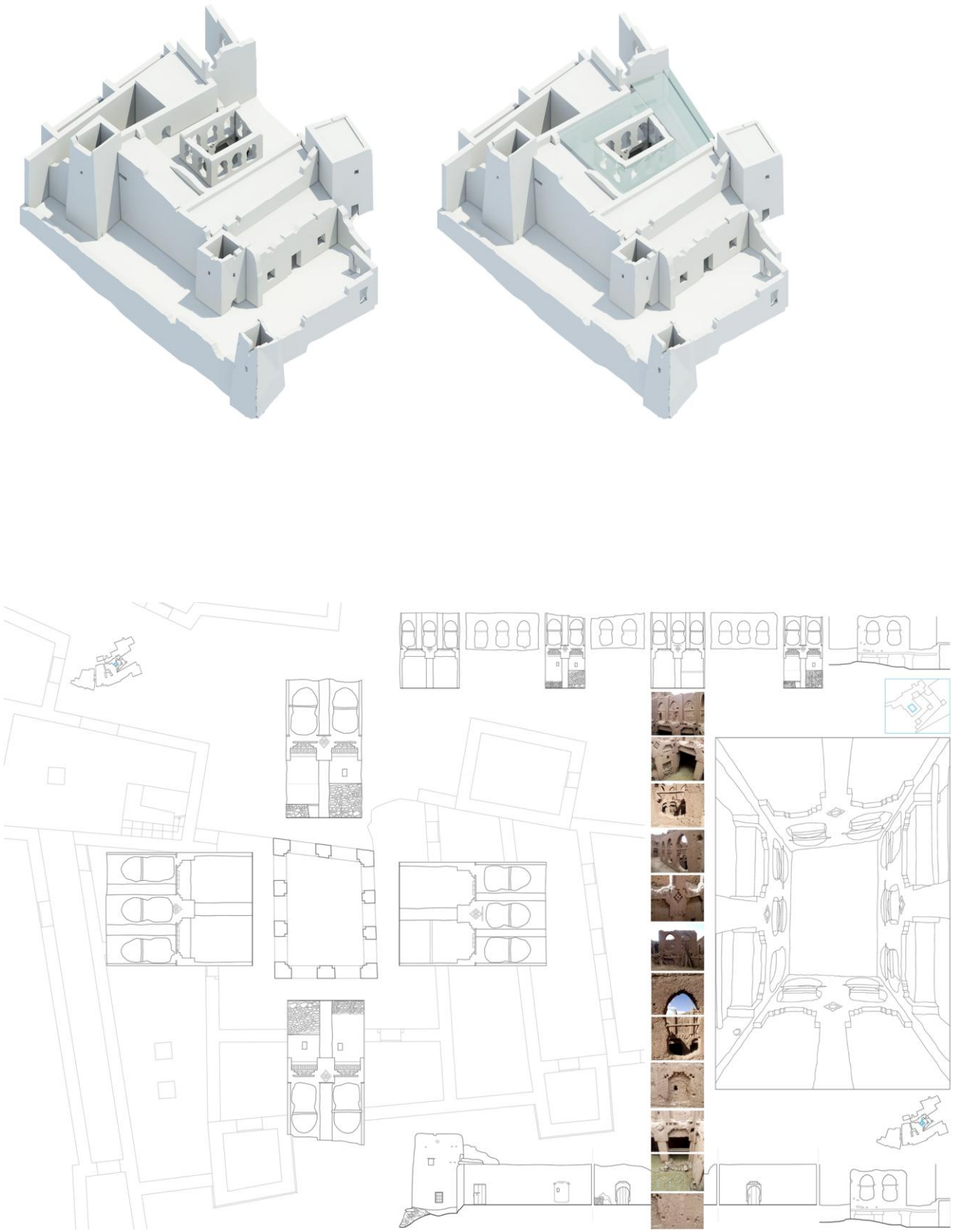

Fig. 6: Earthen House in the Ksar of Tamkasselt.

[1] MIMÒ, Roger. *L'habitation traditionelle dans la Vallée du Todra, Maroc*. 1ª ed. Sabadell: Gràfiques del Matarranya, 2002.

[2] MOCCIA, Carlo. *Ksour città di terra*. 1ª ed. Firenze: Aión, 2012.

[3] NAJI, Salima. *Art et Architectures Berbères du Maroc*. 1ª ed. Aix-en-Provence/Casablanca: Édisud/Eddif, 2002.

[4] RAGETTE, Friedrich. *Traditional Domestic Architecture of the Arab Region.* 1ª ed. Stuttgart: Edition Axel Menges, 2003.

[5] TERRASSE, Henri. *Kasbas Berbères, de l'Atlas et des Oasis*. 1ª ed. Paris: Editions des Horizons de France, 1938.

[6] VALLI, Dario. Castelli di Terra. 1ª ed. Como: Nodo Libri, 1992.



Fig. 7: Conservation status of ksour: houses courtyard.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Nisida, the memory of a myth

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Abstract
The island of Nisida is made up of a cluster of yellow tuff of volcanic origin, covered by a layer of inconsistent gray tuff mixed with pozzolan. This stratification originates underground cavities that, as for the city of Naples, cause the well-known heterogeneity of the subsurface. The presence of factories on the surface, often positioned in correspondence or in the vicinity of such irregularities, causes microcracks in the tuff, which tend to deteriorate over time, both for reasons related to *flegreo bradyseism*, both for propagation of cracking strengths phenomena.
The island of Nisida is home to the juvenile Criminal Institute, housed in a building from the thirties of the last century, below which old Bourbon volumes are preserved, recently under excavation conducted by the current prison administration. To date, the morphology of these areas is not yet defined in terms of space, nor there is a clear functional relationship with the ancient Bourbon Laundry located along the ridge overlooking Porto Paone.
The research in place includes two integrated phases. The first consists in an architectural and environmental relief operation, of the buildings interested by the recent excavation, and of the possible paths that marked the old infrastructural network of the island. The second consists in an assessment of the mechanical characteristics of the material constituent the isle and the artefacts, with the aim to determinate the staticity and integrity of the same, and of the load-bearing capacity as foundation rocks. The general objective of the research is the architectural and environmental safeguard of the island, and the assessment of the stability about the slope and the foundations of the buildings, including the Penitentiary Institute and the factories of the Bourbon period.

Keywords: Nisida, architectural and environmental survey, structural identification, texture wall.

1. The architectural and environmental survey (Ornella Zerlenga)
The island of Nisida is neither directly visible from Naples nor the geographical environment of Mergellina. In fact, from this vantage point, the well-known landscape of Naples ends on the foothills to the west of Capo Posillipo and, when the air is clear, is enriched by the views of the Sorrento peninsula and the island of Capri in the background. In order to see Nisida, it is necessary to go over the hill of Posillipo and go to the viewpoint of Parco del Virgiliano or to the final stretch of Via Manzoni. These viewpoints proudly, and unexpectedly, put the island on display making it possible to appreciate the full spatial configuration of its north-east side. However, there is a substantial difference between these two observation points. In fact, from the viewpoint of Parco del Virgiliano the perception of the island is more foreshortened and the view of the bridge that connects the island of Nisida to the mainland is partial, not allowing (as in Via Manzoni) to fully comprehend the connection with the beach of Coroglio. In addition, from Parco del Virgiliano the front view of the large ILVA steel plant is obstructed and, therefore the image of Nisida is captured in its original environmental context, an enchanting natural landscape of rare beauty, which includes the bight of Baia, the headlands of Capo Miseno and Monte di Procida and the islands of Procida and Ischia (Fig. 1).
However, this magical image of natural harmony (as seen from Posillipo) misleads and obscures the historical and current reality of the island of Nisida. If seen from the beach of Coroglio (i.e. from Bagnoli), Nisida is an island that ‘is not there’. In fact, despite there being a bridge (built around the

1930s), access to the island is prevented by virtue of its intended uses. The island, therefore, is in fact 'isolated' from the context of the city since both access to it is denied as well as any form of visual inspection. Therefore, if on the one hand, the prohibition of access to the island has allowed for the preservation of the natural environment that still characterizes the island, on the other knowledge of the places and existing architecture remains the privilege of a selected few.

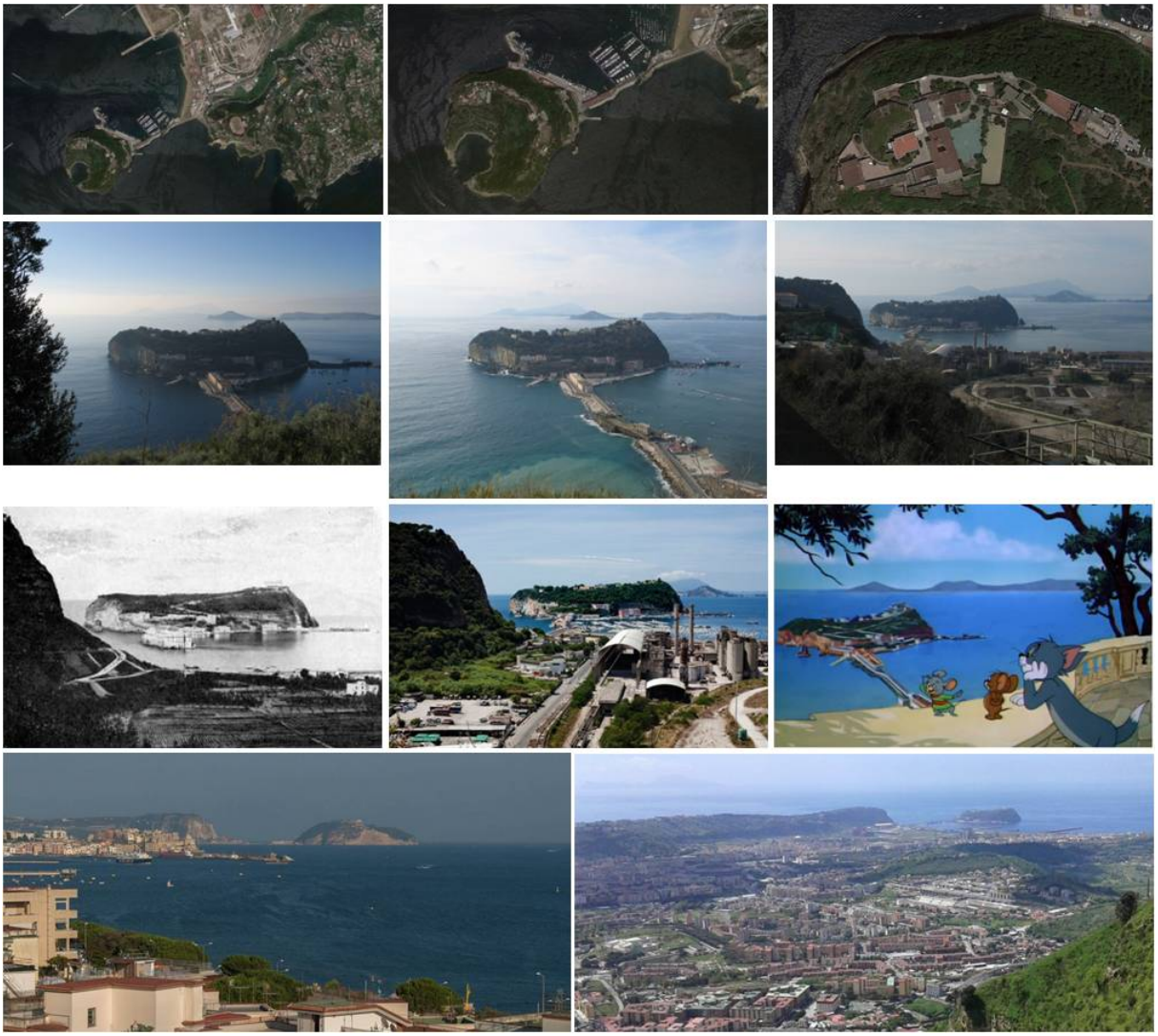

Fig. 1 – Nisida by Google Earth and Parco del Virgiliano and Via Manzoni (ph. by Ornella Zerlenga); Nisida without and with ILVA in Bagnoli and with Tom & Jerry (by Hanna e Barbera, *Neapolitan mouse*, 1954); Nisida by Pozzuoli (ph. by Ornella Zerlenga) and Camaldoli's Hill (ph. by Angelo Granieri).

Nisida has an ancient history [12]. Firstly, geo-morphological, being the island the result of an ancient eruptive cycle of Campi Flegrei: the current bay of Porto Paone was created by the violent action of the sea on the south-west taper of the original volcano [16]. In addition, due to the effects of the extreme excursions of bradyseism (characterising the largest Flegrean area) that connects it to the mainland until the Augustan period (mid-first century A.D.), or shortly after, when it detached becoming an island. The ridge of Chiuppino, in front of Nisida, facing the beach of Coroglio, was in fact a tunnel that made it possible to get to Nisida from the mainland [22, 27]. Its small size seems to be the reason for its name, since a topographic analysis shows how it derives from the Neapolitan dialect and, in particular, from the vernacular nickname of 'Nesis' (which in turn derives from the Greek) 'islet'. In addition, over the centuries, the island's link to the myth of the Campi Flegrei has meant that the small Nisida has played a significant role in Neapolitan iconography [7, 18, 26].
Mythology links Nisida to the adventures of Odysseus and, in particular, to his meeting with Polyphemus and the myth of the earth inhabited by Cyclops i.e. the area of Campi Flegrei. Thus, Porto Paone seems to correspond to the natural harbour where Ulysses landed with his ships before reaching the cave of Polyphemus, perhaps recognizable in the nearby Grotto of Seiano in Capo

Posillipo. However, there was volcanic activity in Greek times and it is also true that the island of Nisida was rather sporadically frequented.
In Roman times, the island's history is mainly linked to the figure of Brutus, who apparently had a summer residence here in the first century B.C. and where he met with Cicero; indirectly, the island is linked to the conspiracy led by Brutus and Cassius against Caesar. There are no traces of the villa but the discovery of 'opus reticulatum' near the prison tower (located at the top of the island) suggests that the villa stood in the highest and most panoramic point of the island so as to avoid smelling the air currents coming from the stagnant waters of nearby Bagnoli that, until the reclamation of the early nineteenth century, was a veritable swamp.

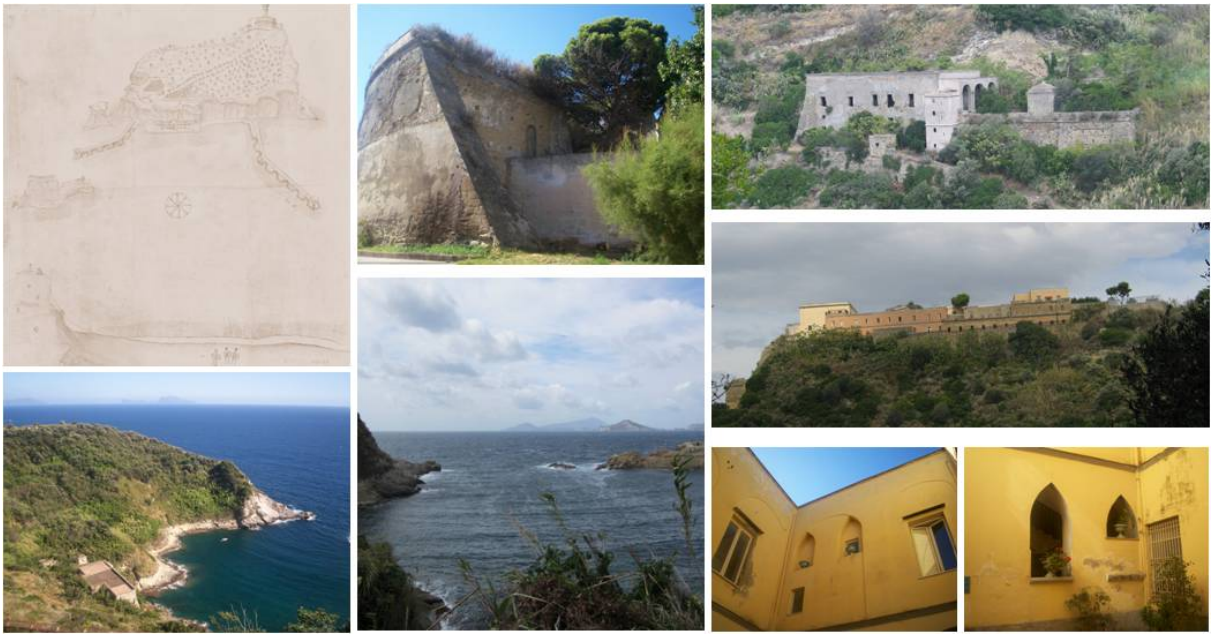

Fig. 2 – Nisida by Conte di Monterey (1635. Archivo General de Simancas. Mapas, Planos y Dibujos). Remains of the historic defensive tower; Bourbon laundry; Porto Paone; Juvenile Detention Centre (ph. by Ciro Scognamiglio).

The discovery, however, of some pylons heading toward Capo Posillipo and Bagnoli suggest that there was a Roman port on the beachfront of Bagnoli and that the villa of Brutus could be reached along a road that differs very little from today's, located along the northern side of the island. In addition, due to its size and strategic location on the island, it is conceivable that this Roman port could have served as a shelter for merchant ships and surveillance.
In the fourth century A.D., the island of Nisida was granted to the Neapolitan Church, consequently either an important monastery was built on the island or more buildings constructed to form a monastic centre. The sources that document the existence and location of the monastery are very scarce and once again it seems that the monastery stood in the highest part of the island, near the current round tower, now annexed to the courtyard of the Juvenile Detention Centre. Some ideas believe that the monastery was identical to the current courtyard of the Centre, whose square shape and the presence of arches (now walled) recall a type of cloistered courtyard (Fig. 2). However, this part of the building seems to be dated between the fourteenth and fifteenth centuries, with it therefore being a subsequent structure. In this medieval period, reports of the island are scarce and it is therefore conceivable to think that the island was a sought-after destination, as attested by the literary sources of Boccaccio as well as those relating to the queen, Giovanna. The construction of a cylindrical watchtower located at the top of the island can be attributed to the Angevin period and therefore conceivable as the primary system of the subsequent 15th century cylindrical sea tower [13]. According to documentary sources, at the beginning of the sixteenth century, Nisida was still property of the archbishop of Naples, who in 1518 granted the lease to Jacopo Carafa, while in 1544, sources report it as belonging to Pietro de Orsanques who, in turn, sold it in 1554 to Giovanni Piccolomini, Duke of Amalfi. With Piccolomini, the island was modernized and beautified, becoming a sought-after and elegant meeting place for nobles and artists, local and foreign, as highlighted by the quote by the famous writer Cervantes in Book II of his "La Galatea" and who in all probability went there. In addition, the importance of Nisida is also demonstrated by being included in almost all the most important maps of the time, even those in large scale that due to its size should not have been included. It is believed that it was Piccolomini who either began work on the sixteenth-century tower or transformed the former into a noble residence,

retaining its defensive function and maritime control. At the beginning of the seventeenth century, Nisida was bought by Vincenzo Macedonio, Marquis of Roggiano who continued the beautification of the island.
The other 'history' of Nisida, or the one that sees it as a place of segregation – that even today defines it – seems to have started in Roman times when Augustus confined his sister Giulia here. However, it was at the end of the sixteenth century that a merchant quarantine station was built on the ridge of Chiuppino. In 1593, the city of Naples bought the island of Nisida and exploiting the close position but at the same time isolated, built a quarantine station to store merchandise from places suspected of having the plague. The hospital was only built between 1626 and 1628 by engineer Alessandro Ciminiello and master builder G.B. Ferraro as a result of the epidemic in Naples in 1619 and later the plague in Messina in 1624. As a result, both the port as well as the hospital were subjected to repeated interventions. In 1766, work was started on the port of Nisida and, with the French decade (1806-1815), Gioacchino Murat decreed that the island should be connected to the islet of Chiuppino and the building of a maritime quarantine station for the hospitalization of infectious Neapolitan patients. In 1815, the State Property Office took possession of the island. With the return of the Bourbons, the island of Nisida was at the centre of a lively debate on the construction of a new port and hospital, whose work (begun in 1855) were very weary and consisted of the link between Nisida and the islet of Chiuppino as well as in the realization of the east pier and the lighthouse [9, 17, 23]. Simultaneously, in this period, the ancient tower on the top of the island was transformed into a penal washroom, while the main part of the building called 'Il Palazzotto' was transformed into the prison laundry (hence the name 'Bourbon Laundry'), near which a small chapel and the 'Convict's Graveyard' was built. During the Bourbon period, both criminals and political prisoners were locked up in this prison, including Michele Pironti and Carlo Poerio. In addition, the prison was visited by writers such as Alexandre Dumas, Matilde Serao and Jessie White Mario. After the Unification of Italy, the prison housed only ordinary prisoners and had about 1,100 inmates in about 70 dormitories. Croce, who visited the prison and published the results in an issue of 'Napoli nobilissima', described the penitentiary building as cylindrical in shape with three floors where the ground floor was occupied by laboratories and the rest by prison cells [14-15]. In 1901, after visiting Nisida, Victor Bérard wrote: «the whole island is nothing more than a prison» [8].
In fact, the island was destined to be permanently divorced from the city and especially the realisation of the ILVA steelworks on the vast plain of Bagnoli in front of the island finally severed any possibility of the development of spa-bathing tourism in the area, for which Nisida certainly would have been a cornerstone. Therefore, additional uses were allocated to the island (such as military), which helped to strengthen the island's isolation from the city. At the same time, in 1935, the old prison was abolished, with two-floors of the original penal tower being demolished and seven halls built to house and school the juvenile detainees on a farm. The new buildings (unlike the theatre and gym) are similar with a central staircase (which serves two floors) and the washrooms placed in a curved projecting block. The same was also done for the connection to the mainland between the island of ex-islet of Chiuppino and the beach of Coroglio. On 25 June 1935, the old quarantine station was demolished and the tuff promontory of Chiuppino cut off to realize the road that joined with the road to Coroglio that leads to the top of the island.
During the last years of World War II, Nisida was used as a military logistics centre for the allied forces, and by the end of the war, it resumed its role as the 'isolated' island due to the strengthening of the industrial vocation of the Bagnoli area with founding of the Italsider plant, which finally closes the spa-bathing tourism that had characterized – albeit timidly – the coast from the 1920s to 1950s of the last century [20]. In 1948, the juvenile detention centre was transformed into a 'House for Juvenile Re-education' and in 1971 an 'Institute of male Rehabilitation for observation and treatment'. The last decades have seen the entire area affected by large-scale projects and ideas that celebrate various uses of the island in relation to the city: a marine park, a tourist centre, a youth city, etc. All hypotheses that have remained on paper, leaving Nisida the island that 'is not there', with forbidden access and which is still debate how to return it to the collective heritage while respecting its natural and historical identity [19, 21].
In this sense, the surveys of the architecture on the island built in different historical periods are significant. The disciplines of surveying and representation of the built and natural environment have constituted an opportunity for the knowledge and documentation of reality, contributing their findings to the formulation of proposals aimed at the enhancement of what is present. In the case of Nisida, the relevant documentation assumes a greater significance as well as a valuable point of departure for any proposals for valorisation, it allows to 'give a face' to architecture that would otherwise remain unknown to most. Thus, the memorandum of understanding for cultural activities and research signed in March 2014 between the Department of Architecture and Industrial Design 'Luigi Vanvitelli' of the Second University of Naples and the Department of Juvenile Justice of the Ministry of Justice has the aim of studying and analysing the material sources for environmental protection and proposes a scientific survey of some buildings that have recently been brought to light and that may answer some

questions. The survey campaign (launched in March 2014) carried out as part of the Laboratory of Final Synthesis in 'Survey and representation of architecture and the environment' under the scientific coordination of the author, the correlation of Claudia Cennamo for the structural aspects and the scientific advice of Vito Cardone, noted scholar on the history of the island [10, 12].
Thus, in this survey campaign, the surveys already carried out during the 1990s by Felice Costagliola and Lucia Trapanese are particularly relevant and constitute material of significant value and unprecedented use of social as they allow to know more about the form and structure of the housing that characterizes the island [28]. The surveys in question describe most of the religious and civil architecture on the island. Drawn to a scale of one to one hundred, through the design of plan, section and elevation and, in some buildings, including through the use of graphical representations suggestive of a three-dimensional perception (specifically, axonometric), these drawings represent the planimetric configuration and elevation of the buildings located on the island of Nisida, such as the church of the Immaculate Conception, some buildings of the Juvenile Detention Centre, the remains of the historic defensive tower, the Bourbon laundry (for which exploded isometrics were also performed in order to highlight the areas used for the hydraulic lifts), residential halls with a theatre and gym. Analysis of these graphs allows to: read the dimensional and formal characteristics of the buildings surveyed, to retrace the traces of ancient environments, even by comparison with archive documentary sources, to compare between their forms and types such as, for example, residential halls, built around the 1930s located along the ridge that divides the island into two sides (one facing the mainland, the other towards the sea).

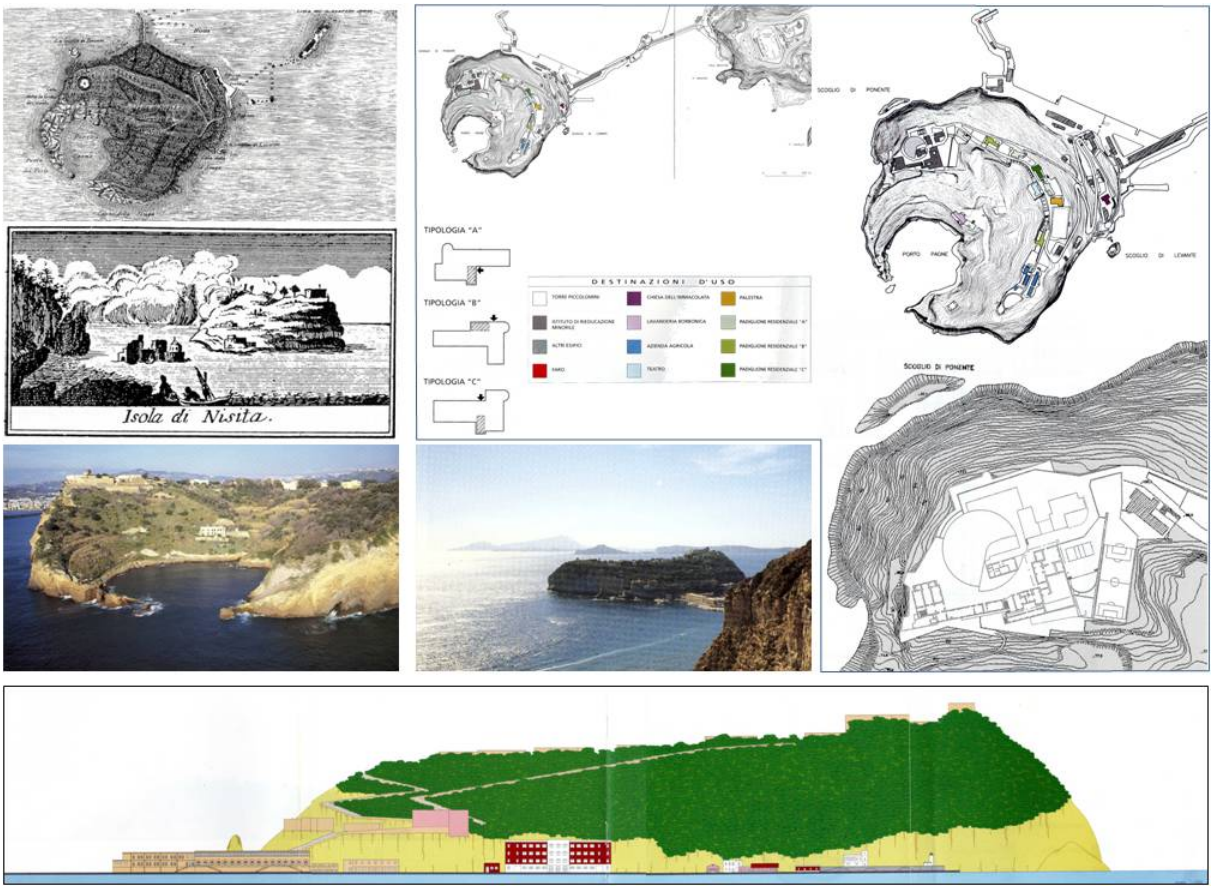

Fig. 3 – Nisida by Giovanni Carafa Duca di Noja (1775); with some buildings (church, Juvenile Detention Centre, defensive tower, Bourbon laundry, residential halls with a theatre and gym); Nisida: Porto Paone, and by Parco del Virgiliano (ph. by Mimmo Iodice); by Coroglio (drawing by Letteria Spuria).

Upon completion of the morphological surveys of the architecture on the island, an environmental survey was also carried out (Fig. 3). This is the elaboration of the two aspects of the island: one, longitudinal scale 1:2.500, carried out by observing Nisida from Bagnoli; the other, front, with the inclusion of the architectures that characterize this side of the water-front and document the coastline along the stretch from the building currently used as a headquarters of the Guardia di Finanza up to the lighthouse (scale 1:1.000). The graphs, drawn up in 2001 by Letteria Spuria under the scientific coordination of the author, allow to read the environmental relationship that links the island of Nisida

across the bridge to the hill of Coroglio, the altimetric collocation of the architectures, the presence of vegetation and the steep tufa walls [11], the chromatic impact of the water-front towards Coroglio [28]. At the same time, the graphs evoke and emphasize the secular environmental relationship that links the island to the Campi Flegrei (Fig. 4), proposing a spatial configuration when looking at the island from east to west i.e. from the coast of Pozzuoli [24-25]. Thus, emphasising the environmental (and historic) link that connects the island of Nisida to Campi Flegrei and, more generally, to the west of Naples cannot consolidate the idea, and hope, that the future Nisida, that today is the island that "is not there", could find a new social dimension that cannot provide for a national and collective use of the island in a more general proposal for the reorganization of the western area of Naples in the aftermath of the dismantling of the ILVA steel plant [translated by Sacha Berardo].



Fig. 4 – From Nisida: Bagnoli with Italsider and Camaldoli's Hill; Parco del Virgiliano; Villa Pausylipon; Penisola Sorrentina, Capri, Ischia and Monte di Procida (ph. by Ornella Zerlenga).

1. Structural identification and first dating of the artifacts basing on the observation of the texture wall (Claudia Cennamo)

The interpretation of the 'masonry' through a precise structural model and the development of a readable mathematical model, able to take into account any mechanical characteristic, is a complex problem, since, including under the term masonry all that vast range of materials that show, between the main features, predominantly inelastic character, the study becomes very onerous. In fact, due to the texture of the material that presents itself somewhat differentiated depending on the mode of construction, or on the type of brick used, or also because the individual structural elements are less unwieldiness of the beams, pillars and floors in steel or reinforced concrete by the contemporary structures, the studies about masonry structures are controversial, and the mathematical model able to represent them is not uniquely determined, but it is still the subject of careful study and always new elaborations. Really, to arrange a model that includes all or at least most of the masonry types and to define the laws that govern all mechanisms, is very difficult: so far there is no general theory so as to

adapt to the multitude of special cases which have come over the years by the observation of the masonry structures behavior.
On the other hand, since the historical monuments testify, with their millenary presence, the validity of the construction methods of the past and the strength of the masonry (if 'workmanlike' built or 'well built'), which is threatened mostly by catastrophic events -mainly earthquakes and bombings-, there is a clear need, before tackling the project of restoration of a masonry building, to acquire as far as possible, the scientific and technological elements on which its original manufacturer based the project, some of which are part of the constructive 'modus' commonly in use, although modified today in accordance with a more rigorous logic.
The decay of the artifacts found in Nisida, deserves a particular attention, because it is caused primarily by the lack of maintenance, as well as by the exposure to the sea, by the continuous bradyseism in the Phlegraean area, together with the poor knowledge of the construction material, that came from quarries on the island, and it isn't the classic Neapolitan yellow or gray tuff, but it has primary mechanical characteristics (Fig. 5).



Fig. 5 – Nisida, actual state of an ancient tuff wall along the path to the sea (ph. by Claudia Cennamo).

Studying about the evolution of construction techniques is crucial not only for the value of historical evidence, but especially to reconstruct the "intuition" about one particular masonry structure that motivated the architects of the period, to translate it into modern scientific terms, and finally to evaluate the more suitable mode of action for ancient buildings of particular significance; a problem that requires the use of appropriate techniques which allow to avoid the alteration of the static characteristics and the mechanical properties through which the artifact was originally conceived.
So, in this logic, through a brief historical comparison of the various component elements of the Nisida structures and some of the main techniques of calculation, it is possible to come into a first knowledge of the masonry buildings on the island and of their structural performance, with the aim to be able to design an intervention that allows both a possible functional recovery, both a preservation of the structures over time.
Therefore, it is helpful to go back very briefly on the steps that have marked the evolution of masonry construction, signaling, albeit briefly, the most representative typologies of the past.
One of the more ancient known types of masonry is that of the Cyclopean walls, which enclose the ancient Mycenae and supporting the embankment on which was placed the temple of Apollo at Delphi: these are large irregular blocks with surfaces accurately machined, matched between them without any binder, which Vitruvius called *silex* («ubi sunt saxa quadrata, sive silex, seu caementum aut coctus later sive crudus, his erit utendim») [6; I, V].
The resistance, that in these dry walls was entrusted only to the friction and to the weight of the blocks, could be improved, then, by the use of the mortar which, in addition to facilitating the implementation of the stones, spreads the stresses with greater uniformity, increasing, when correctly used, the overall strength of the wall structure.
The stone walls with mortar have different typologies in relation to the way in which the stone was used, in a stage of processing more or less refined and accurate.
In order to achieve a better stability and a more uniform transmission of loads, sometimes courses of coarsely cut stones with rows of squared stones were positioned, or brick and stone cutters were

alternated. In any case, for the parts subject to greater stresses, such as corner posts or shoulders of walls, the more resistant stones to compression were selected and used.
These constructive features were not essential in the walls formed by the only squared freestones, because the same shape of the blocks guaranteed the horizontality and the regularity of the rows, which together with the vertical staggered of the joints, ensured a more effective strength and resistance to the whole structure.
The Italian historical sites, such as those of the whole of Europe, have a long tradition. Deriving from ancient plants, often of Roman, have undergone medieval restructuring and transformations in the Renaissance and during the Counter-Reformation, taking on a bourgeois aspect in nineteenth century.
The common technology is masonry, but the difference between the way of building in the old times and today is clearly placed in the foundation 'cultured' of modern society that is taught in universities and spread with the means of the entrepreneurial market, against the spread 'popular' of the building typology in the past.
In fact, given the difficulty of transport, the first problem that arose for the manufacturer, to build a masonry structure, was the choice of the type of stone to be taken, which was primarily limited to those materials that can be found on the premises or in the immediate vicinity: therefore the structural safety and all the final appearance of the historic center were influenced by local stone and also the spread of a particular typology had rather limited diffusion pathways, mainly entrusted at the ability of the individual who was the promoter, to pass it. Cases of transport of material from distant places are included only for the construction of monumental buildings of particular value: such shipments were made generally by sea, e.g. the buildings of Piazza dei Miracoli in Pisa, made with stones from far Sardinia.
Once identified, the available materials were used for different elements of the construction, in relation to their qualities of resistance to crushing, of duration, of resistance to atmospheric agents, to their specific weight, to their workability. The form in which the stone had to be processed to be used, will be defined in a second time.
Giuffrè distinguishes the two schematic strands of masonry technique, which have been mentioned previously: the popular tradition; the classical (or cultural) tradition [4].
At the popular tradition can be attributed those walls that were said *formacei* from a definition of Plinio il Vecchio [5], built with clay strongly pressed between formworks.
In addition, the *lateres* can be included, which are unfired clay bricks dried in the sun, mentioned by Vitruvius [6; II, III] and often used by the Greeks, Romans and to this day in many parts of the world.
Finally the *macera* can be considered belonging to the popular tradition, that is masonry consisting of rough stones side by side without binder, as we can still see in the Italian countryside: the *macera* marks the boundaries and acts as a wall to a shelter, or as a support to a terrace.
The classical tradition may be, however, schematically represented by the squared stone masonry, i.e. the *isodomic* and *pseudoisodomic* masonry that Vitruvius attributes to the Greeks, whose next expression was the *opus quadratum* in Roman times.
So, gradually in the time, the masonry typology passes to a first embodiment consisting in perfectly squared blocks; the opus quadratum is in fact made up of two rows of stones: the *orthostates*, namely rectangular blocks placed with the longer side in the direction of the wall, and *diatones*, with their greater length placed perpendicular to the wall.
Unlike of masonry cataloged among those of popular tradition, the opus quadratum is courses or horizontal rows: the vertical joints are staggered and follows studied rhythms alternating between orthostatic and diatones. The construction of such walls obeys, therefore, to strict geometric rules, both with regard to each element that composes them, both with regard their position. As will be seen below, even the mechanical model of reference can not be the same for both the typologies.
Turning now to the binder, as another component of the masonry building, its interposing between the stone elements with great accuracy and regularity, and especially the no exceeding as quantity, are critical factors for the good performance of the structure; the experimentation has shown that the limit load borne by a masonry panel, is inversely proportional to the thickness of the mortar joints. It is also deduced, always experimentally, that for an optimization of the behavior of the masonry, the mortar should be present with a volume fraction on the masonry variable between about 10% and 30-35%.
However, the mortar used in ancient buildings had low resistance; this means that the degree of safety of these structures requires a careful evaluation, since the only physical integrity of the constituent elements is not enough to assume a satisfactory resistance of the whole.
On the other hand, from some experiments carried out on brick masonry, the inopportunity of the use of mortars with high resistance is carried out, because beyond a certain limit, the increase in resistance of the binder does not correspond to an equal increase in the overall strength of the masonry; instead, it is found that the optimal behavior is obtained with mortar whose compressive strength is between 50 and 100 kg/cm², with bricks of characteristic strength of 150 kg/cm². This suggests, therefore, that, even if the resistance of the masonry is influenced by the characteristics of

the individual component materials, for a more realistic safety criterion it is necessary refer to the behavior of the whole artifact.
The note ‘pozzolana’, used in Phlegraean area, or ‘cocciopesto’, used to waterproof the Piscina Mirabilis in Bacoli, are high-strength mortars whose presence is in fact almost unchanged over time; nevertheless, to argue that the global stability of certain structures is due only to the binders, is a paradox. Rather, it depends on the same Architecture, understood as weight, shape, cut, blocks placement, and symmetry of the plant, regularity of the elevation, proper sizing of solids compared to empty, clamping between the vertical walls, proper sizing of the roofs, etc etc.

2.1 The mechanical model

As already mentioned, the organization of the masonry texture that is found in the ancient buildings is very different from what is currently adopted in masonry buildings, and it is extremely variable from case to case; this involves many difficulties when attempting to establish computational models for ancient masonry structures [4].
In other words, if for a masonry made by regular and squared blocks, the finite element method (FEM) can be easily applied, for a chaotic masonry [5] it does not provide adequate results, and the more inherent method appears the macro-elements one, which allows a global vision [6] of the whole structure.
The extreme variety of textures does not allow, therefore, the formulation of a single model of calculation, but allows, on the other hand, the setting of a pattern of behavior quite flexible, which, even if it can not reflect every possible aspect characteristic of the material, can be however adapted, with appropriate diversification, to the numerous schemes according to which the ‘masonry’ material is catalogued.
This is mainly the model called traction not reagent (TNR): in fact, as it is known, from the experimental tests we can be note that both the tuff materials, both the lava stones in general (that represent the large part of the ‘walls’ on our territory), have an excellent resistance to compression and a virtually zero resistance to traction; so the behavior of the material can be generalized neglecting the tensile strength, which is assumed irrelevant with respect to the global behavior of the structure. In general, in fact, the structure is actually designed trying to do work the material only under compression, in an attempt to prevent the occurrence of tensile stresses that could produce brittle fractures.
The TNR model is preferably used for walls in which the randomness of the directions of the joints and the irregular shape of the segments do not result in preferential directions of detachment (eg. walls built according to the ‘popular tradition’): in that case the material can be assumed as traction not reagent in all directions; instead, in the walls formed by the superposition of regular rows of square blocks (such as eg. for walls constructed according to the ‘classical tradition’), it is possible to identify preferential directions of fracture, in consequence of the sliding phenomena along the horizontal joints: so the inability to transmit tensile stresses are reduced only into the directions of the joints, and does not involve other directions. If then the joints are sufficiently staggered from each other, assuming that there is no breakage of the individual stone elements and that the lesion occurs along the links, the action of the sliding is combined with the friction force between the ashlars, giving rise to a certain tensile strength in the horizontal direction.
The traction not reagent model is one of the most used for the study of the ‘masonry material’, but it is not the only one. In fact the rigid-plastic model, the elasto-plastic model (it is assumed that the masonry, after a short phase in elastic behavior, enters into the plastic phase, that is, eg., the situation where is located steel when it exceeds the yield strength, now unable to pay back the energy used to deform, and unable to return in the original configuration) may be admitted; the elastic-brittle material, which retains a moderate resistance to tensile stresses, but, with the opening of the fractures, loses its property to transmit tensile stresses along the fractured direction, may be also taken as a model; instead, there is the argument about mortars, as already mentioned: the mortar (sand, water and cement or lime) is a binder and, therefore, at least in the case where it is not dry and dehydrated, provides to the individual blocks greater cohesion and to the masonry even a modest elasticity, to be taken into account in the initial phase of the characteristic curve of the material. It is necessary, finally, to consider the friction between the blocks, whose major or minor contribution can transform the model that is being developed (e.g., a column composed of individual blocks with a very high coefficient of friction may be, ironically, assimilated to a monolithic block).
When the choice of model to be used to locate the material is been made, it is possible to pass to the actual structural model, that is the structure that is being analyzed as a whole: in fact, the ‘workmanlike’ is considered, i.e. optimal proportion reports between the individual structural elements, good clamping between the various wall panels of a building, and a whole series of features from graphics, based on the geometry of the bodies, that were used by the designers of the past, which did not have the scientific knowledge available to the contemporary culture. And since these simple rules,

sometimes intuitive and ever empirical, still defy the passing of the centuries, some scientists yet put the 'workmanlike' in high rank in the scale of values for the global static security.
In conclusion, starting from these few but essential parameters of knowledge, it will be certain possible, in future study developments, produce an initial dating of the structural elements present on the island of Nisida.

Bibliographical References [C. Cennamo]

[1] CENNAMO, Claudia. CHIAIA, Bernardino. *Fractal Analysis of the stress flux in chaotic masonry*. Masonry International, vol. 23:1, pp. 9-25, ISSN: 0950-2289, 2010.
[2] CENNAMO Claudia. CHIAIA, Bernardino. D'ANGELO, Sara. FERRETTI, Daniele. Seismic assessment and rehabiliation of a historical theater based on a macro-element strategy. In *International Journal of Architectural Heritage*, vol. 5:3, p. 264-295, ISSN: 1558-3058, 2011.
[3] CENNAMO, Claudia. DI FIORE, Marco. *Structural, seismic and geotechnical analysis of the Sant'Agostino church in L'aquila (Italy)*. Revista De Ingenierìa De Construcciòn, vol. 28, pp. 7-20, ISSN: 0716-2952, 2013.
[4] GIUFFRÈ, Antonino. *Letture sulla Meccanica delle Murature Storiche*. Roma: Kappa, 1991.
[5] PLINIO. *Storia Naturale*. Torino: Einaudi, 1988 (anastatica), V, XXXV, cap.48, p. 491.
[6] VITRUVIO. *De Architectura*. Udine: Fratelli Mattiuzzi, 1830. VI, XI (Della fermezza e dei fondamenti degli edifici). Traduzione di Quirino Viviani.

Bibliographical References [O. Zerlenga]

[7] ALISIO, Giancarlo. VALERIO, Vladimiro. *Cartografia napoletana dal 1781 al 1889*. Napoli: Prismi, 1983.
[8] BÉRARD, Victor. *Les navigations d'Ulysse*. Paris: Armand Colin, 1927-1929.
[9] BIANCHINI, Ludovico. *Sul progetto di un porto franco a Nisida e di un Lazzaretto a Miseno*. Napoli: Tipografia Flautina, 1834.
[10] CARDONE, Vito. *Bagnoli nei Campi Flegrei. La periferia anomala di Napoli*. Napoli: Cuen, 1989.
[11] CARDONE, Vito. *Il tufo nudo nell'architettura napoletana*. Napoli: Cuen, 1990.
[12] CARDONE, Vito. *Nisida. Storia di un mito dei Campi Flegrei*. Napoli: Electa Napoli, 1992. ISBN 88-435-4218-4.
[13] CARDONE, Vito. Un rilievo per la storia: la Torre di Nisida. In *XY: Dimensioni del Disegno*. V, 11-12, pp. 170-173.
[14] CROCE, Benedetto. Nisida. In *Napoli Nobilissima*, 1894, III, II, pp. 17-23.
[15] CROCE, Benedetto. *Storie e Leggende Napoletane, Nisida*. Bari: Laterza, 1919.
[16] DE LORENZO, G. Il cratere di Nisida. In *Reale Accademia delle Scienze Fisiche e Naturali*. Napoli, 1915.II, XVI, n. 10.
[17] DE RITIS, V. Il porto di Nisita. In *Annali Civili del Regno di Napoli*, 1838, XVIII, XXXV, pp. 5-25.
[18] DE SETA, Cesare. *Cartografia della città di Napoli*. Napoli: Edizioni Scientifiche Italiane, 1969.
[19] DISCEPOLO, Bruno. *Nisida, l'isola. L'ambiente, l'architettura, i progetti*. Napoli: Graffiti, 2001. ISBN 888698340-9.
[20] FERRI MISSANO, A. *Nisida*. Napoli: Edizione Circolo Nuova Italdider Bagnoli, 1987, pp. 23-24.
[21] GRASSO, G. *Introduzione all'opuscolo Nisida: un'oasi di verde in città*. Napoli: Lega Ambiente, 1992.
[22] GÜNTHER, R. T. *Earth-movements in the Bay of Naples*. Oxford: Parker & Son., 1903, pp. 35-36.
[23] MAIURI, Amedeo. Delle opere intese a riparare e compiere il porto di Nisida, ed a stabilire colà un lazzaretto semisporco. In *Annali Civili del Regno di Napoli*, 1856, LVI, CXI, p. 9.
[24] MAIURI, Amedeo. *Passeggiate Campane*. Firenze: Sansoni, 1950 (1982, p. 31).
[25] MAIURI, Amedeo. *I Campi Flegrei*. Roma: Istituto Poligrafico dello Stato, 1953, p. 14.
[26] PANE, Giulio. VALERIO, Vladimiro. *La città di Napoli tra vedutismo e cartografia*. Napoli: Grimaldi & C., 1987.
[27] VIGHI, L. Rilevamento geologico della zona a Sud del parallelo di Baia e della zona di Nisida, Coroglio e Trentaremi, nei Campi Flegrei. In *Bollettino Società Geologica Italiana*, LXIX, II, 1950, pp. 179-209.
[28] ZERLENGA, Ornella. Il rilievo architettonico e ambientale. In DISCEPOLO, Bruno. *Nisida, l'isola. L'ambiente, l'architettura, i progetti*. Napoli: Graffiti, 2001, pp. 147-177. ISBN 888698340-9.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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THE TIE RODS IN HISTORICAL HANDBOOKS

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Abstract
The paper aims to describe synthetically the result of an research in historical handbooks on application of chains in the strengthening of masonry buildings. This study is seemed necessary because the actual trend in strengthening of building contemplates application of tie rods. The reference to the building tradition is seemed necessary because in the second half of 20th century the study on chains was neglected..

Keywords: building technologies, tie rods

1. Introduction

Tie rods have been largely employed since ancient times till the first half of the 20th century. During this century steal concrete became the largest employed material both for new buildings and for restoration and structural consolidation. It allowed innovative operations of consolidation, far from any reference to building tradition. Nevertheless, in the last years, the large use of reinforced concrete (for riveted joints, injections, insertions of cases in the wall skeleton) proved to be dangerous both for the scarce durability of the material and for the irreversibility of the interventions that, in some cases, determined destruction of the monument . At the end of the 20th century these serious failures of reinforced concrete determined a renewed attention toward the traditional techniques of consolidation. In particular tie rods again have been employed for seismic upgrading and consolidation.
Today they are considered one of the better solutions for seismic upgrading of monumental buildings as also the Ministry recommends: “The traditional technique of inserting of metal anchors and tie rods is considered, in general way, the most effective provision for seismic upgrading in relation with the impact on building, so its use is required to be adopted as a rule”. Tectonics, which is traditionally concerned with the mechanics of solid bodies that are stressed by dynamic and static forces, is able to work out a mathematical seismic check of the project in case of building made of reinforced concrete and steel. The simplifying hypothesis of homogeneity and congruence of the resistant material might be assumed for those buildings. However, it could be not effective and congruent when this simplifying scheme concerns building. Its elementary components and structure are considered neither homogenous nor elastic. The quality of the material, its performance and conservation state highly influence its behaviour under seismic conditions so that it is hardly possible to make good predictions. Operators working in the field of seismic prevention, however, have become more sensible to the problem since the last years so that they recommend as necessary a quality enquire on the real condition of the building. The diagnosis shall not only express mathematical values. However, in order to provide relevant interventions especially for the preservation of the original static building typology, the diagnosis shall take into account logic considerations in relation to the resistance of each component and to the reliability of the whole building.

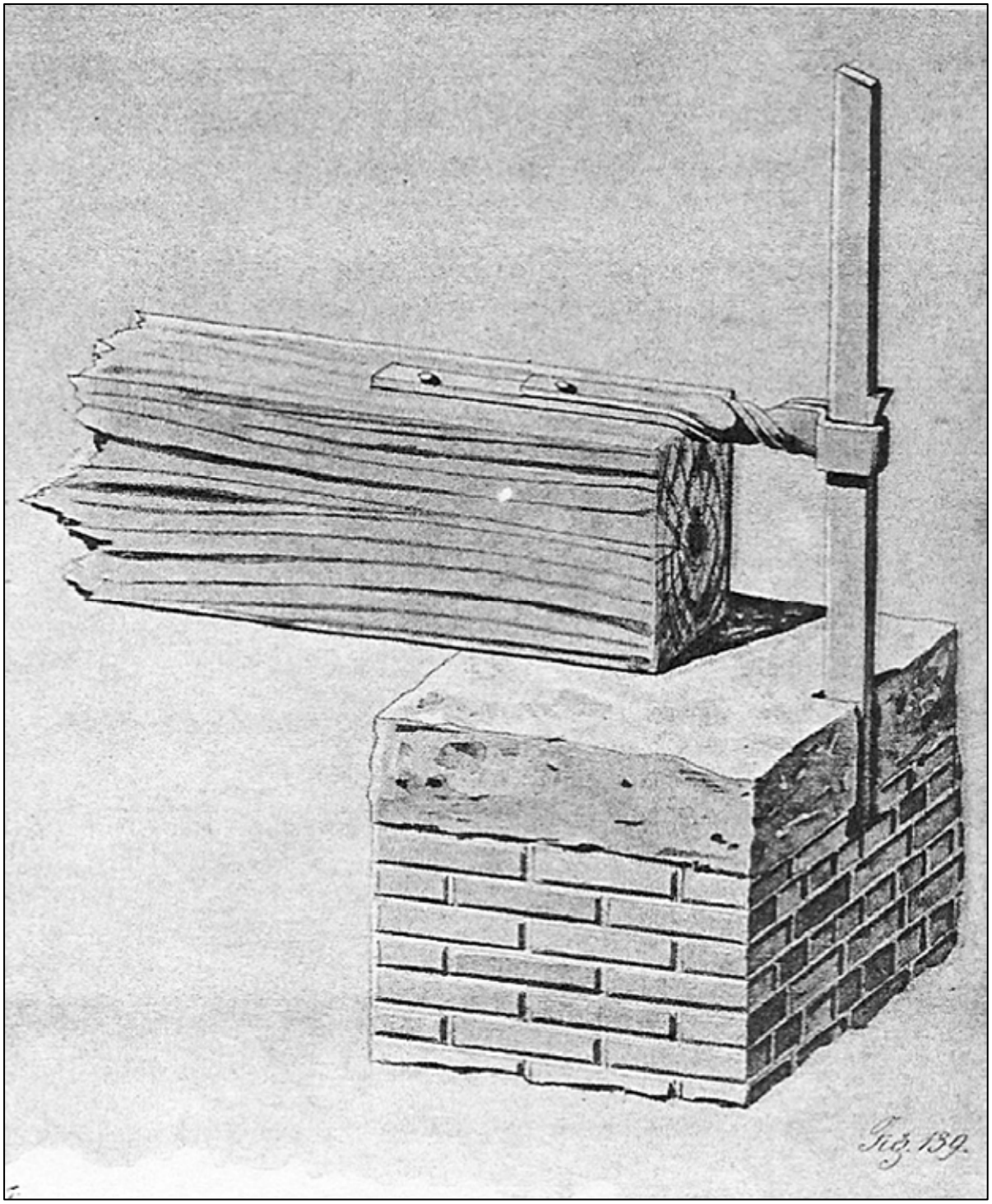

Fig.1: Anchor of wooden beam made up by iron bar fixed on beam. (C. Formenti, La pratica del fabbricare, Milano 1893, parte prima, pag.184)

Therefore, it seemed necessary to study the traditional solutions adopted in the past according to the

technical literature published till the beginning of 20th century. They are highly innovative for the way

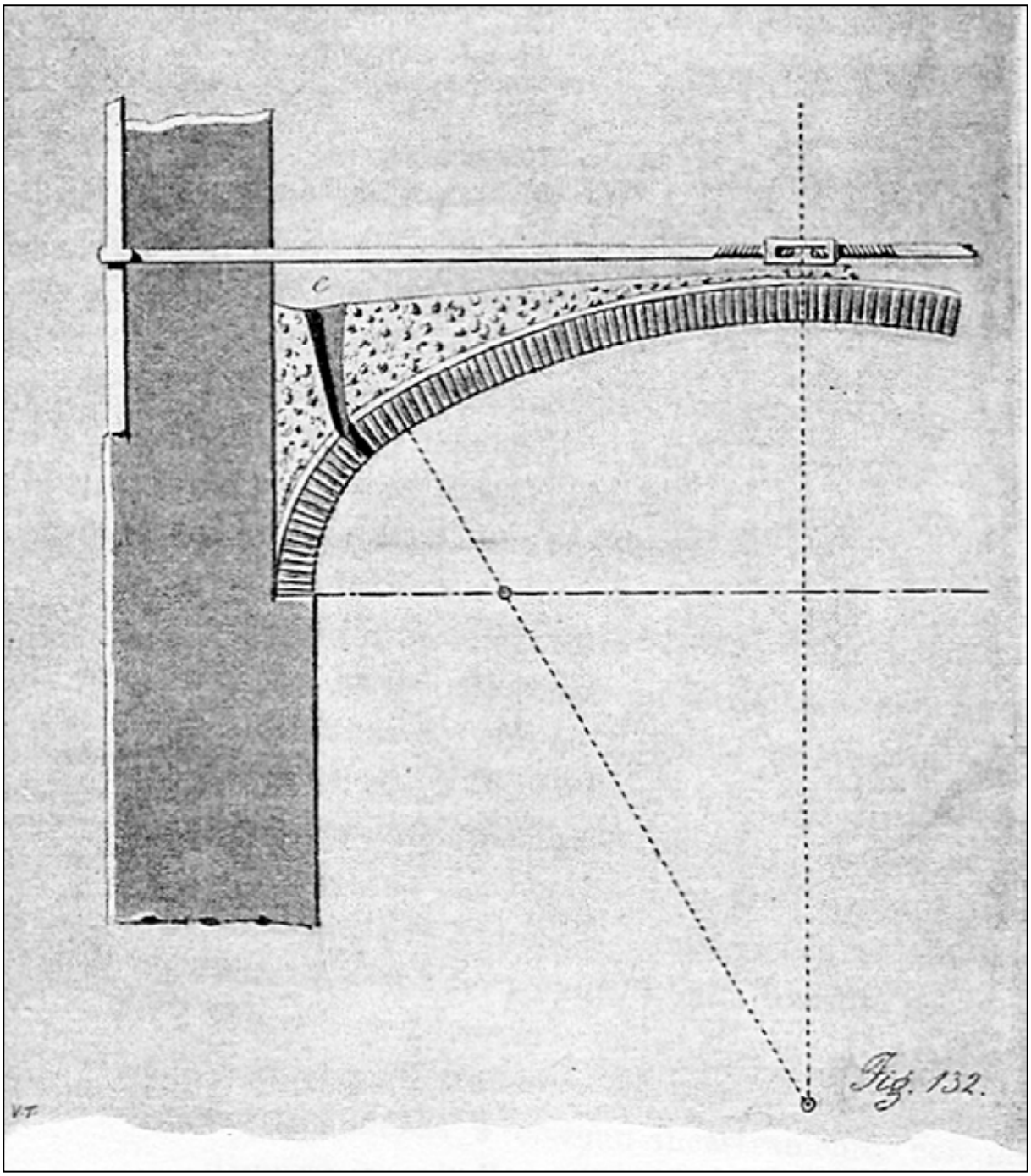

Fig.2: Tie rod applied durig the building to strengthen a vault (C. Formenti, La pratica del fabbricare, Milano 1893, parte prima, pag.177)

they conceive the consolidation and the construction of new buildings.

1.2 Tie rods in technical handbooks

The first historical document about the use of metal tie - bars dates back to roman times. It confirms that this technique has been largely employed since past times. Besides authors' documents of that period, an interesting evidence of the employment of anchors in roman times can still be admired in the archaeological site in Pompei. A large number of anchors join connecting angles and crossing walls of the houses in "Soprastanti" alley. These interventions might due to the damages determined by the earthquake that upset the area about 10 years before the eruption of 79 A. C. During the classical period chains and their anchorages were made of iron, wood or bronze. In the past as still nowadays the use of chains were functional to the elimination of seismic stress on walls in the presence of flying structures such as arches, vaults and trusses but also to provide the building with a

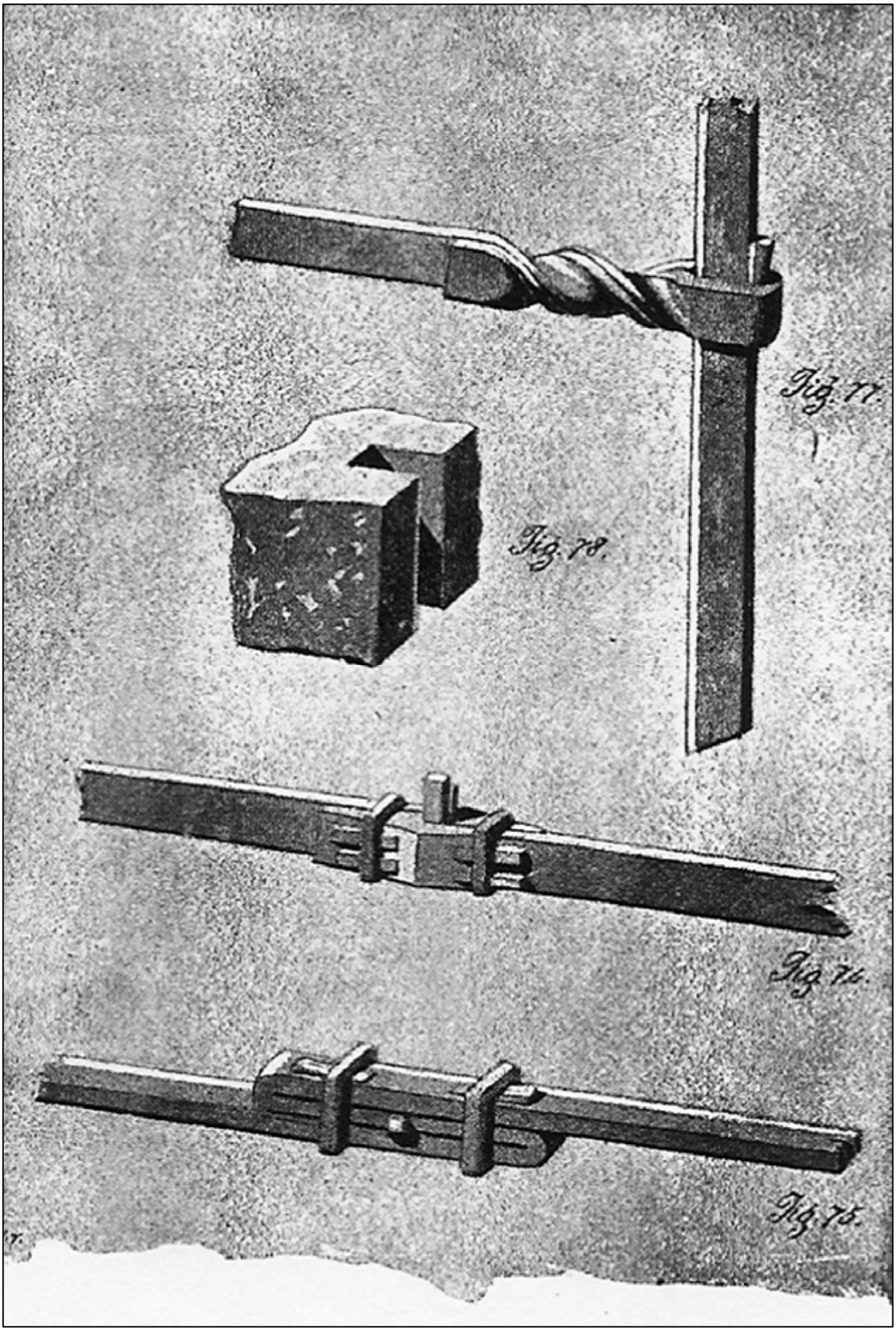

Fig. 3: Same different anchor and connection devices (C. Formenti, *La pratica del fabbricare*, Milano 1893, parte prima, pag. 118)

better steady condition especially in seismic areas. Leonardo gave a significant example. He

suggested that a better steady condition might be achieved keeping the walls firmly together.

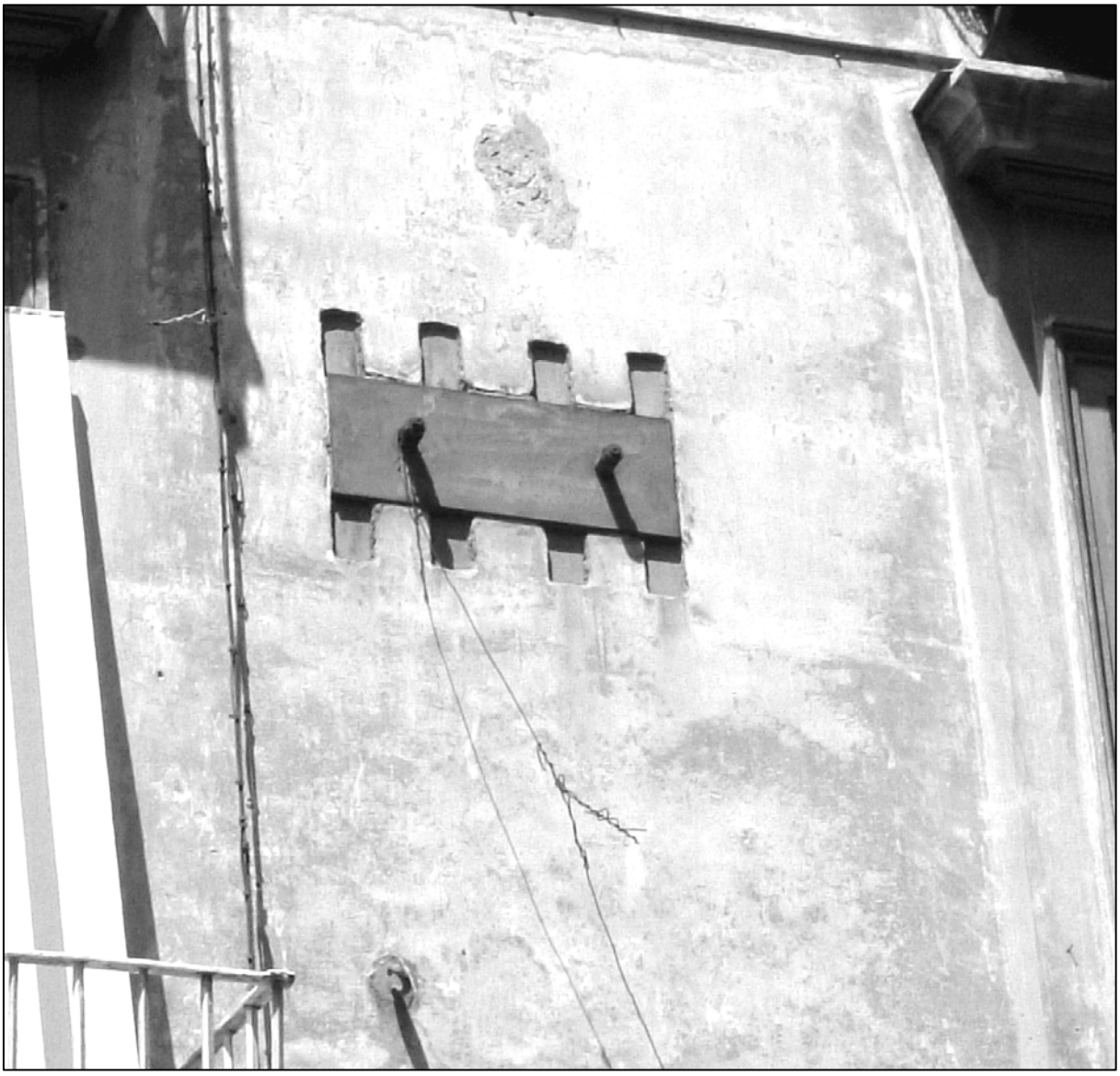

Fig. 4: The anchor made up by a large plate and iron bar reticulate. The tie-bar fixed with a two big bolt (Residential building in Aversa)

Referring to a widespread building tradition he wrote: “each beam shall be passed through the walls and be secured there with sufficient chains, since beams have often been dislodged, ruining walls and floors in an earthquake; where they were secured with chains, they have kept the walls firmly together and the walls in turn have secured the floors”[1]. Besides Leon Battista Alberti and other writers of that period, Leonardo referred to the current building technique, which consisted in the use of floor beams to join the walls and firmly anchoring the beams to the walls. Wood chains were still widespread at that time as it also results from the hoop of Santa Maria del Fiore dome in Florence. It was made of chestnut and iron beams which were set in round arches. Moreover, the use of this material was widespread because it was easy to work, cheap and easily available. Iron was employed when wood was inadequate. The first documented applications in medieval times were linked to the building tradition of gothic cathedrals. Among the most famous applications those in the Saint Chapel in Paris by Pierre de Montereau (12th century), the Cathedral in Strasburg (14th century), the Carcassone Cathedral (12th century – 14th century), and the Narbonne Cathedral (14th -15th century) are worth of mention. Iron and wood have both been employed for some centuries. In 19th century iron chains substituted almost totally wood chains. Between 17th and 18th century thanks to Gallileo’s studies a new structural trend was born. Scientists were concerned with important studies about the applications of tie - bars and hoops and with the improvement of building stability. On the 15th September 1606 Bernardo Buontalenti drew an application of hewn stones with a metallic structure – he probably thought to set chains in stone arches such as the building system adopted by Vasari in the “Uffizi”.

The use of doubly reinforced stones was adopted in florential buildings just at the beginning of the 19th century whereas this system was already widespread in France since the second half of 17th century. It was Giuseppe Martelli, who came back from a short scholar visit at Polytechnique in Paris, who first adopted metallic beams in the Royal Lodge on the Grass (1821-30), projected by Luigi de Cambray Digny to reinforce the epistylium made of sand stones. In the 19th century numerous books dealt with this method. Since the second half of 19th century many Italian theoretic manuals have provided technicians of that period with specific information about tie – bar scaling and with a very useful project.
Among the most known manuals the following ones are worth of mention since they are innovative and complete examples. Besides the most usual applications of tie bars in roofing trusses of big loft buildings, A. R. Emy in the "Treaty on the Art of Carpentry" [2] supplies a scheme with all the most used iron systems of the current carpentry. The analysis of this scheme underlines that several technical solutions were adopted for the iron-wood –and iron-iron attachment. Besides the allowable tensile stress for each square centimeter in the "Manual of Practical Mechanics" [3], A. Morin calculates the admeasurements of an iron chain section, provided that the tensile stress is known.



Fig. 5: The anchor made up by an eyelet realized in extremity of the beam or tie-bar and by a little pile. It fixed the little pile into the eyelet and it secured with a wedge. (Residential building in Aversa)

Also the "Elementary Practical Guidelines about the Art of Building Civil Factories"[4] by A. Cantalupi provides typologies and some calculation examples of iron chains to be used instead of wood chains for roofing trusses. "In the Art of Building" [5] G. Curioni wrote about the chain scaling: "Chains or crowns made of iron shall be used to ensure the stability of the arch, when piers of the needed size cannot be built for any reason. They allow to join firmly both side of the arch and to hinder its deviation. Crowns are made of one piece or many pieces; in general they are placed horizontally. This system is mostly effective, if crowns are placed in the arches close under the joining point, where the failure on the sides generally occurs. (…). Anyway, iron crowns are better than that made of wood; the size of the transversal section should be 0,015 per 0,025. They occupy very little space inside the walls, where they are placed. If two or three pieces of the crowns gather together in one place, they

should be joined to a vertical sliding bar, fixed to the wall. This system allows to obtain resisting cases, which are firmly secured in the wall and able to hinder horizontal thrusts".

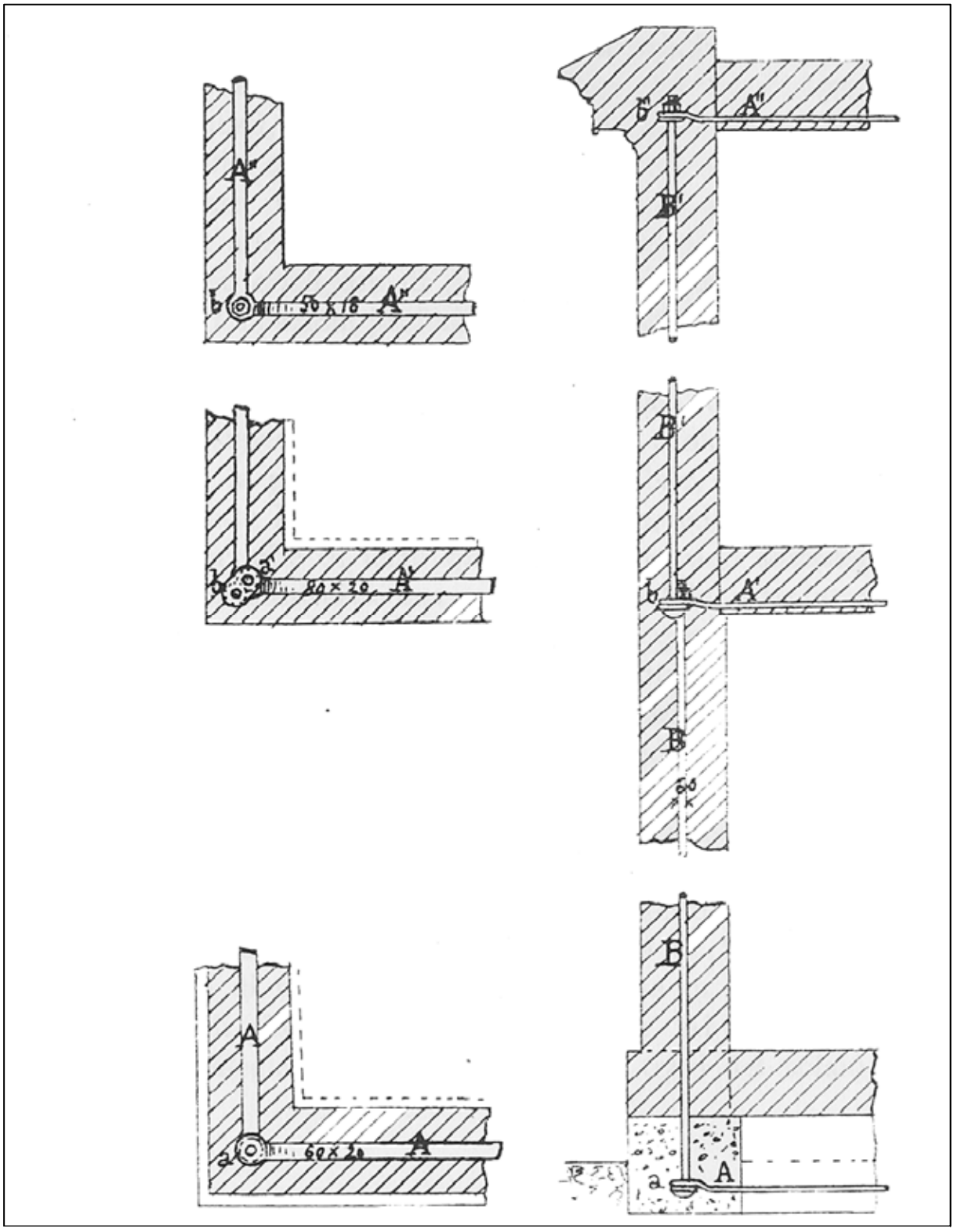

Fig. 6: Reinforced walls. Lascasses method (F. Masciari Genovese Trattato di Costruzioni antisismiche, Milano 1915 pag. 266)

After a short outline about technologies of iron production for chains and about their warm working methods in the "Economy of building" [6], A. Sacchi gave examples of several iron applications in the course of the centuries. He underlined that during the ancient times iron was first used for making anchors and cramps of different size and shapes. Then the author dealt with tie rods, which were usually employed to join the walls and to hinder the tensile stress of the arches and vaults. He also gave an example of innovative iron application in a doubly reiforced beam. G. A. Breymann suggested

several solutions, which were adopted during past times, to join freestones of the walls. These structures were made of iron and classified as anchors, cramps and dovetails. In the “General Treaty about Civil Buildings” [7], the author quoted the technique already described by Leonardo. In order to link two walls firmly together so that they cannot shift each other, he suggested to use a beam equipped with an iron crown at the top and a screw eye at the end, where a sliding bar shall be set in. The description of the mixed floor made of H-beams, which are blocked by sliding bars in the walls, and of a secondary roof frame made of wood rafters, is also worth of mention. The quick widespread of iron floors was also quoted by prof. P. Boubèe, in the “Elementary Theoretic and Pratical Treaty of Metallic Buildings” [8].
He described the technique to join floor beams together with tie rods, aimed at ensuring stability, keeping bars-track constant and stiffen the whole. Also C. Formenti underlined the use of horizontal tie rods. He also suggested that “the use of tie rods and of horizontal iron chains to be fixed and blocked at their end by vertical bars makes the lateral thrusts on pillars and on the walls coming from the arcades in two opposite directions contrast and hinder each other. They are called either sliding bars or bolts. The stretched chains prevent piers from opening as a consequence of the tensile stress of the arch. Each floor of the factory building shall be supplied with a latticework of tie –bars, attached to the main walls, at the height of the arch springer, that is, at the point where the thrust is stronger”. [9] The building tables of the manual showed how to make iron chains with the old method of forging iron. Flat bars were pinched and beaten at the extremities to make a screw eye where the sliding bar was set in. The chain was stretched by iron shims, which were inserted in the screw eye against the sliding bar and pinched to guarantee seal. Tie bars could also be made by a more modern method, that is, threading round bars at the top with a dado for fixing. In that case, a screw coupling along the tie - bar stretched the chain. The substitution of the screw eye with the bolted connection allowed the consequent introduction of anchor plate. The plate was almost always thin to allow lime plastering. Moreover, Formenti’s manual outlined all the new technologies in the field of chain junctions and sliding bars that technicians of the iron industry had at their disposal. In addition, very interesting executive tables describe the laying mode of the chains for different types of arches. While Formenti underlined the role of chains in hindering thrusts by the arches, A. Lenti’s concern was “on the role of chains in keeping the different parts of the walls together and preventing it from breaking” [10]. After that a terrible earthquake upset Calabria in 1905, a decree law updated the rules of 1887. New technical rules were required in the field of aseismic buildings. The article 14 stated to place on each floor iron chains horizontally at about one meter below the top of the walls in longitudinal and transversal direction and along the perimetral and dividing walls. The chains are to be hardly stretched and supplied at their end with a sliding bar and an anchor beam to be placed against a metallic slab. The end of each tie rod is required to be part of the chain and not soldered or added. Since the new code has been adopted, many authors and treaties concerned aseismic buildings and suggested how the regulations could be improved. In order to make the anchorage system more effective, M. Baratta [11] suggested to link the sliding bar of the ground floor with the one under the roof into one rugged iron sliding bar, to be set at the joining point of the chains with the wall. Moreover, he suggested the use of large plates or metal latticework in order to distribute thrusts on a lager surface and to get thrusts contrasting each other. In addition, he found necessary to butter iron with protective minimum before using, in order to avoid the chain rusting, degradation and the consequent wall breaking. In the ”Treaty on aseismic buildings” F. Masciari Genoese describes different building solutions which were adopted and patented in the entire world to front seismic events. Here The Lescasse’s method is also worth of mention. This method was patented in California in 1868, published by the eng. Lescasses nel 1877 and used by himself in China and Japan. However, it is still unknown if this method encountered success. Nevertheless, it is interesting because it concerns tie rods use for reinforced concrete walls and somehow reminds the structural idea by Bernardo Buontalenti or the recent experiments on reinforced concrete walls. Lescasse thought that building walls could be ideally divided into vertical slices or into a sort of pillars through the vertical lines of the opening. Each pillar should build just one indeformable block and at the end all these pillars should be all joined together in an invariable way. He suggested a system of pillars strengthened by vertical and horizontal iron tie rods, to be set in the walls and to be firmly linked together in the three orthogonal directions of the building: height, width and length. Vertical tie rods made of rod-iron ensure the monolithic structure of the pillars whereas horizontal pillars made of flat bars make one block. The effects of thermal dilatation, due to temperature variation, could also be prevented by a system of compensation, obtained by placing wood keys in the junction points.” [12].

Bibliographical References

[1] RICHTER J. P., *The literary works of Leopardo da Vinci*, London, 1883, vol. II, pag. 99
[2] EMY A. R., *Traitè de l’art de la carpenterie*, Parigi, 1841
[3] MORIN A., *Manuale di meccanica pratica*, Napoli 1842

[4] CANTALUPI A., *Istituzioni pratiche elementari sull'arte di costruire fabbriche civili*, Milano 1862
[5] CURIONI G., *L'arte di fabbricare*, Torino 1873, pag. 95
[6] SACCHI A., *L'economia del fabbricare*, Milano 1878
[7] BREYMANN G.A., *Trattato generale di costruzioni civili*, Milano 1885
[8] BOUBÈE F. P., *Trattato elementare teorico e pratico di costruzioni metalliche*, Napoli 1880
[9] FORMENTI C., *La pratica del fabbricare*, Milano 1893, parte prima, pag.117
[10] LENTI A., *Corso pratico di costruzioni*, Alessandria 1896, pag. 76
[11] BARATTA M., *A proposito del nuovo codice di edilizia sismica per le Calabrie*, Perugia, 1907
[12] MASCIARI GENOVESE F., *Trattato di costruzioni antisismiche*, Milano 1915 pag. 267



Fig. 7: In this case stuccos were used to hide the anchor plate of the tie rod (residential building in Aversa)

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The observation of Michelangelo's Moses monumental complex at the Church of St. Peter in Chains and in virtual reality

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Abstract
The perception of reality depends on ambient conditions and one's own personal physical and mental state. New problems arise when we use modeling to provide "remote" visits to monumental environments and viewing of artworks.
Current technological tools already allow us to distinguish between viewing an artwork reproduction and viewing an immersive virtually reconstructed image of the same artwork (virtual reality). Other issues involve the possibilities provided by modern technologies to manipulate the images, including three-dimensional images. Of course, we cannot ignore the inherent risk that any variation may falsify the communication.
Therefore we need to experiment at length in order to establish the limits of these variations. Within the framework of a valuable interdisciplinary dialogue, the experiments which have been carried out in recent months on important sculptural works and monumental environments all focus on these problematic issues. The goal of the experiments was to scientifically analyze how the brain reacted when a person looked at artworks or architectural environments and then assess how these reactions influenced the communication of documentation and survey.
This paper focuses primarily on the statue of Moses by Michelangelo in the Basilica of St. Peter in Chains in Rome. We believe that this experiment can lead to interesting developments in digital communication; in any case, it will be exciting to consider the reliability of the communication and the possibility to vary the perception of an object.

Keywords: Virtual reality, 3D modeling, brain activity, Michelangelo's Moses

1. Introduction
It is a well-known fact that the perception of reality - and, therefore, any artwork - depends on, ambient conditions (lighting, clear air, etc.) and one's own personal physical and mental state (feelings, training / cultural interest, etc.). The relationship between the viewer and the artwork also depends on many other factors; when figurative images are involved, people will react differently when they look at a small work of art (as Arnolfini Portrait by Jan van Eyck) or a large painting; likewise in the architectural field,, the reaction of a visitor to the Sacro Speco in Subiaco will be different to the one he has when visiting St. Peter's. Extensive scientific bibliography exists about these problems.


Fig. 1: The interior of the Basilica of St. Peter in Chains in Rome.

In this time when, thanks to technological developments and its fallout on communication tools, we rely more and more widespread use of modeling and its manipulation to provide “remote” visits to monumental environments and the viewing of artworks, perceptual aspects are proposing new problems, including, first and foremost, the need to recreate the most realistic and favorable conditions in which to enjoy the cultural heritage.
For this purpose the current technological tools already allows us to distinguish between viewing the reproduction of an artwork (perhaps created using a laser scanner, but not to size) and viewing an immersive virtually reconstructed image of the same artwork (virtual reality).
The latter image recreates the true size of the artwork, making it possible to view the object as if one were actually in front of the real thing. Other issues involve the remarkable possibilities provided by modern technologies to manipulate the images, including three-dimensional images. For example, if ambient light conditions influence the way a visitor reacts when he looks at a marble statue, then when we propose an immersive virtual reality model of the statue we can modify the ambient light and the light and shade features of the model to improve the visitor’s perception of its characteristics.
Of course, we cannot ignore the inherent risk that any variation may falsify the communication and, as a result, induce an incorrect or ineffective “remote fruition”.
Therefore we need to experiment at length in order to establish the limits of these variations.

2. Direct observation and immersive reality

Within the framework of a valuable interdisciplinary dialogue, the experiments which have been carried out in recent months on important sculptural works and monumental environments all focus on these problematic issues. The goal of the experiments is to scientifically analyze how the brain react when a person look at artworks or architectural environments and then assess how these reactions influence the communication of documentation and survey activities.
Particularly the experiment aims to evaluate the perceptual differences that exist between the vision of a real object and the vision of a reconstructed object through 3D modeling.
The goal of the research can be summarized as follows:
1 – to record brain activity during the direct observation of an architectural or sculptural episode, possibly in different lighting conditions;
2 – to virtually reconstruct as closely as possible the architectural environment or the sculptural work and prepare it for an immersive experience of reality;
3 - to record the brain activity of the same observer in the field of immersive reality, by varying artificially lighting conditions and contrast of the environment or of the virtual object so that it can stimulate different reactions of the observer;
4 - assess the reactions recorded in step 1 and in step 3 for any observing conditions which better are suited to a situation of "well-being".
Among the steps of program briefly mentioned before, the first three are obviously kind of preparatory and easily achievable.



Fig. 2: The three observation points of Michelangelo's Moses. The first, on the left, were in front of the statue, roughly three meters away. The second, in the middle, to one side of the statue, in the right nave, about four meters away. The last one, on the right, again in front of the statue, but roughly ten meters away.

The fourth requires that testing be extended to a lot of subjects, environments and sculptural work, with different characteristics (considering that the brain reactions vary according to the decorations, type of surface finishing, lighting conditions, etc.).
The results should help to identify the specific criteria to be met in virtual models, especially for the purpose of preventing that they falsifies the intentions of the artist-author, by intervening in order to make communication more acceptable to the observer.

3. The observation of Michelangelo's Moses

Among the experiments planned the first focuses on Michelangelo's Moses in the Basilica of St. Peter in Chains in Rome (Fig.1).
A group of ten adults (of different cultural interests) was invited to look at Michelangelo's Moses from three different viewpoints and with two different light conditions: natural and artificial light.
The observation points (Fig.2) were in front of the statue (one time roughly three meters away and then roughly ten meters away), and next to one side of the statue (in the right nave, about four meters away). The cerebral activity of all the adults was recorded while they looked at the statue and each adult looked at the statue from each of the three positions, with different lighting conditions (a total of six experimental conditions) for the same length of time (one minute for each observation performed).
Brain activity was recorded by a mobile electroencephalographic devices (EEG) provided by *BrainSigns*, a spin-off by Rome Sapienza University. We choose the indicator defined in specialized international literature as Approach/Withdrawal [1] to asses the cerebral activity in each experimental condition. Using this indicator we can objectively assess how much the individual in the experiment appreciates the object when subjected to this kind of sensorial stimulation (in this case the statue of Moses).
The same ten adults were then subsequently invited to look at a three-dimensional reconstruction of Moses statue in an immersive virtual reality structure, with the same experimental lighting conditions and from the same spot they stood in previously in the Basilica.
The structure used for virtual reality is the CAVE system at IRCCS Fondazione Santa Lucia (Fig.3).
It consists in three back-projected active stereo screens (3 walls) and a front-projected screen on the floor that surround the subject. Left- and right-eye images are alternately displayed at 60Hz each and synchronized by Nvidia stereo glasses. The head position and orientation are tracked at ~120 Hz by means of Intersense IS 900 tracking device.
As special feature of the CAVE system, the four images are seamlessly joined together so that subjects do not see the physical edges of the adjacent walls. Hence, the active stereo projection is perceived as a continuous virtual world.
This allows to reach a high level of realism so that the subject feels himself as physically immersed and present in the virtual environment.
The measurements in the CAVE system are generally divided into two sessions. The first part of data recording is performed in a guided navigation mode in which subjects allow to experience a whole selected architectural environment by standing in the middle of the CAVE. This part of the experiment permit the subjects to familiarize with the virtual scenario and the related neurophysiological and behavioral measurements. In the second session, subjects are directly exposed to both original and modified specific architectonical elements.
Also in the CAVE we proceeded to record the cerebral activity of ten subjects for all the experimental conditions employed.



Fig. 3: Three picture of the CAVE system at IRCCS Fondazione Santa Lucia.

For the experiment it was built a small digital model of the architectural environment of the Basilica of St. Peter in Chains, as well as the model of Moses sculpture. In both cases use was made of both the electronic scanning (realized through Scanner Leica C10) and the processing and three-dimensional modeling programs (Cyclone, Autocad, Rhinoceros, 3DStudioMax) [2].
During the second phase of the experiment in immersive reality, it was decided to change - according to preset parameters - both ambient light conditions than those of luminance contrast on the surface of Moses (Fig.4), in order to record the brain reactions of the observer in various situations.

4. Why this experiment?

To understand whether the point of observations plays a role in the cerebral and emotional fruition of architectonical artifacts and sculptures it was decided to analyze the cerebral reactions of a group of subjects during an observation of the Michelangelo's Moses sculpture in the ancient church of St Peter in Chains in Rome. It presents the interesting feature that the Moses's face has the orientation not toward the observer, but rather tilted toward the right side of him/her.
Thus, in the Moses sculpture the observers are not pointing on the Moses's face. If Moses was a paint, there will be no other available information. However, since it is a sculpture it is then possible to collect the different cerebral and emotional reactions to its observation from different points of views. Thus, it has been decided to collect both neurometric and emotional responses of the observers

during the contemplation of the sculpture from different points of views that are significant for the gathering of different details related to the sculpture.
This experiment provided neuroelectrical evidences of the activity of the prefrontal cortical areas in occurrence of the evaluation of a succession of aesthetic stimuli. By collecting the emotional and cortical responses during the observation of a real sculpture we observed such dissociations of the cerebral signals linked to the different modalities of fruition of the same sculpture.
We believe that these observations could be used in a future to generate specialized paths across the museums to induce different emotions and perception of sculptures and artworks in the general public. This will be made possible by the possibility to collect reliable measurements of brain and heart activity not only in the neurophysiology laboratories but rather in a challenging environment such as museums, art gallery, churches and archeological sites [3].



Fig. 4: Two pictures of Michelangelo's Moses with different light conditions and luminance contrast

5. Conclusions

From the current research will undoubtedly lead to interesting consequences for the digital communications; will be interesting to consider the aspects that, regarding the possibility of changing the perception of the models, however, relate to the reliability of the communication.
With regard to the experiment, in line with the general objectives of the research, it has allowed us to describe in an objective appreciation of the brain of individuals in the experimental view modes of Moses statue, by viewing the real monumental complex and the immersive virtual reality, with proper evaluation of the different reactions to the environmental and perceptive changes.
Deferring the delineation of the first general conclusions to the completion of all trials provided, it is possible, even now, to anticipate one of the main problems that the research suggests. Of course, in the process of fruition of cultural heritage, many variations will be fit for use; will be necessary to discern which of them can be practiced and within what limits. It is also expected that some changes are useful and / or appropriate, from time to time, in relation to education, interests, purposes of the observer. It is necessary, in each case, to consider that no communication is "neutral".
For this reason, since it is, however, affects the viewer, it is absolutely necessary that in every case it strictly reflects the content of the artwork to which it relates and does not betray the author's intentions. This aspect will again need the competence of the "communicator subject".

Section 1 is by C.Cundari; section 2 is by G.C. Cundari; section 3 is by G.M. Bagordo; section 4 is by F.Babiloni; section 5 is by M.R. Cundari.

Bibliographical References

[1] DAVIDSON, R.J. *Cerebral asymmetry, emotion, and affective style.* In DAVIDSON, R.J. HUGDAHL, K. *Brain asymmetry*. Cambridge, MA: MIT Press, 1995, pp.361–387.

[2] LA MANTIA, M. *Pre- e post- processing digitale nell'esperienza di rilevamento del chiostro*. In CUNDARI, C. BAGORDO, G.M. LA MANTIA, M. LANFRANCHI. F. *S. Lorenzo fuori le Mura*. Roma: Aracne Editrice, 2013.

[3] BABILONI, F. CHERUBINO, P. GRAZIANI, I. TRETTEL, A. INFARINATO, F. PICCONI, D. BORGHINI, G. MAGLIONE, A.G. MATTIA, D. VECCHIATO, G. *Neuroelectric brain imaging during a real visit of a fine arts gallery: a neuroaesthetic study of XVII century Dutch painters*. Conf Proc IEEE Eng Med Biol Soc. 2013; 2013:6179-82.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

From Pompei to Çanakkale: the Officiamuseumed project proceeds his way

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Abstract
In 2013 SUN realized the "Summer School in designing of company museums systems in euromediterranean area" with Okan Üniversitesi of Istanbul and Fachhochschule Köln. This is an IP (LLP ERASMUS) approved, flying colors, by Indire National Agency of the Italian University Ministry.
During the Turkish week, the Teachers College were assigned the task of designing a museum in Çanakkale (TR) for German, Turkish and Italian students. Çanakkale is known for its traditional pottery and it is the nearest major town to the ancient town of Troy. For these significant features Çanakkale has been chosen to be the center of turkish museum system for design and applied arts. So this new museum can be homologous to the one under construction in Pompei. Subsequently, three of the sub-themes of the School (Bridge Museum over Çanakkale Cayi; Factory Museum over Çanakkale Cayi near the old abandoned factories; Underground Square Museum, near the terminal ferry) were assigned to Interior Arechitecture's students of SUN for their final exam and degree thesis.
The full paper will be analyzed using three fundamental aspects: 1) How the School has been an important first step to bring the project of the museum system of design and applied arts outside Italian borders and what could be the future of Officiamuseumed; 2) what are the potential interconnections between development of Design in Turkish area and architectural plan of museum; 3) which method was adopted to plan and launch while using little working groups and study models.

Keywords: Officiamuseumed, Company museums, Summer School, Pompei, Çanakkale

1. Introduction

In any research project, there is always a “mythical” element, sometimes hidden, which illuminates and guides. OFFICIAMUSEUM and OFFICIAMUSEUMED [1] are scientific projects with clear repercussions in the Concrete sphere, they are therefore *ideas-forces*, to quote the French philosopher Alfred Fouillée, capable of generating actions and influence on so many aspects of reality overcoming the various obstacles they encounter in their being realized; and these ideas are opposed forces, on the one hand, regulations and procedures – the bureaucracy -, and, on the other, the human psychological weaknesses with which it must deal. However, these two projects would be deprived of a soul if they were not driven by a “mythical” element, essential to deal with the real friction; from an ideal that want to “incarnate” with an attitude, in some ways, heroic. It is worth highlighting in the first project the idea of wanting to make the relationship between museums and entrepreneurs in the regions of Southern Italy organic, i.e. between the storage places and those of producing to build a design nostrum [2]. Before to that, however, there is the idea of wanting to get out of an atavistic southern precariousness of our world that makes it so unstable and poor. And, perhaps, even before that, I would propose the anxiety of redemption, the wanting to stay in the South knowing how to compete with the North, the desire to preserve an ancient originality, rooted in modernity. All this is reflected in the second project, with an airiness proportional to its geographical size, the Mediterranean. Here, the ideal is to think of a meta-world dominated by an old beauty, artisan, “a

beauty of here", as one of our women, that may be transferred into a modern framework of Design, that nurtures a durable construction. There is more though. OFFICIAMUSEUMED brings with it an ancestral and poignant attraction towards the East that pervades our world. An east that Maffesoli called "mythical" because it does not necessarily coincide with what lies to the east of us, which is found only in the most established forms of art, but also in the most basic tourist consumerism towards distant destinations, both East and West. An attraction rooted in Western Culture as well as the spirit of our time. Without doubt, there is a downside and it is called Orientalism, an idea that is not completely innocent, «[...] an idea created by the West to subjugate the other [...]»[3], as revealed by Edward W. Said [4] in his essay *Orientalism. Western Conceptions of the Orient* (1978). However, according to me, it is worth saving the need to go to the other without saying that it cannot be interpreted solely in terms of anxiety of Western hegemonic power, which also led to colonialism and imperialism [5]. In other words, the desire of the other and the other which is the basis of love should be saved. Without much rhetorical emphasis the Bilateral Agreement signed with Turkish universities and the subsequent "Summer School in designing of company museum systems in euro-mediterranean area" (2013) were healthy concrete tools, scientific and administrative, who have held the profound need to meet each other.



Fig. 1: Çanakkale (picture by http://looklex.com/e.o/canakkale.htm)

2. Çanakkale and the Summer School

Turkey was therefore the first country in which to try to "export" the Officiamuseum model, or, more precisely, starting with its international version, Mediterranean. In 2013, the Seconda Università degli Studi di Napoli (SUN) realized the "Summer School" project with Okan Üniversitesi of Istanbul and Fachhochschule Köln. This is an IP (LLP ERASMUS) approved, by the Indire National Agency of the Italian Ministry of Universities. The Summer School had a double meaning. It was an important and compelling educational experience, carried out within the Erasmus program as well as the first concrete initiative to create a local museum of design and applied arts system outside of Italy. The management was long and complex. We had started to talk with our Turkish colleagues from Okan in 2012. In the edition of that year of the International Forum Le Vie dei Mercanti, with my colleagues Ayse Ozbil Torun and Jochen Siegemund from Cologne, we presented a full paper to define the scientific basis of the project Officiamuseumed in Turkey and verify the feasibility of the project. The conference was followed by a trip to Istanbul in September of the same year, to propose and discuss in detail with the Dean of the Faculty of Engineering and Architecture of Okan, Prof. Nejat Tuncay Ramazan and Prof. Dr. Harun Batırbaygil , Head of the Department of Architecture, the project of the Summer School. From that moment on, an intense and daily work started, consisting mainly of e-mails between the various parties involved. It was the Batirbaygil colleague, responsible for the two weeks of the school, the Turkish one, to propose Çanakkale as a possible centre of the museum system in Turkey. Çanakkale is a sea town on the southern (Asian) coast of the Dardanelles in Anatolia: it has a seaport and a river - Çanakkale çay – that passes through it. Çanakkale later became known for its

pottery, hence the name the Çanak Kalesi “pot fortress”. Moreover Çanakkale is one of the most well-known historical cities, housing many world famous sites and ruins of antiquity like Troia, Assos, Apollon Smintheion, Alexandria Troas and Neandria etc., and is the land of many events that take place in antique mythology of the region. For example, the Judgement of Paris took place at Mount Ida which is now locally called as “Kaz Dağı**”**. It was one of the major events that led up to the Trojan war. In addition, there are 20th Century warfare heritage from Gallipoli war of the WWI, in addition to Ottoman relics and artisan works of the region. For example, Çanakkale ceramics of the 17 - 18th century are famous for their original forms and design. It was one of the major events that led up to the Trojan war. For these significant features Çanakkale was chosen to be the centre of the Turkish museum system for design and applied arts. Thus this new museum can be homologous to the one under construction in Pompei.

The long bus trip with students and professors of the School, from Istanbul to Çanakkale, revealed an unseen part of Turkey to me. I started to understand how this country is neither a so-called developing country, third world, backward, nor a country whose *genius loci* is devoured by capitalism as in China. Turkey is at the centre of opposing forces that do not seem to annihilate the identity; they have not wiped out the memory, but try to take it into “modernity”; they have not canceled the rural and still largely archaic landscape, but conserve it, for example, not only a site like Troy, but also its wider context. Pompeii, on the contrary, has been lost forever, from the 1960s onwards, even the surrounding area because of the disastrous building policy as well as the culpable failure to enhance the value of the cultural heritage. At the same time, in Turkey, there is a thriving ceramics industry that is in strong expansion in the global market and well supported by an intelligent and extensive promotion through international exhibitions. The Summer School was aimed at students in their final year of Architecture, at the the German Fachhochschule Köln, Okan Üniversitesi in Turkey and Italian Degree Courses in Architecture - Interior Design and Autonomy , in Italian and English, of the SUN. In addition to the theme, the participating student groups were asked to carry out their designs in four conceptual places of the City of their choice. The places were as follows: 1. A floating museum on the harbour, 2. a bridge museum over “Sarıçay”- river bisecting the city; 3. A museum intertwined with old structures stretching beside Sarıçay, and 4. An underground museum at Central Square in front of the harbour. The project work was carried out in mixed groups and continued in the Italian week in Campania. It was, therefore, an activity which, on the one hand, should take into account the Turkish OFFICIAMUSEUMED museum, considering all the strategic aspects related to the creation of a museum of companies: the relationship with the city, the target visitor, the bond with other historical museums and production activities in Turkey, craft and industrial; on the other hand, being an architectural project, it was necessary to take into account all the relevant aspects: the relationship with the urban context and/or landscape; the relationship with the contemporary; the structural setting of the project; the project construction.



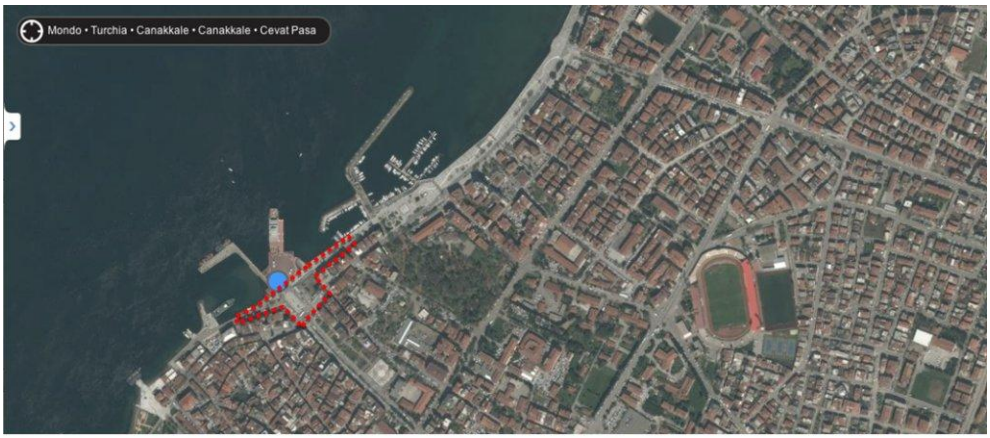
1_FACTORY MUSEUM





2_BRIDGE MUSEUM





3_UNDERGROUND SQUARE MUSEUM



Fig. 2, 3, 4: Çanakkale: the locations of three sub-themes

3. The Museum of Çanakkale : designing with 3D models

The Summer School was an amazing teaching and human experience. It highlighted the different settings in the teaching of design, which for Italian students is not only through seminars and workshops, but also lectures. This is not because the professors in this country are tied to a method that has now been exceeded in the rest of the world, but because design is an expression of a culture open to humanistic thinking. A sign is, therefore, rooted in a deep plane where memory and innovation, art and philosophy, sociology and anthropology meet.

In just two weeks of work, the first in Turkey and the second in Campania, the fourteen students of the Summer School produced interesting, but not quite mature, results. This experience of the School was proposed to students of Interior Architecture at the SUN. Thus, three of the sub-themes of the School (Bridge Museum over Çanakkale Cayi; Factory Museum over Çanakkale Cayi near the old abandoned factories; Underground Square Museum near the ferry terminal) were assigned to students for their final exam and degree thesis. Of the four sub-themes assigned during the Summer School by the professors, the three “stably” linked to a physical place were chosen, excluding the fourth – that of the floating museum – due to it being closer to Design.

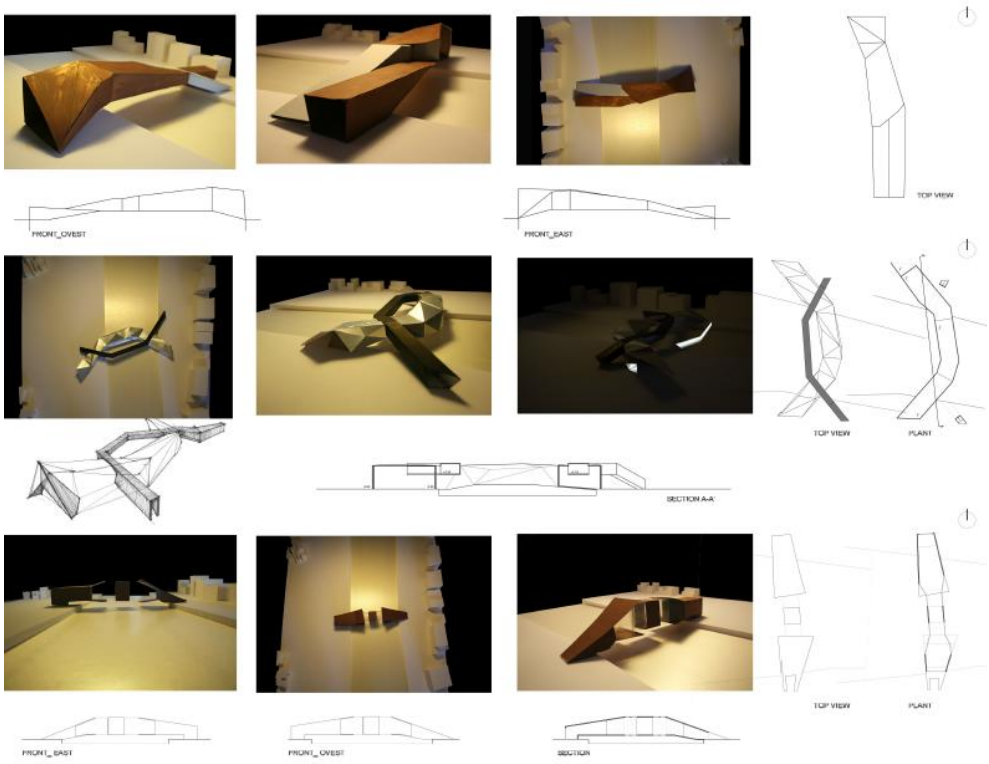


Fig. 5: The Bridge Museum. Study models by M. Contestabile, D. Fimmanò, L. Gnerre

Two of these sub-themes were considered near the mouth of the Çanakkale Cayi, the river that runs through the town and then into the sea after passing a series of pedestrian bridges and viaducts. The Bridge Museum, closer to the mouth, is a bridge between two different realities, a poor and unapproachable neighbourhood, due to it being infamous – but with an ancient fifteenth century fortress, Kale-i Sultaniye, also unapproachable because a military area – and a residential neighbourhood, with private and public green areas. On this side, along the river bank, families , young people, friends meet in a lush grove, the Osnabruck Parki, drinking tea at all hours, as often happens in Turkey; on the other bank, it is possible to see the stalls of an area that when there is no market is completely desolate. The two areas that the Bridge Museum could connect are so different from each other, with the idea of the bridge being an intervention that can heal the deep contradictions of this place. Nevertheless, metaphorically, the bridge is also the construction that connects not only two different areas of the city, but also two different worlds, Craft and Design. The relationship between Craft and Design – that De Fusco and Alison founded on a third kind studied in Italy in 1991, called “artidesign” – are the pillars upon which the entire framework of OFFICIAMUSEUM and OFFICIAMUSEUMED are based. The sub-theme of Factory Museum was identified in an area close to the previous one and separated from the latter by means of one of the two bridges that defines the boundaries. The title of this sub-theme comes from the presence of a group of old abandoned factories in the area, with a car park directly overlooking the river. In this second case, the intervention is declined both through a new building as well as through the reuse of existing ones. The Underground Square Museum is conceived under another crowded square, in front of the Maritime Station where it is possible to take a ferry to the largest island of Turkey, Gökceada , in the Aegean Sea and close to the Greek islands of Lemnos and Samothrace as well as Kilitbahir, where there is another fortress similar to that of Çanakkale built by Fatih Sultan Mehmet in 1463 to control the Dardanelles. Istanbul can be reached from Kilitbahir by car and bus. The square is located at the

confluence of major and busy roads. Two, for everthing, the Cumhuriyet bulvari – which comes from inside the city, running almost parallel to the river – and the pedestrian promenade Kayserili Ahmet Paşa Caddesi, a continuum of cafés and restaurants. The sub-theme of the Underground Square Museum was also recently studied in a tesi [6].
Through these three sub-themes, the students had to articulate a complete project, starting from the casing up to the preparation of the museum. A museum that falls under the category of general Company Museum [7], a far cry from that of the general museum because it aims at the promotion of trade-marks ; in particular, as already mentioned for the Temporary Museum of Pompei or the Casa Enzo Ferrari [8], the museum in Çanakkale is set up as a museum of firms in a country, Turkey, connected to its numerous museums of ceramics, glass, metals spread throughout the country.

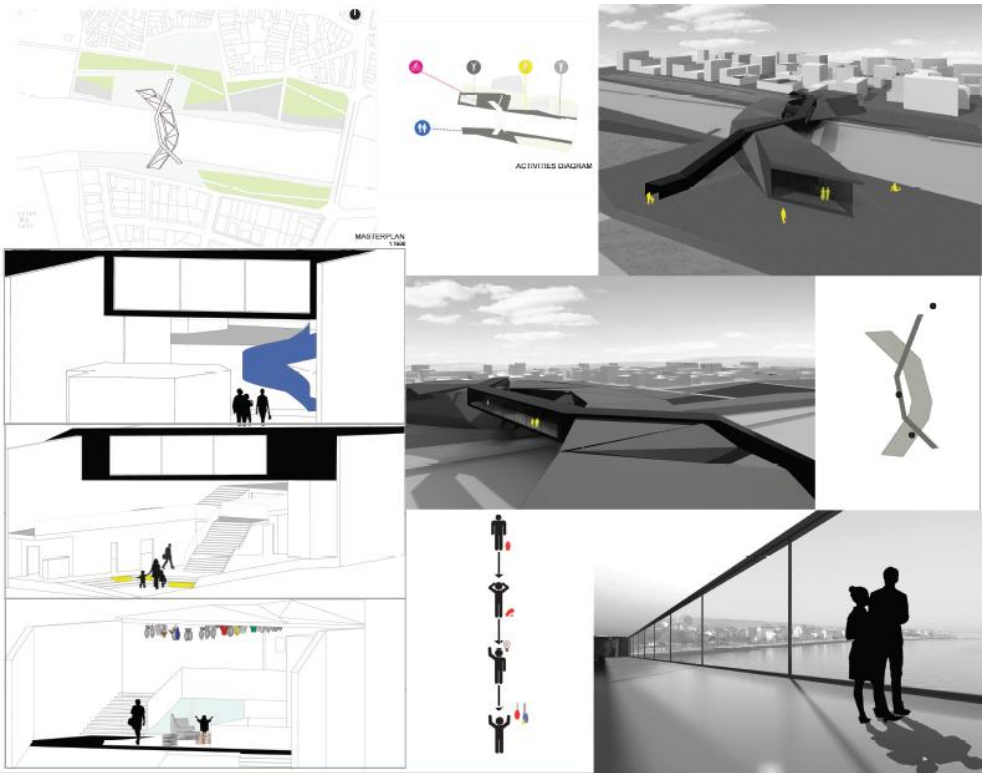


Fig. 6: The developing of project designed by M. Contestabile, D. Fimmanò, L. Gnerre

Bibliographical References

[1] GAMBARDELLA, Claudio. The [temporary] company museum in Pompei. In GAMBARDELLA, Carmine (edited by). *Atlante di Pompei*. Napoli: La scuola di Pitagora editrice, 2012, p. 543-548; GAMBARDELLA, Claudio - SIEGEMUND, Jochen - OZBIL TORUN, Ayse. OFFICIAMUSEUMED. The Mediterranean Museum System of Design and Applied Arts. In GAMBARDELLA, Carmine (edited by). *Proceedings of Less More Architecture Design Landscape. Le vie dei Mercanti_X Forum Internazionale di Studi*. Napoli: La scuola di Pitagora editrice, 2012, p. 893-905; GAMBARDELLA, Claudio - SIEGEMUND, Jochen. Smart communities and local company museums: two new concepts for the Mediterranean Museum System of Design and Applied Arts. In GAMBARDELLA, Carmine (edited by). *Proceedings of HERITAGE ARCHITECTURE LANDESIGN focus on CONSERVATION REGENERATION INNOVATION Le vie dei Mercanti_XI Forum Internazionale di Studi.* Napoli: La scuola di Pitagora editrice, 2013, p. 988-998.

[2] GAMBARDELLA, Claudio. Tensioni ambivalenti nel design. In AA.VV. *Visioni a_moderne. Culture del design in Campania.* Firenze: Alinea Editrice, 2010, p. 36-46, 138.

[3] http://www3.lingue.unibo.it/romanticismo/?page_id=243

[4] Edward Wadie Said was an Palestinian-American literary critic (Gerusalemme, 1935 – New York, 2003).

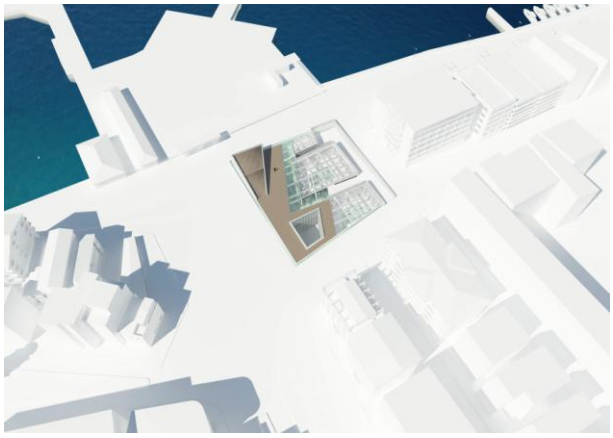
[5] It is worth reading the pages of Franco Cassano, in his *Il pensiero meridiano*, in which he invites a new analysis of a south studied, analyzed and judged by himself and not by others. «The southern consideration [...] is born in the Mediterranean, on the coasts of Greece, with the opening of Greek culture in contrast to the speeches, the *dissoi logoi*. At the beginning there is never one, but two or more», CASSANO, Franco. *Il pensiero meridiano*. 2ª ed. Bari: Editori Laterza, 2003. 146 p. 8842069582.

[6] The thesis (awarded 110 cum laude and dignity of print) was produced by Gianmarco Longo, a student of the two-year Master (in English) in Architecture - Interior Design and for Autonomy of the Architecture and Industrial Design Department / SUN. Claudio Gambardella was the thesis supervisor and Harun Batirbaygil the international tutor.

[7] On this subject, there are various publications edited by Claudio Gambardella. In particular, see his contribution at the conference of the Politecnico di Milano “Places & Themes of Interiors – Contemporary Research Worldwide”: GAMBARDELLA, Claudio. Company museums: places with zero exposure?. In PERESSUT, Luca Basso - FORINO, Imma - POSTIGLIONE, Gennaro - SCULLICA, Francesco. *Proceedings of Places & Themes of Interiors – Contemporary Research Worldwide*. Milano: FrancoAngeli, 2008, (CD ROM).

[8] See GAMBARDELLA, Claudio - SIEGEMUND, Jochen. Smart communities and local company museums: two new concepts for the Mediterranean Museum System of Design and Applied Arts. In GAMBARDELLA, Carmine (edited by). *Proceedings of HERITAGE ARCHITECTURE LANDESIGN focus on CONSERVATION REGENERATION INNOVATION Le vie dei Mercanti_XI Forum Internazionale di Studi* cit.

[9] The website of the Summer School: http://www.officiamuseum.org



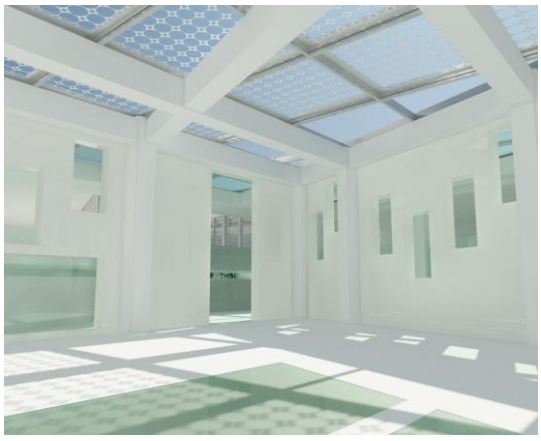


Fig. 7, 8: Underground Square Museum in Çanakkale, top view and interior view of temporary exhibitions space. Gianmarco Luongo's degree thesis (2014). Prof. Claudio Gambardella /SUN, supervisor; Prof. Harun Batirbbaygil / Okan Üniversitesi, international tutor.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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The complex and multidimensional representation of the landscape on the Volturno River between Capua and Castel Volturno

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Abstract

The Volturno River – one of the main waterways of Southern Italy due to both its length and water flow – was the forced crossroad to many who, coming from the sea, wanted to reach the Port of Casilinum (today known as Capua). The reference territory for the analysis concerns the fluvial axis between Capua and Castel Volturno, which also includes the towns of Santa Maria La Fossa, Grazzanise and Cancello Arnone. The multi-disciplinary investigation, and the photographic report, focus on a landscape analysis related to the history, traditions, agricultural production as well as archaeological, natural, and cultural assets of the area. Furthermore, elements of degradation were considered, such as landfills and illegal constructions that have contributed, over the years, to undermining this part of the Ager Campanus defined the "Garden of Europe" by 18th century travellers. Nevertheless, the landscapes of the Volturno remain beautiful and can become a resource, not only aesthetic, but also for the area's economic development, for example, through the creation of cultural and tourist routes. Thematic maps were developed by analyzing the historic, rural, flooded, urban and contemporary landscapes. From the analysis comes out the project for the establishment of a network between the fluvial axis and the cultural and landscape heritage of Campania, including the six World Heritage properties of the region [Caserta, Naples, Pompeii, Amalfi, Cilento, and Benevento (Italy Langobardorum)] as well as the emblematic places of the region: Mt. Vesuvius, the islands of Capri, Ischia and Procida as well as the Phlegraean Fields.

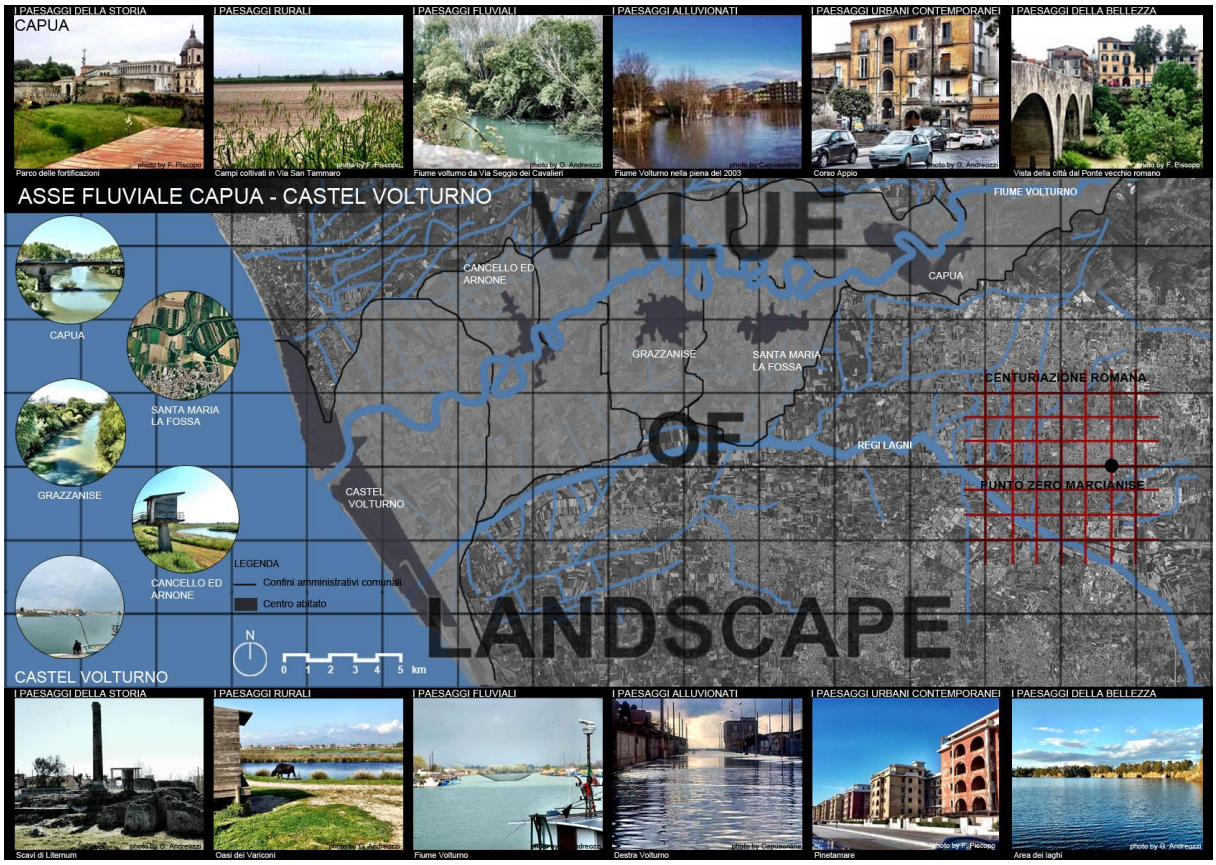
Keywords: representation, landscape, cultural heritage, territorial governance, cultural identity

1. Methodology

The research was developed within the "Aesthetic of Landscape", Department of Architecture and Industrial Design at the Second University of Naples (professor Jolanda Capriglione – architect Alessandro Ciambrone), with the participation of 10 students,* in the academic year 2013 – 2014. The cognitive method, intended as a preparatory phase for each project proposed by the research, is related to multi-dimensional [1] and multi-disciplinary principles [2]. This allows to investigate from the territorial-landscape scale to the architectural art craft, regardless of the date the object of study, the anthropic and natural phenomena intended as complex and in progress realities through a process of discretization and measurement that allows to study each element of the entire research object [3].
This process makes it possible to know the intangible heritage, which is an integral part of the historical and cultural heritage of the area. It is in the discovery of the identity matrix of the places as well as enhancing the human capital of the territories, which the traces capable of stimulating actions for the protection and enhancement of heritage are sought. These are intended as parts of collective projects, coordinated and concerted, among the involved institutions – at different territorial scales – as Public entities, Universities, Research centres and local communities, represented by the principal actors of the associated and business sectors [4].

The main objective of this research is the propose a knowledge platform for a subsequent phase of a project that can envisage a landscape regeneration of the river axes from Capua to the sea. This axis had an historical importance. The axis represents the link between the Mediterranean and ancient Capua, the most important cities of southern Italy in Roman times. In the design phase, in addition to the enhancement of the river axis, the proposals hypothesize the inclusion of the city of Capua in the World Heritage List as well as Castel Volturno in the Man and Biospheres network, along with the mouth of the Volturno, the Oasis of Variconi and the area of the lakes.

* Gaetano Andreozzi, Chiara Coppola, Maura Coppola, Noemi Coppola, Ferdinando D'Addio, Fabrizio Di Renna, Paolo Moretta, Giovanna Nichilò, Federica Piscopo, Vincenzo Zampella

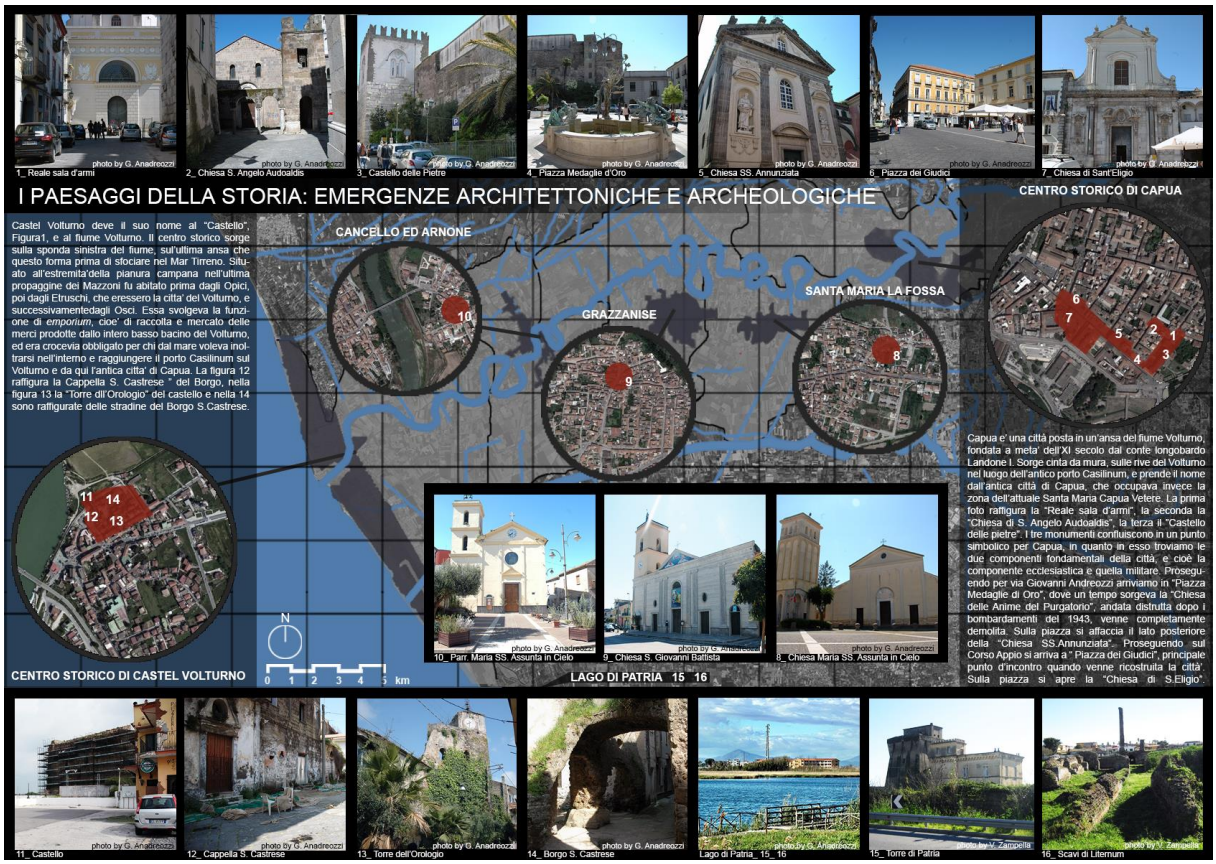


Value of Landscape from Capua to Castel Volturno. Design by Gaetano Andreozzi and Federica Piscopo

2. The historic landscapes

The analysis of the landscapes starts in the east and continue towards the sea. Capua is a city set in a bend of the Volturno River, founded in the middle of the eleventh century by the Lombard Count Landone I. It stands surrounded by walls, on the banks of the Volturno in the place of Casilinum, the ancient port, and takes its name from the ancient city of Capua, which occupied the area of actual city of Santa Maria Capua Vetere. The new Capua soon became a major economic and military centre.
The outstanding urban testimony and the surviving monuments make Capua the real capital of the Lombard art. The strategic role played by the city in this period is documented by the many monuments still well preserved and not influenced by the Carolingians, and also by a large part of the original layout of the urban plan developed at the side of the ancient Appian street. Further west, the City of Santa Maria La Fossa is located in the area known as the "Mazzoni". The area was famous in the past for the cultivation of roses. The town was built around the year one thousand as a hamlet of the town of Capua and reached its maximum development in the Lombard period. The city centre is located just 4 km from the Royal site of Carditello, built by the Bourbons [5]. Continuing towards the sea, there is the City of Grazzanise, which is the main centre of the Volturno plain, and is about 14 km from Capua. Grazzanise, Asylum of Graces. This according to historical sources is the name given by the ancient Romans to the modern city centre. This ancient origin is found constantly in the life of the City, which takes its name from the three figures of Greek mythology, daughters of Zeus, the “Three

Graces": Eufrosina, Talia and Aglaia. They are depicted on the emblem of the City's banner and the main roads of the City are also named after them. Further to the west, there are the cities of Cancello and Arnone. The first documents date back to 1114 AD, when the town of Arnone is mentioned in a document of the monastery of Sant'Angelo in Formis. After belonging to Capua, in 1200 it passed into the hands of a few noble families, such as Filangieri, the Estendarda and Cantelmo and ended up among the domains of the archbishops of Capua. The municipality extends on either side of the two banks of the Volturno, where there are the two hamlets of Cancello and Arnone. Buffalo breeding and the production of buffalo mozzarella are very important here. On the mouth of the Volturno River, Castel Volturno owes its name to the "Castle", and the Volturno River. Located at the end of the Campanian plain in the last offshoot of the Mazzoni, it was first inhabited by Opici, then by the Etruscans, who built the city of the Volturno, and subsequently by Osci. It carried out the function of emporium, market of the goods produced by the entire lower basin of the Volturno and was an obliged crossroads for those who wanted to head inland from the sea and reach the port Casilinum on the Volturno, and from there the ancient city of Capua [6].



The historic landscape. Design by Maura Coppola

3. The rural landscapes

The landscape of the province of Caserta, in the centuries-long succession of historical events and up to World War II, has been not only the expression of a rural culture but it has also focused on innovative agricultural processes through a conscious attitude of man towards this extraordinary natural heritage. Over the last decades, it has passed, in a short time, from agricultural to industrial use, denaturalizing the natural vocation of the territory. This has involved a meaningful variation in the models of life and fruition of the area. The province of Caserta has been defined an "immense Mediterranean garden" by the travellers of the XVIII century and Terra Laboris, due to its characterization linked to the agricultural production and extraordinary fertility of soils. The rural landscape in the eighteenth century, is strongly marked by extraordinary hydraulic engineering works: the Regi Lagni, a massive irrigation canal that runs through the hinterland to the sea: and the aqueduct of Vanvitelli, declared World Heritage property in 1997 along with the Royal Palace, the royal gardens and the industrial city of San Leucio characterized by its production of silk [7].

The landscape of the Caserta province, characterized by buffalo pastures and “bufalare” on the coastal stretch, is also strongly marked inland by particular crops, like those of the ancient “viti maritate” (married vineyards) for which many scholars believe appropriate to ask for special request for protection by UNESCO. Among the finest wine production, it is worth noting the “Falerno del Massico”, wine of excellence for the ancient Romans, and the “Asprino d'Aversa”, of Norman origin together with Galluccio and Casavecchia, all DOC (Certified Origin). Other worldwide famous products are the extra virgin olive of the “Terre Aurunche”, “annurca” apples, cherries, Vairano hazelnuts and the “percoca aversana” along with the famous buffalo mozzarella.



The rural landscape. Design by Giovanna Nichilò

4. The river and flooded landscapes

Five bridges characterize the landscape between Capua and Castel Volturno. At Capua, the Roman bridge, ruined several times, was restored to its original state by Frederico II, who built the two towers, of which today only a part can be seen today. Destroyed during the Second World War, it was rebuilt as it appears today. The new bridge, always in Capua, is in a poor state of maintenance. The bridge of Grazzanise is called “United Bridge of Italy” since the unification of Italy took place on the Volturno River with the bloody final battle between the Bourbon army and the forces of Garibaldi. Highway “7 quarter Domitiana” is a variant of the Appian Way [8]. It starts from Formia and crosses all the Domitian – Flegra coast, ending in Pozzuoli, where it connects to the Naples ring road. Near Castel Volturno, the road crosses the Volturno river. Finally, towards the sea, the new bridge at the mouth of the Volturno was built in 1954 near the I century A.D. Domitian bridge of which remains only a hint in the arc of red brick in the medieval castle. The area around the river is at hydro-geologist risk. The floods of the Volturno, when they occur, cause a great deal of damage, due to the fact that a lot of constructions are illegal and located in areas of hydrogeological and flood risk. Particularly, Castel Volturno, in 1970 was first all the classifications for unauthorized works: one abuse out of five in Italy was erected in this City [9]. Only in the “Lago Piatto” district on the right bank, at the mouth of the Volturno, there are 4,000 illegal constructions. In the area of study there were numerous floods, especially after the Second World War, as a result of the many illegal houses.



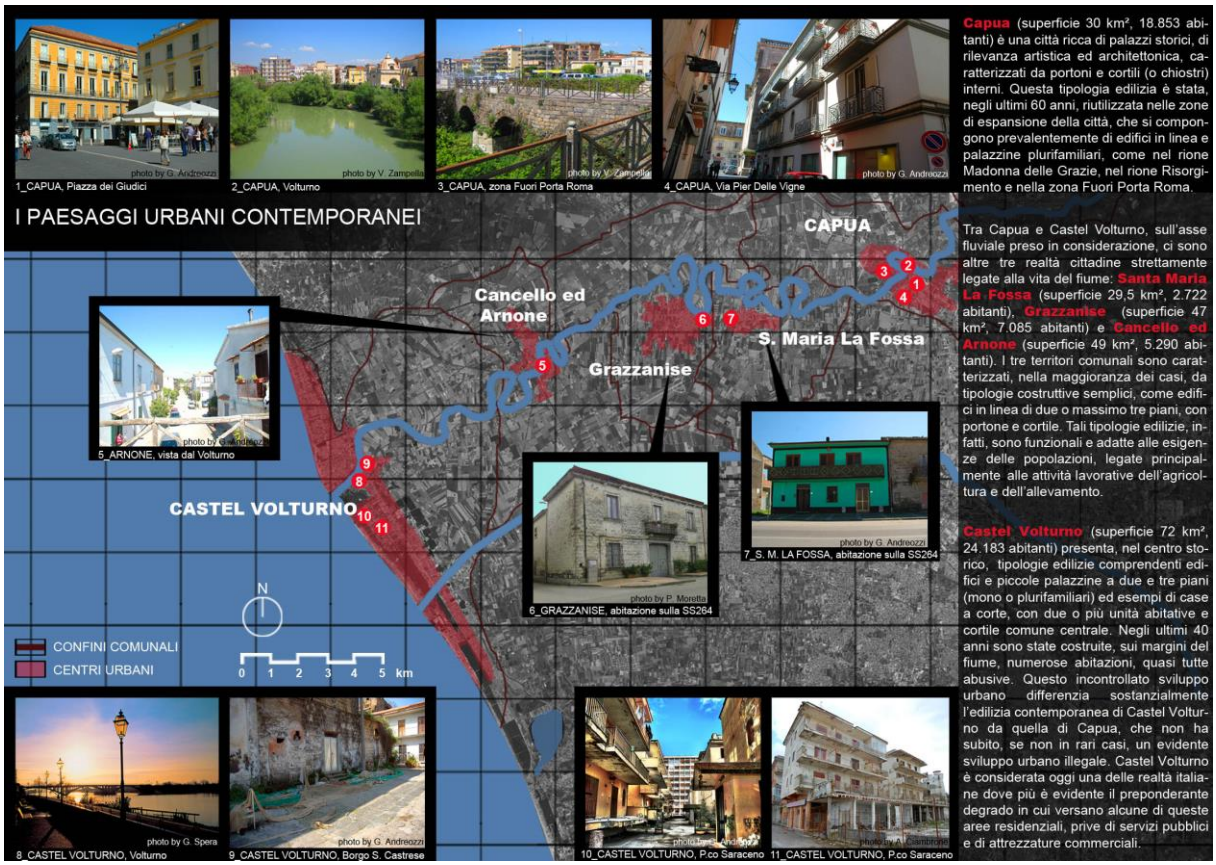
The river landscapes. Design by Noemi Coppola



The floaded landscapes. Design by Chiara Coppola

5. The urban contemporary landscapes and the landscapes of beauty

Exceptional historic architectures, rural villages, and in some cases, poor housing, characterize the five urban centres under study. Capua (surface of 30 km², 18,853 inhabitants) is a town rich in historic buildings of architectural and artistic importance, characterized by ancient gates and interior courtyards (or cloisters). This type of construction has been, over the past 60 years, re-used in the areas of expansion of the city, which are composed mainly of one floor and multi-family buildings, as in the neighbourhoods of Madonna delle Grazie, Risorgimento and in the Fuori Porta Roma.
The three municipalities of Santa Maria La Fossa (area 29.5 km², 2,722 inhabitants), Grazzanise (surface of 47 km ², 7,085 inhabitants) and Cancello Arnone (surface of 49 km ², 5,290 inhabitants) are characterized, in most cases, by simple constructions, such as linear buildings of two or maximum three floors, with an entrance and courtyard. These are the most commonly used building types, due to being functional and suited to the needs of the population, mainly related to agriculture and livestock working activities .
Castel Volturno (surface of 72 km², 24,183 inhabitants), outside of the historic centre, hosts buildings of two or three floors, constructed over the last 40 years. Since the 1970s, many constructions, nearly all abusive, have been built near/on the river banks. This uncontrolled urban development differs substantially between the simultaneous constructions of Castel Volturno and Capua, which was not subject, except in rare cases, to a spread of illegal urban development. Castel Volturno is now considered one of the places in Italy where the predominant degradation faced by some of these residential areas is most evident, with a lack of public services and commercial activities [10].



The urban contemporary landscapes. Design by Paolo Moretta

6. The enhancement of the river axis river, and development plans for Capua and Castel Volturno

The exceptional historical, landscape, artistic, architectural and intangible heritage of the river axis between Castel Volturno and Capua was not put into a network system and generates very limited contributions in terms of cultural, social, and economic development for local communities. A network between the heritage of this area, the cultural districts within the province of Caserta and at the regional level should be created.



The landscapes of beauty. Design by Vincenzo Zampella

In the Region, there are six UNESCO World Heritage properties. This makes the area one of the administrative jurisdictions with the largest number of such sites in the world. The properties are included for different typological characteristics in the World Heritage list:

- the 18th-Century Royal Palace at Caserta with the Park, the Aqueduct of Vanvitelli, and the San Leucio Complex;
- the Historic Centre of Naples;
- the Archaeological Areas of Pompeii, Herculaneum and Torre Annunziata;
- the Costiera Amalfitana
- the Cilento and Vallo di Diano National Park with the Archeological sites of Paestum and Velia, and the Certosa di Padula;
- the Church of Santa Sofia in Benevento, part of the network Longobards in Italy. Places of Power (568-774 A.D.)

It is also worth mentioning the two UNESCO Man and Biosphere of the National Park of the Cilento and Vesuvius, as well as the beautiful islands of the Gulf: Procida, Ischia and Capri. In addition, five of the twenty most-visited cultural and natural sites in the Country are located in the Region: Pompeii (2.7 million), Royal Palace of Caserta (700 thousand), Archaeological Museum of Naples (360 thousand), the Blue Cave in Capri (290 thousand) and Herculaneum (270 thousand) [11]. Not less important is the cultural and landscape heritage of the Province of Caserta with the wonderful cities of Capua, Sant'Angelo in Formis, Calvi Risorta, only to highlight some examples [12].
The scientific community of the Department of Architecture and Industrial Design SUN and the Research Centre of Excellence for Cultural heritage, Ecology and Economy (Benecon) are developing a project to establish a network among the six World Heritage properties and a cultural district for each site. The Capua-Castel Volturno River axis can be included within this project, among others, for the system of transportation, which connects this area with the main localities of the region, from Caserta to Naples. Moreover, Capua could be included in the World Heritage list accordingly with criteria 3 out of the 10 criteria for selection. The City addresses the Outstanding Universal Value considering that it: "bears a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared". In fact, the urban and exceptional testimony of the surviving monuments

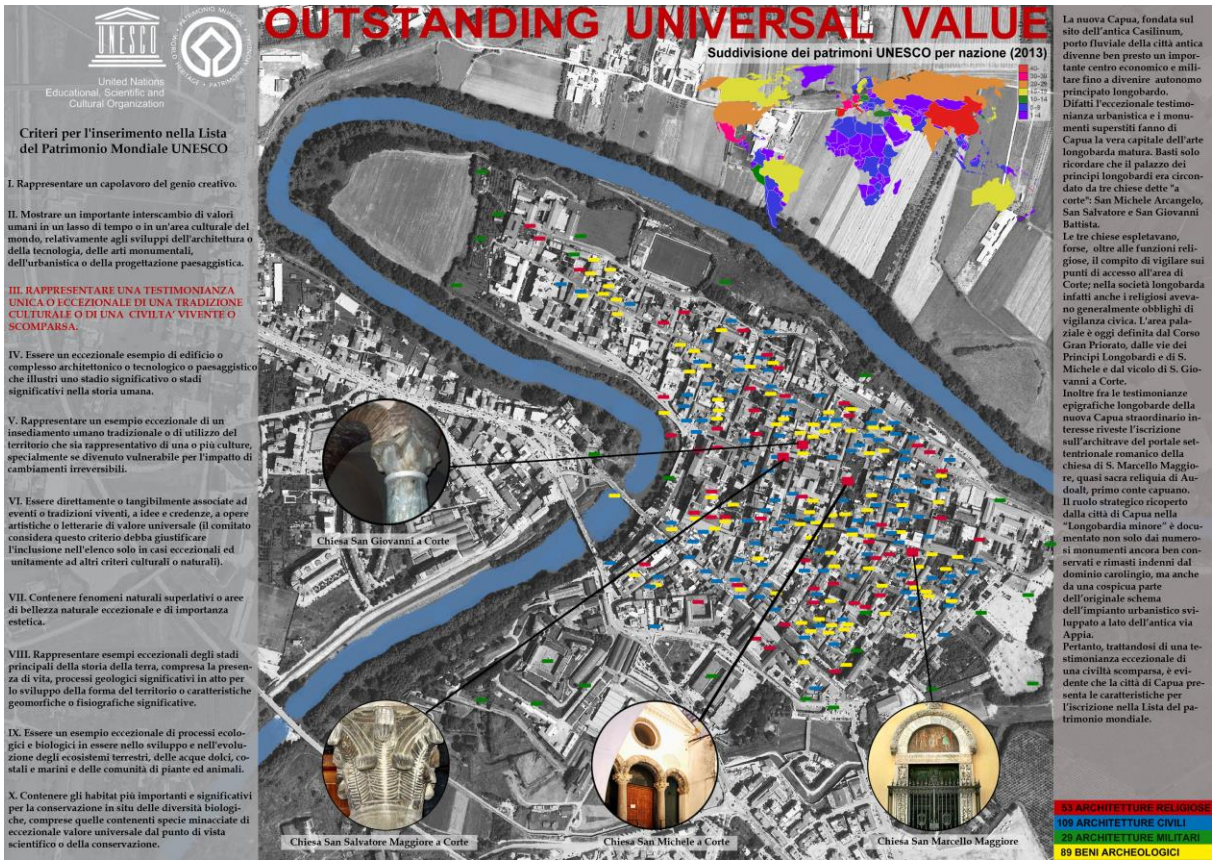


The Cultural District of the province of Caserta. Design by Fernando D'Addio



The Regional network of World Heritage properties. Design by Fabrizio Di Renna

gives Capua the real role of the Lombard art capital. It also has an extraordinary historical and artistic heritage consisting of 59 religious, 109 civilian, 29 soldier and 89 archaeological architectures [13].
This heritage can be part of a cultural network, within the cultural district of the province of Caserta and the fluvial axis, including the landscape heritage of Castel Volturno. In the coastal town, for example, a Man and Biosphere in the area that includes the Oasis Variconi, protected by the international Ramsar Convention, the lakes' districts, which was set up by private entrepreneurs, the Mediterranean Eco-park, and the mouth of the Volturno river could be established. The realization of the river port might enhance the activity of fishing, which for centuries has characterized this area and connect, as in the ancient and glorious past, Capua to the sea [14].



Proposal for Capua to be included in the World Heritage List. Design by Gaetano Andreozzi - Federica Piscopo



Castel Volturno, Mediterranean Eco-park, photo by Gaetano Andreozzi

Bibliographical References

[1] GAMBARDELLA, Carmine . Tra antico e moderno. Il progetto di un'identità in divenire. In: Atti del Seminario di Studi Internazionali su Architettura e Città. ROMA: Kappa,2009. ISBN: 9788865140048

[2] HAUMONT Bernard, MOREL Alain. La Société des voisins: partager un habitat collectif. Paris, Éditions de la MSH, 2005

[3] GAMBARDELLA Carmine. Altante del Cilento. Napoli, Edizioni scientifiche Italiane, 2009. ISBN: 9788849518368

[4] GAMBARDELLA, Carmine, ZERLENGA, Ornella. Rilievo come piattaforma tecnologica della conoscenza: il paradigma di Pompei. In: Rilievo come piattaforma tecnologica della conoscenza: il paradigma di Pompei. ALICANTE: Marfil, 2010. ISBN: 9788426815293

[5] SERRAGLIO Riccardo. Architetture per i Lavoratori tra Napoli e Caserta. Napoli, La Scuola di Pitagora, 2012. ISBN: 9788865421383

[6] GANGEMI, Virginia. L'habitat agricolo del Basso Volturno. Napoli, tipografia Lithprint, 1979

[7] LARACCA-RONGHI, Enrico. Caserta e le sue Reali Delizie. Napoli, Athena Mediterranea, 1973

[8] PAONE, Rosario (a cura di). Antiche strade della Campania. Università degli Studi di Napoli "Federico " (Dipartimento di Conservazione dei Beni Culturali), 2000

[9] DE JACO, Aldo. Inchiesta su un comune meridionale: Castelvolturno. Roma, Editori riuniti, 1972

[10] CIAMBRONE, Alessandro. Integrated management and cultural districts. The French experience for the Campania Region. Napoli, La Scuola di Pitagora, 2012. ISBN: 9788865421741

[11] Regione Campania. Movimenti Turistici. Assessorato Regionale al Turismo, 2005

[12] CAPRIGLIONE, Jolanda. I musei della provincia di Caserta. Camera di Commercio di Caserta, 2005

[13] PANE, Giulio, Filangieri, A. Capua, architettura e arte: catalogo delle opere. Vitulazio, 1994

[14] CIAMBRONE, Alessandro. Cultural Tourism and Sustainable Development. A Management Network for the Campania World Heritage properties. Napoli, La Scuola di Pitagora, 2012. ISBN: 9788865421680



Castel Volturno, Mediterranean Eco-park, photo by Gaetano Andreozzi

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Places of identity in Campania; Traces represent the area between reason, regions and existing buildings.

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The reading of the tangible signs of the territory and its paradigms altered , the latter understood as elements of the places of persistence and life but also of action and reaction , allow the drafting of a multicriteria-elements of representation , where the sides of reason and reality territorial come together in a unique identifying mark representative communicative element complex as what he wants to be in the contemporary world "territory." Tangible presence of the sign territorial, is its connotation within its historical path that marks the places in need in the prospects of development planning, systematic analysis of existing structures optimization of the combination of essential explicate between place and space. The reading of these elements, the schematic ordered them, the return also altered, allows the appearance territorial revitalization, the latter in the firmness of pre-existing dialogues with the attitude to the future planning in a direct and vectorized. Intensity with which density and spatial knowledge in the places, the point of application as a characteristic element of the study context, understood as a form of value and meaning of meaning assigned to read, and understood how to sign proposition, almost obligatory direction of development, calling and waiting. Not neglecting then through a conscious approach to its analysis of the problematic Successive cultures in places , their actions and reactions of the territory. The territory, the vast area known, understood then in his new reading, with force as a stimulus for investigation and clarification through the preparation of true signs and control with those achievable programming . So in the end all presented epidermically the relationship of the sign to the man actor-spectator; single subject, the internal space volume multi-dimensional reality and meta- reality of investigation and design . The fact , therefore, requires a reflection of multi-track score, and on the meaning of the territorial reality, therefore, a strong view on the meaning of the signs , visible and invisible , and the role that those who now competes for quality cultures and scientific interests is in charge of dialogue and to intervene operating on the tissue, ensuring, conservation, protection, reason-region, organic growth.

Keywords: places, identity, systematic, territory, reason-region.

The reading of the tangible signs of the territory and its altered paradigms, the latter understood as elements of the persistence and life places but also of action and reaction, allow for the drawing up of a multi-criteria representation elements, where the aspects of reason and territorial reality come together in a unique identifying mark representative communicative of the overall element as what the "territory" wants to be in the contemporary world. The tangible presence of the territorial sign is its connotation within its historical path that marks the places in need in the planning prospects of development, systematic analysis of existing structures, optimization of the essential combination

between place and space. The reading of these elements, their schematic ordering, their restitution, also altered, allows for a revitalization of the territorial appearance, the latter in the firmness of the pre-existing dialogues with the approach to a direct and vectorised future planning. With intensity which density and spatial knowledge in the places, the point of application as a characteristic element of the contextual study, understood as ascribed value and attributing it meaning and seen as a sign of proposition, almost an obligatory direction of development, vocation and expected. Not therefore neglecting through a conscious approach, the relative issues of the analysis of successive cultures in places, their actions and relative reactions of the territory. The territory, the vast known area, understood as its new reading, with force as a stimulus for investigation and clarification through the preparation of true signs and control with those that can be achieved through planning. Finally, all presented epidermically to the relationship of the sign to the man actor-spectator; single subject, in multi-dimensional spaces, reality and meta-reality, of investigation and design. This, therefore, requires a reflection on the sign and the multi-level traces of the territorial reality, therefore, a strong consideration of the meaning of the signs, visible and invisible, as well as the role that those who now compete for quality cultures and scientific interests is open to dialogue and to intervene operating on the tissue, ensuring, conservation, protection, reason-region, organic growth.(Fig.1) From the experience of perceptual and emotional places, then proceeding in the construction of a new “vision of the city”, assuming a kind of “resemanticization” of its places that seemed crucial. Excursions, walks... are famous “tactics” that have returned throughout the twentieth century a particular history of the city: they told us the trivial city of Dada, of the unconscious and dreaming of the Surrealists, of the playful and nomadic city of the situationists. All visions of particular facets captured through a simple action, a walk - understood as “aesthetic practice” (practice from that experience has almost reached the status of an autonomous discipline) - act capable of giving an idea of the city “in which the spaces of being are the islands in the great sea formed by the space of going”. All the ideas of the city in which to walk while not representing a real “building”, implies a “transformation” through a new attribution of meaning. From those experiences we have learned that “wandering” in one place and the changing perceptions that are received represent a form of transformation that does not leave marks, but still culturally change the meaning of places and space. Thus, a walk is at the same time, a perceptive and creative act that takes shape through a “route”.

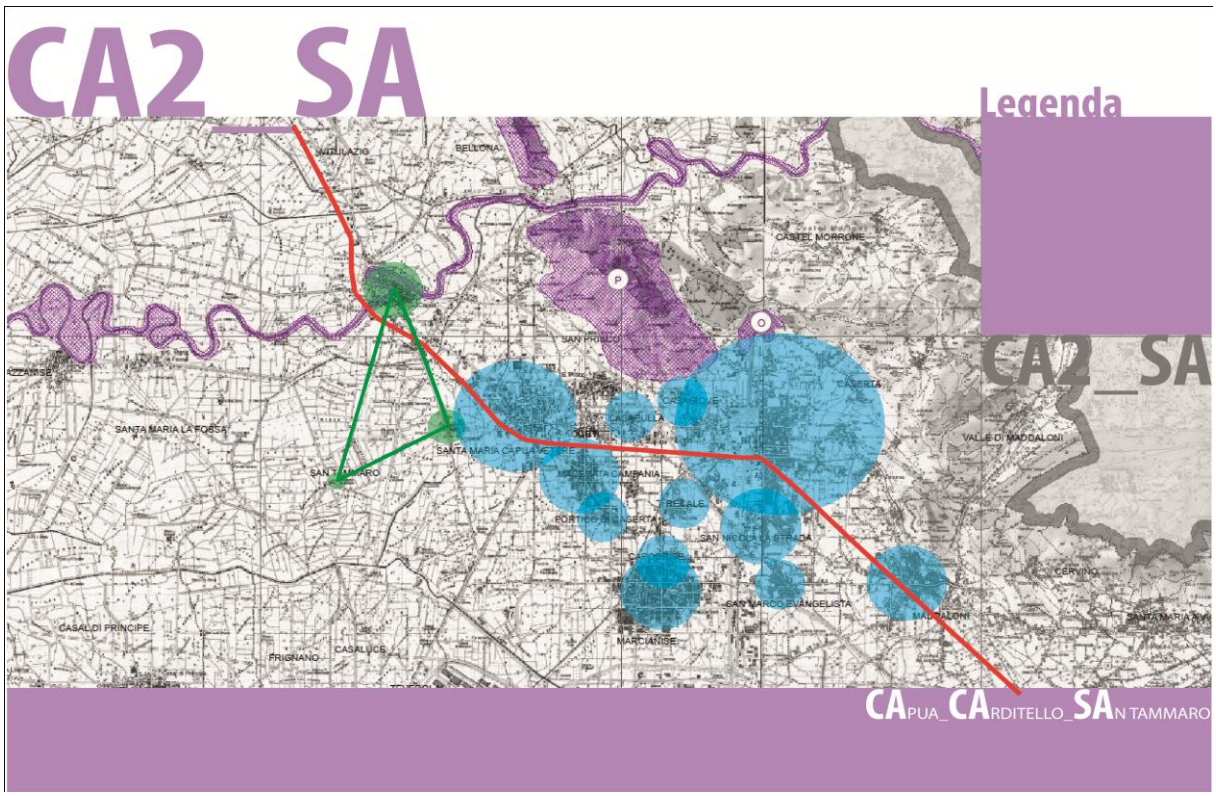

Fig. 1: Territorial analysis; the validity of the signs as a result of visual.

A heavy term, the meaning of which embodies, at the same time, the idea of the physical act of crossing (the path as the action of walking) , the idea of the trajectory, that is the line along which crosses the space (path as an itinerary), and the idea of the story of the space traversed (path as a narrative structure). Thes aspects of the route and the “story” - and the representation that underlies them both - are the most interesting because, through these two dimensions, the “walk” tends, on the one hand, to produce “maps” of the territory and, secondly, to attribute to it the symbolic and aesthetic values whose representation is manifested in specific visual artifacts from a strong communicative impact. The idea of the route and itinerary as the narrative is evidently connected to the complex action of the possible mapping of the territory. This is from the earliest maps of nomadic cultures, which constitute an interesting outcome in terms of representation, the slow and steady action of appropriation of the land by those peoples who first posed the problem of “inhabiting the earth by covering it”. However, the idea of the “map” contains in itself the most diverse narrative outcomes, which in various ways have been developed over time. (Fig. 2) It is worth mentioning, due to the particular fortune that similar issues have gained in the contemporary debate, the meaning it assumes in influential meta-graphs of the situationists or the psycho-geographical maps drawn by Guy Debord of Paris in the 1950s. These are maps where places of the city, completely out of context, appear as the land of passion, while the city itself is conceived as a “psychic landscape built with holes, in which whole parts are forgotten or deliberately suppressed, to build in the endless empty in possible cities”. It is therefore driven by an experience that wants to narrate the territory, also proposing walking as an aesthetic practice, capable of describing and modifying areas of the city whose nature often goes even interpreted and filled with “meaning”, rather than by “objects”. Elsewhere, however, it is intended to interpret the idea of the “map” restoring all its meaning of “guide to the exploration of places”, but enriching the key of the reading through an approach that has intertwined the results with those relating to the contemporary debate around the meaning of more complex “geographies of communication”. However, wandering cannot always do without “map”, that is not always possible without the absolute acquisition of news and information on places. It is on this issue that the building and transfer of information, interesting food for thought emerge from the experience and computer graphics that the particular field of visual communication that is interested in the representation of the “information” in graphical form. A whole industry, infographics is interested in the information for city maps, information systems, signage systems all fall into this horizon of communication that often, in the contemporary scenario proposes artifacts not quite conventional, capable of transforming the collection of information into an experiential action that involves the user in a dialectic relationship and makes the acquisition - and sometimes the building - the information at the same time simple, useful, enjoyable. Often the same city is interpreted as a “sheet” upon which to plot directions and routes, a city as a fabric (and therefore once again as a text) to write possible stories through the images of the new frontier of signage systems. Intuitive, dynamic, environmental, the signs today are using the city as a support, and working towards the redefinition of visual landscapes, giving new meaning to the experience of places. The multiple actions proposed by the project in the urban and social fabric of the city, return, however, an idea of multiplicity that cannot find consistent representation in individual communicative artifacts. Interpreted as “viral actions”, that could trigger a chain reaction in the identity statute transactions of the city, the project activities have ended up merging once again in possible “vision of the city”, each of which lives and strengthens its position in the light of the others, above, below.... The events that can potentially invade the city are linked to a number of paths of culture and art and food, greenery and energy. They can often simultaneously give the idea of a pulsating city, full of vivid events: concerts, performances, exhibitions, events, while in the greenhouses of art, spread all over the territory, showing the world the spectacle of nature. The information on such a jumble of activities and initiatives finds with difficulty their own representation in the forced two-dimensional map of the complex redefinition of its objectives and or a tourist guide. Eduard Tufte has good reason to define the practice of escaping flatland as a prerequisite to any infographics action. It is precisely to overcome the two-dimensionality that the project has focused, designing artifacts able to contain in a single object - in a sense “convertible” - separately, but simultaneously, useful indications for the use of all the areas of interest. Unconventional maps in which paths should be intuitive rather than identified, because only suggested as suggestions of a possible thematic itinerary that is designed by the reader. Appearing on the map, colour codes and sign elements that are a true correspondence in a system of dynamic and environmental signage invades the streets and physically marking the city

used as a sheet upon which to write, draw, set out directional systems. Even the temporal dimension has its own representation: nocturnal maps reported night places and events visible through special

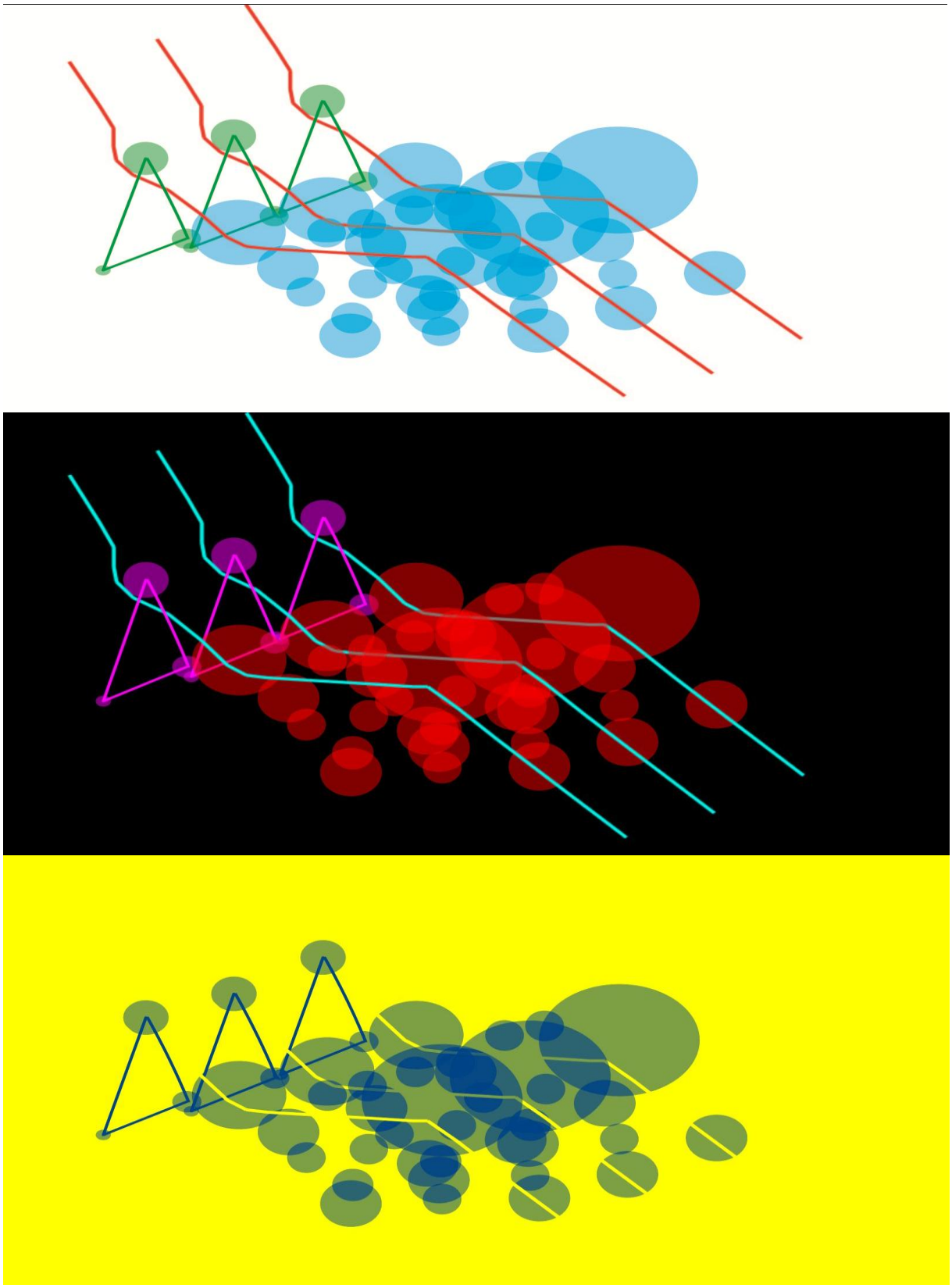

Fig. 2: Views of changes in metrics, analysis of the graphic references.

inks, using the same technique with which environmental signaling take shape in the dark, defining scenarios of unpublished night landscapes. On the whole, the project is declined as an experimental model of communication, exportable to other experiences and other territories, and to take an approach that seems to convincingly interpret instances that arise in the contemporary debate: the life of a city and the story of its heritage are at the bases of the life of the relationship that it is able, over time, to weave with its users; it is the story of the characteristics of this relationship and the ways in which it can interpret different levels of intense forms of communication and dialogue; and of this dialogue, the “dynamic maps of identity”, there seems to be an interesting support. Once again, the cultural horizon imposes reflecting on the communication strategies and actions, searching among those that are best able to interpret the emotional dimension that the experience of tradition and culture can give. However, these interesting interpretations are likely to remain purely theoretical, if it is not possible to convey to the community the idea that cultural heritage can concretely represent “a piece of its everyday life”; if it is not possible to convey the belief that that heritage is “accessible” – in the sense that Rifkin gives to the term - namely, that it is really part of a “possible experience” . (Fig.3) The theme is to be related to the widespread opinion that the new economies of experience supplant those of knowledge and in the short term the “learning society” will have to deal with and confront the relentless “emotional society”.

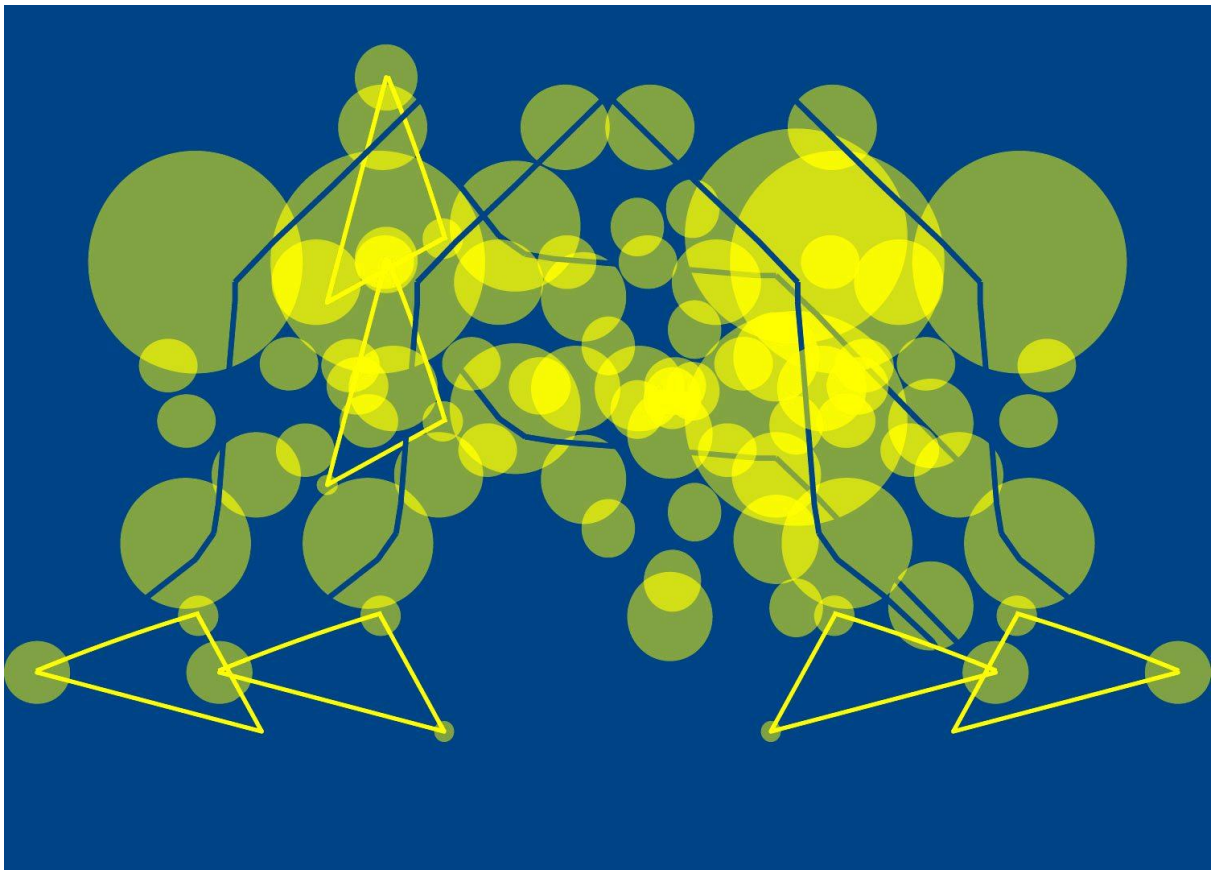

Fig. 3: Views of changes in metrics, meaning the little face in the spectrum bitonal

All thevalues that often seem to be far away from the communication processes, but can find their own expressive figure, as stated by Perniola in “a way of doing based on memory and imagination that does not flee the world, but moves it.

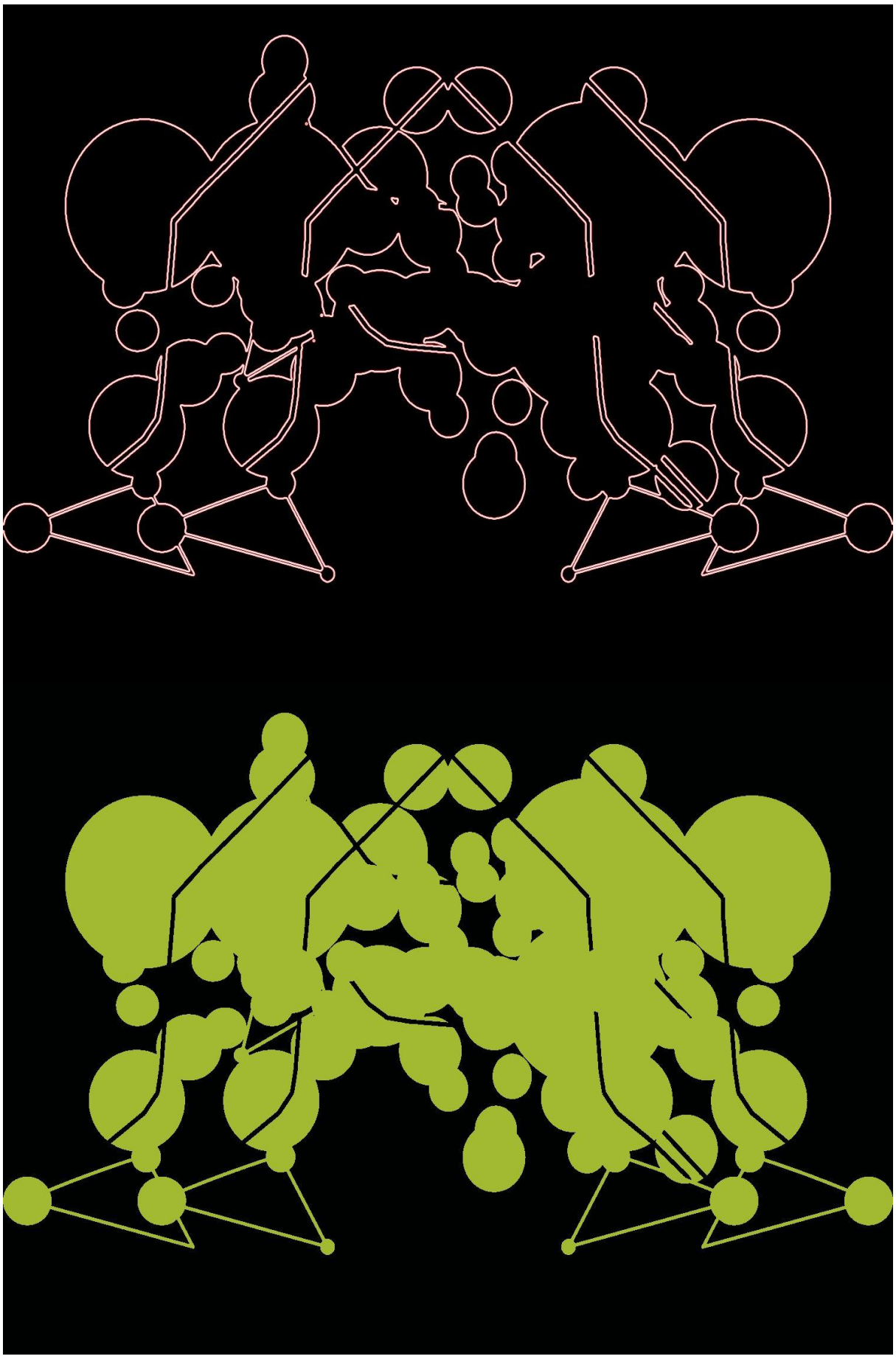

Fig. 4: Views of changes in metrics, meaning the geographic visual displays such as picture communication

The power of making and sizing are and will serve as a boost for the new landscape of the contemporary world; the final idea (Fig. 4) of this contribution is that it is possible to draw from our past energy to invent our future, our observation of the signs of territoriality and drive a scientific project towards a sign - a sign of memory and imagination.

Bibliographical References:

[1] *I segni distintivi dell'Abitare tra Memoria e Ragione*. A cura di CIRAFICI, Alessandra, Edizioni Frammenti, 2008

[2] ZERLENGA, Ornella. *Dalla grafica all'infografica. Nuove frontiere della rappresentazione nel progetto di prodotto e di comunicazione,* Claudio Grenzi Editore, 2007

[3] ANCESCHI, Giovanni. *Monogrammi e figure. Teorie e Storie della progettazione di artefatti comunicativi,* La Casa Usher, 1981

[4]ANCESCHI Giovannì *Progettazione visiva: convenzioni e procedimenti di rappresentazione.,* Officina Immagine, 1981

[5] *Design, territorio e patrimonio culturale.* A cura di Vincenzo Cristallo, Ermanno Guida, Alfonso Morone, Clean, 2006

[6] *Tracce, sguardi ed altri pensieri*. A cura di Di Marino Bruno, Ed. Feltrinelli, 2007

[7] MUNARI Bruno. *Fantasia, invenzione, creatività e immaginazione nelle comunicazioni visive,* Ed. Laterza, 2006

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Staircases as a representative space of architecture

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Abstract
Due to its important architectural function, the staircase of a project is as old as the architecture itself, with there being significant examples throughout history, from those of the Palace of Knossos in Crete and Persepolis in Iran as well as in the works of Francesco di Giorgio Martini, Leonardo da Vinci and Bramante. However, it is in the Baroque period that we experience forms that restore the staircase of a project as a space-time configuration representative of the architecture, along with not only the monumental but also imaginative dimension as demonstrated by some European models introduced by Johann Balthasar Neumann in Germany or Mansart in France. In Italy, however, there is a particular design period of the staircase as a representative area of the architecture in Naples, with the work of Ferdinando Sanfelice being a masterful example. Specifically, the staircases of Ferdinando Sanfelice in Naples will be studied, highlighting the geometric-configuration arrays of his two main models i.e. the "gullwing" and the cantilever, which earned the architect the nickname of "Ferdina lievat'a'sotto" (Ferdinando get out from below). The unusual and bold formal configuration of his staircases, whether they were "neck" structures or, especially, "overhang" or "in flight", had such an echo to the point that their lightweight appearance gave rise to legitimate doubts about their solidity and resistance.

Keywords: Neapolitan historic buildings, Ferdinando Sanfelice, staircases, architectural survey.

1. The staircases of the historic buildings of Naples
Open eighteenth-century Neapolitan staircases originate from the 1400s and are architectural organisms characterized by peculiar space-perception relations. This complex architectural reality manifests itself through a dynamic journey of flights of steps covered with vaults and a changing perception of views, with light and shadow created by perforated walls. These holed fronts are an added value to design capable of triggering a space-perceptual continuity between the courtyard (interior space), where there is a staircase and the road (external space) from which the staircase takes you through the archway of the entrance. In this sense, while in pursuit of its main architectural function (the vertical connection between the different floors of a building), the open Neapolitan staircase is, at the same time, a reservoir of space representative of several factors which are produced in it and manifest themselves. This condition finds reason in the distress of the roads with the consequent inability to grasp from each road the unique design of each façade. Therefore, in the expressive requalification programme of the residence, the portal and the staircase assume the task of attractor as if a piece of scenery where the portal is the proscenium and the staircase the backdrop.
In residential Neapolitan architecture, it is worth noting the widespread existence of an entrance that consists of a portal, entrance hall, courtyard and staircase. The portal draws the attention of the passerby as a attractor element due to its shape, size, material, decoration as well as function (to allow the passage from an internal to an external space) that antiquity has given a symbolic meaning. Functionally, the portal is an opening that allows for the passage from one environment to another. Symbolically, the function hails back to the arc of triumph, monumental building of the Roman period

designed to celebrate a victory, arranged along the streets where the triumphal processions were carried out and under which the leader marched with the spoils of war, treasure and slaves [13].
In historical Neapolitan buildings, the portal is the first link in a continuous spatial sequence marking the transition from a public space (the street) to a private one (the building). Whether it is a noble or lesser building, the portal is a symbolic means of representation that, by virtue of size, shape, material and decorations invades the street attracting the attention of the passerby. In close connection with the road, the plastic-figurative spatiality of the portal and the light-shadow-light pattern (which connotes the sequence street-entrance-courtyard) attract the passerby who, having passed the entrance hall, looks into the intimate space, the courtyard, an open reservoir of space where in most Neapolitan buildings there is the "open staircase", often located in the front position with regard to access in order to visually seduce the passerby (when passing by on the street), thanks to the strength of an ever-changing spatial dynamism generated on the performance of the buttresses and a multiplicity of vaulted structures, typologically different and variously articulated. In some cases, behind the staircase, there is the garden, and the set is transformed into a multidimensional perceptual context in which the portal is the intermediary (Fig. 1), with a masterful example being the eighteenth-century "gullwing" staircase in Palazzo Sanfelice by the architect Ferdinando Sanfelice, located in the Sanità neighbourhood in Naples.

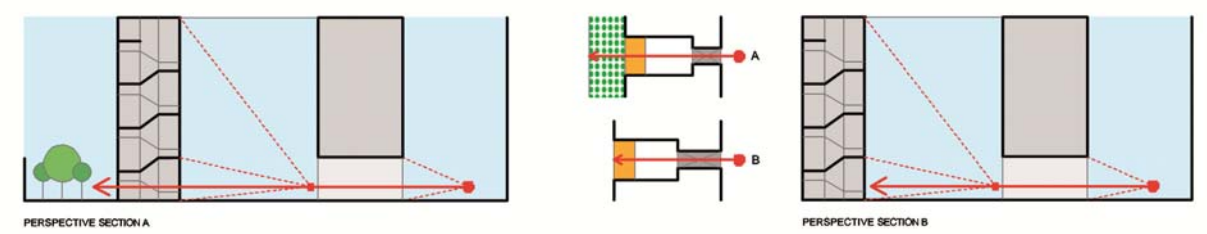

Fig. 1: The access systems of a residential architecture: portal, entrance hall, courtyard, staircase, garden.

2. The Sanfelician "gullwing" model: the extroverted staircase

Among all the open staircases of eighteenth century Naples, without a doubt the most impressive are the work of Ferdinando Sanfelice (or his collaborators), unconventional architect due to both language and structural design. For Sanfelice, the model of the "open staircase" is a bold disseminator capable of reworking the linguistic and structural elements using an ingenious and free invention: the back wall of the courtyard (opposite the road and hiding the body of the staircase) is interpreted as an improvised and piece of scenery to burrow into, with the prime task of manifesting to the outside the complex system of flights of steps. In this sense, Ferdinando San Felice moved away from frivolous and superficial decorations to experiment with bold and unprecedented formal solutions capable of being implanted on unusual planimetric configurations, pillars, arches, vaults and flights of steps with a unparalleled structural fluency. In this unified architectural composition, the real protagonist of the cognitive experience is the visual-perceptual dynamic use of space and light, with the latter being generated by the ever-changing play of solids and voids.
In the 1720's, Sanfelice designed in Via Arena in Sanità his family home, consisting of two buildings assembled on the street with a single façade with two identical portals, straight broken profile with molding and embossed. The staircases, with a different spatial layout, each facing a courtyard with a different shape. In particular, one of the two staircases (number 6), taking up and reinterpreting the tradition of the monumental double staircase, introduces in the panorama of the building an unusual theatrical model called by recent historiography "hawk wing" or "gullwing" [6] (Figs. 2-B, 3-B).
The staircase occupies the entire width of the transverse façade of the courtyard opposite the entrance and is made up by a body that is the same height as the building. The structural system includes sixteen pillars whose planimetric rhythm is regulated by a double bilateral symmetry and in which there are different flights of stairs, landings and wells, and upon which the whole system of vaults and arches rests, including the horizontal flights and rampant. Both sides of this staircase, of considerable size (the one facing the entrance as well as the one facing the back), are completely perforated and projecting outside the pillared structure through the use of pilasters. In addition, on the facade facing the entrance, a parallel system of moldings, taking higher up the levels of the landings of the side elevations, shows the outside the altimetric development of the landings and lines of the slopes of the flights of steps and, therefore, connotes the design the perspective with an original use of the sloping lines and the subsequent allusion to movement.
Specifically, the spatial configuration to "wings of seagulls" comes from the peculiar planimetric design of the staircase. This, in fact, refers to the double monumental staircase with four flights of stairs that

wrap around an empty space sharing a central flight. In this diagram, the edge of the staircase is set along the transverse direction, thus confirming the architectural layout called a double monumental staircase, and at the same time, giving the central bay on the ground floor, free and not committed to any flight (see, for example, the staircase in Weissenstein Castle in Pommersfelden by Johann Dientzenhofer, 1711-18; the Daun-Kinsky Palalce, 1713 by J. L. Hilbebrandt) (Fig. 2-A). This solution allows to connect the front courtyard with the free space behind to be used as a garden. At the same time, by virtue of the existence of a completely perforated body of the staircase, this solution allows the passerby to see through entrance, beyond the body of the staircase and into the garden at the rear.

This model – with or without a garden – was widely replicated in a Naples that had fallen in love with spectacular Baroque scenery, with the staircases of the Spagnuolo(Via dei Vergini, 19), Fernandez (Via San Giuseppe dei Nudi, 25) and Trabucco (Vico San Liborio, 1) being outstanding examples albeit with more or less relevant differences.

In 1738 Ferdinando Sanfelice was responsible for realising a noble residence in Via Vergini, known as Palazzo dello Spagnolo, re-proposing the “gullwing” staircase with some slight variations, which make the perspective on the courtyard even more “ethereal”. While the main supporting structure still consisted of sixteen pillars, the floor plan of the double staircase, as in Palazzo Sanfelice, and the main body of the staircase, the diaphragm between the two courtyards (one of which was to be used as a garden), the perspective onto the entrance is reduced even further since the wall system is reduced to the pillars upon which the arches and vaults rest. In addition, the wing shaped marcapiano – that gave continuity to Palazzo Sanfelice, with three horizontal, broken strips – is discontinuous, thus enhancing the verticality of the side and central spans. Finally, the last level of the perspective, instead of ending with a view of the pillars and rear loggia – presents an additional floor pierced by arches with the same line. The building also has a rich array of stuccos, subsequently realised by Aniello Prezioso based on drawings by Francesco Attanasio (Figs. 2 - C, 3 -C).

The staircases of the noble residences Fernandez and Trabucco were based on the “gullwing” model and built by students from the Sanfelician school. If compared, the fronts of the courtyard of the two staircases seem to arise at the antipodes, almost as if hybrids of the previous Sanfelician solutions. Unlike the original models, these two staircases do not have a garden behind them, with the only façade perforated being the entrance. The scenic backdrop of Palazzo Fernandez refers more to Palazzo Sanfelice since it has both a front pierced with arches (a low arch) and windows (instead of only the reduction of the pillars), as well as the molded strip that, however, has a lesser inclination since the layout of the staircase is different. In fact, in accordance to the model of the double monumental staircase, there are only three flight of steps that wrap themselves around at right angles to the corresponding wells in Palazzo Fernandez; the fourth flight (the one that touches the front of the courtyard) is absent and replaced by a few steps. Therefore , the horizontal strips that create the prospect appear less pronounced and almost horizontal (Figs. 2-D, 3-D).

Built by Nicola Tagliacozzi Canale, the staircase of Palazzo Trabucco serves five floors (unlike the previous one which only four) and looks out onto a courtyard whose transverse dimension is much smaller than the others. This accentuates the effect of vertical thrust of the perspective that, even in this case, is enhanced by the reduction of the front wall to the sole of the pillars with arches and the absence of a continuous molded strip. Consequently, there is a dynamism in the perspective that is created by alternating the height of the vertical bands corresponding to the central and side spans, which is further accentuated by the remaining ones that, qualified by a reduced passage, leave space for the rampant openings, perceived as if slots (Figs. 2-E, 3-E).

Overall, the open Sanfelician' “gullwing” staircase innovates with imagination and boldness the design of the residential staircase, making it the central place of the representative space of architecture. The objectives of Sanfelice such as the scenic and ,at the same time, structural wonder give a new type of body to the staircase that make the multiple perceptions as well as contrasts of light the main elements of an original design. The reinterpretation of the double monumental staircase and its spatial reconfiguration in multiple vertical levels (made possible thanks to a daring experimentation of walls, pillars, arches and vaults) results in a new space of the journey; the perceptual experience is dynamic and full of multiple views presented by both visual continuous visual crossings that along with the “holes” of the arches and wells allows the gaze to go in all directions as well as the change of the tonal value of the light. In this architecture of visuality and multiple experiences, the prevailing feeling is one of being in an “explosive”, “centrifugal” space, where anything can and must remain immobile.

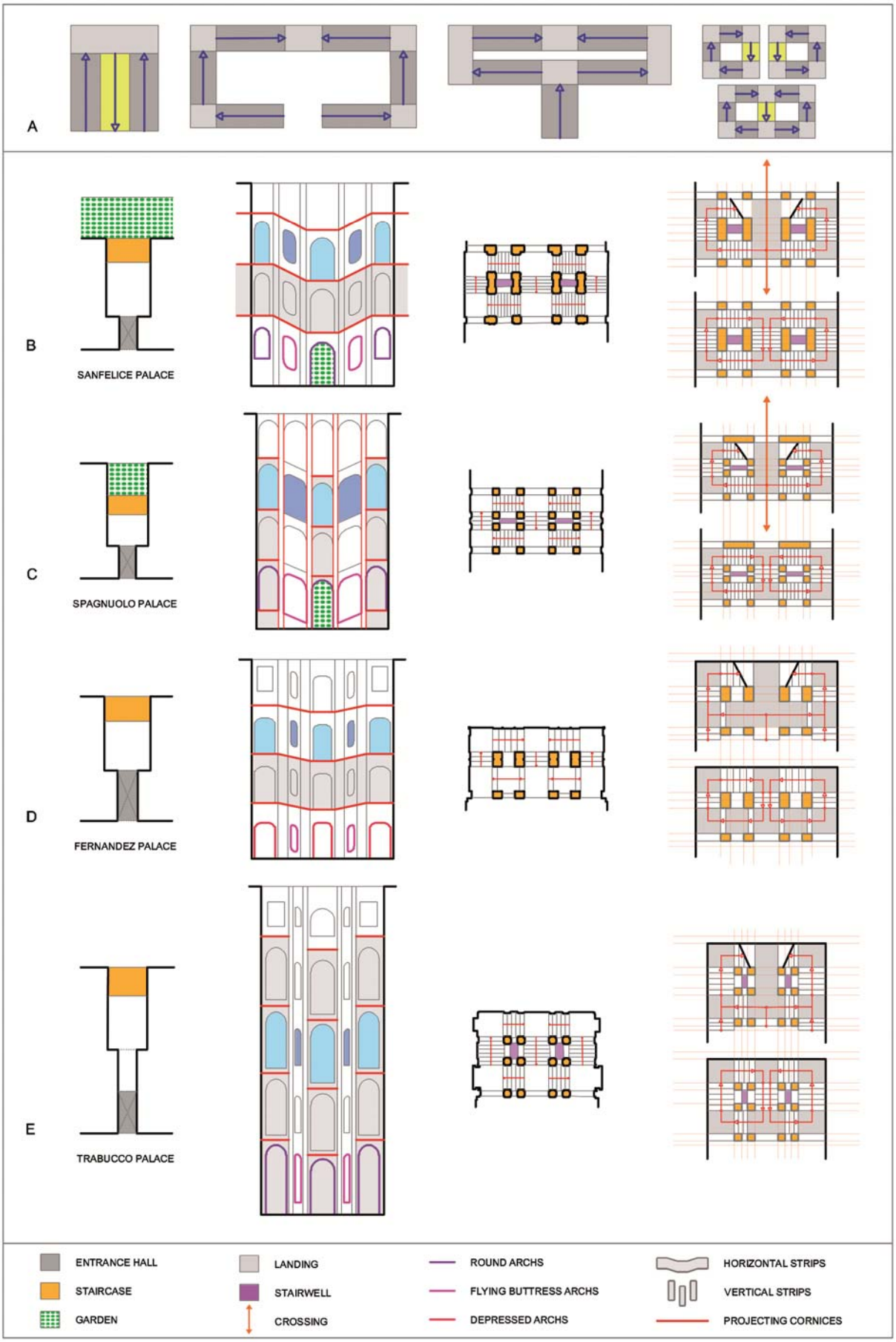

Fig. 2: Planimetric diagrams of double staircases; B-Palazzo Sanfelice; C-Palazzo dello Spagnuolo; D-Palazzo Fernandez; . E-Palazzo Trabucco.

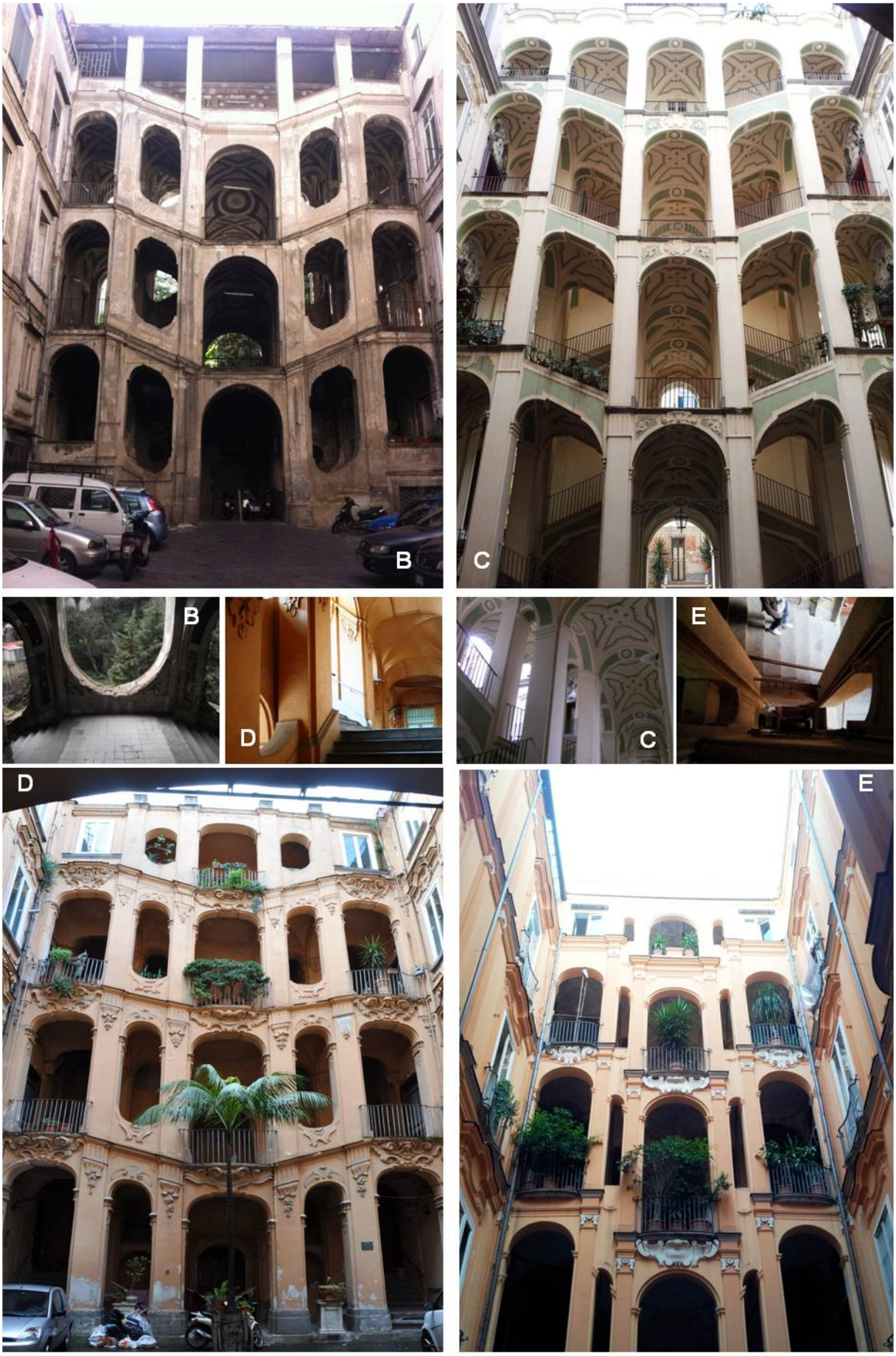

Fig. 3: B-Palazzo Sanfelice; C-Palazzo dello Spagnuolo; D-Palazzo Fernandez; .E-Palazzo Trabucco.

3 . The Sanfelician “cantilevered” model: the introverted staircase

As previously mentioned, in the 1720s Ferdinando Sanfelice realised his family home in Via Arena in the Sanità, consisting of two buildings (with independent entrances) and two courtyards (separate and different shapes) overlooked by two different staircases, the “gullwing” (previously described, n. 6) and the “twin-scroll” (n. 2). It is well-known that the spatial configuration of a “spiral ”staircase arises from a planimetric circular or oval shape where the steps dwindling in size towards the center or the inside, however, leaning on a central pivot (called “core” or “column”). The solution designed (and realised) by Sanfelice is “double” in the sense that there two separate staircases that run parallel but in opposite directions and are accessed by a single straight flight located in the middle (Figs. 4 -E , 5 -E). The typological reference is, therefore, the double staircase where the central ramp is lower and bisects into two right-angled sides as well as the double spiral staircase in the castle of Graz in Austria and dated 1499 where, unlike the one built by Sanfelice, the flights are initially separate and then come together in a share landing. Sanfelice’s solution was to follow the one rectilinear flight with the two spiral flights in a median position, serving two distinct and symmetrical entrances with respect to the central axis of the planimetric configuration. Overall, this staircase is full of the intense “introverted” spatiality, internal and confined. In fact, while going up the steps, it is gradually revealed, with surprise, stopping at to the small overlook, that is over the courtyard, and then leading to the first and only floor. In addition, the presence of only two light sources (the aforementioned small one and a single open window overlooking the rear perimeter wall) contribute to the gradual unfolding of the reservoir of space particularly in light of the significant tonal variation of the natural light that is appreciated during the climb.

Sanfelice designed a further two “introverted” staircases in Naples which, just as with the twin-scroll of Palazzo Sanfelice, are characterized by the analogous design of an attractive and intense internal space that is not manifested by anything outside: these are in the noble residences of Palmarice (Piazzetta Teodoro Monticelli) and Bartolomeo di Majo (Descent Sanità, 68). The design of both of these staircases revisit the “ring” where the steps, clamped to the side walls, leave a central space known as a “well”. In this case , the steps are “cantilevered” and the staircase is statically self-supporting in the sense that it does not possess load bearing elements apart from the connection of the steps to the exterior walls. This type of staircase can also be developed on a square plan, variously polygonal, as well as circular or oval plane: in the latter, there are noteworthy examples of “cartouche” staircases by Jacopo Barozzi, known as Il Vignola, in the Palazzo Farnese in Caprarola as well as oval staircases by Andrea Palladio, including the one built in the Academy of Venice and, in 1786, Goethe said to be “the most beautiful spiral staircase in the world [so that] we do not grow weary of climbing and going down it”. Thus, the staircases of the noble residences Palmarice and Bartolomeo di Majo are cantilevered stairs which represent further remarkable examples of the unprecedented structural imagination of Ferdinando Sanfelice.

The staircase of Palazzo Palmarice can be accessed through a small Sanfelician style portal (mixtilinear molding wrapped with studs and diamond point located in the left corner of the courtyard (Fig. 2-B, 2 -B). The staircase develops planimetrically along an octagon, or a square rotated 45° and with the vertices blunted. This allows to set the flights along the directions of the diagonals as well as obtain triangular landings and a central square shaft, which is also rotated 45° with respect to the portal. This is not insignificant, when considering, in relation to the direction of the front of the perspective that “hides” the scale, that they are not parallel, but rather, create an unusual perceivable dynamism from both the entrance on the ground floor as well as the openings at the different levels and from which the staircase is illuminated. The intrados of the flights is solved with Roman vaults while the landings are covered with spindles. The spatial configuration of the staircase of Palazzo Palmarice has a basic geometric layout but the result is spectacular, not only due to the dynamism that the solution of the rotation to 45 degrees generates, but due to the contribution of the natural light that, penetrating through the arches opening onto the courtyard (including the top floor, one oval eye), is the other variable and constant component of the spatial design by Sanfelice.

In 1726 Ferdinando Sanfelice renovated Palazzo Bartolomeo di Majo, creating another unique cantilevered staircase (Figs. 4-A, 5-A). In this case, the spatial body is a rhombus with convex sides towards the inside of the well and rounded vertices. Even in this case, the four flights are arranged along the diagonal directions of the rhombus to the convex sides and, consequently, the planimetric shape of the well is to concentric with that of the reservoir wall so that, looking at it, the planimetric plane of the Palazzo Bartholomew di Majo staircase (also in this case, the flights are covered by barrel vaults and the landings with spindles) seems to be the topological stretching of the Palazzo Palmarice staircase along one of its axes. Looking at it from below, the Palazzo Bartolomeo di Majo staircase seems to stretch upward like an elastic material, almost unfolding like a ribbon and this feeling is supported by the absence of moldings on the external walls joining the arches that support the flights. Bernardo De Dominici, biographer of Sanfelice, commented on this staircase with great admiration: «It is the most capricious staircase in Naples, bringing wonder to how so a great staircase can be in the air, with only one part being connected» [1].

The description of the design of the open staircase by Ferdinando Sanfelice for Palazzo Capuano-Lauriano in Vico Pellegrino (Figs. 4-C, 5-C) is worth mentioning. Planimetrically, the staircase relates to the double staircase model, while introducing a variant. In fact, the lateral flights, from which it has access , do not have a rectilinear development but are arranged at a right angle along the adjacent sides of a square rotated 45° with respect to the courtyard, while the flight is arranged along the median axis. This allows to jut part of the staircase onto the courtyard and to model the perspective spatially. Thus, the three sides of the masonry walls, which extend towards the hallway, open up a series of arches (on the central front) as well as a series of oblong octagonal windows on the front sloping sides. As with the “gullwing” staircase, also in this case, the line of slope of the flights is declared to the outside by virtue of the presence of a molding that follows the movement of the facade and which contributes to reinforcing the dynamic effect of the design of the perspective. However, unlike the “gullwing” model, the flights ramps but not unload onto pillars but rather onto masonry walls that reduce the transparency effect of the staircase.
The open staircase of Palazzo Mastellone also seems to be insipred by Sanfelice, located in Piazza Carità and renovated in 1732 by Nicol Tagliacozzi Canale, architect of the adjacent Palazzo Trabucco (Figs. 4-D, 5 -D). The spatial layout of this staircase has several elements that connect it to the work of Sanfelice, such as the theme of the double staircase and the projection onto the courtyard, although in this case, the part that juts out into the hallway is only the flight of steps that leads to the ground floor, modelled according to a curvilinear connection. Specifically, the theme of the double staircase and the projection onto the courtyard make it similar to the double spiral staircase of Palazzo Sanfelice as well as the perspective of Palazzo Lauriano-Capuano.

4. Architectural surveys as an investigative tool

The graphical and configurational analysis of the similarities and differences of the Sanfelician staircase (and those built based on it) have been the subject of study by a research team led by the writer and includes Giuseppe Celiento, Vincenzo Cirillo, Raffaele Federico, Valeria Marzocchella and Salvatore Volpicelli. The diagrams compare – for the first time and to the same scale of representation – the staircases designed by Sanfelice in Naples and highlight the spatial qualities that have made them well-known (Figs. 2, 4). These issues have been dealt with in an architectural survey campaign of several staircases in Naples, where the spatial layout refers to the Sanfelician models discussed here, and where, specifically, the research work was supported by the recent archive studies carried out by Alfonso Gambardella, one of the most important scholars of the works of Ferdinando Sanfelice.
The staircases, studied under the scientific coordination of the author, have been analysed by the entire research team as well as individually by each member of the group (Fig. 6). They are located in Via Nilo, 30 (Palazzo D’Afflitto, Vincenzo Cirillo), Salita Capodimonte, 10 (Palazzo Santoro, Raffaele Federico), Via Duomo, 220 (Palazzo Persico, Giuseppe Celiento), Via Salvatore Rosa 98 and 103 (Palazzo Maciocco, respectively Salvatore Volpicelli and Valeria Marzocchella).
The architectural survey campaign of the staircases was carried out by Pasquale Argenziano (the laser scanner survey), Antonio Grillo (3D prototypes) and Assunta D’Urzo, Gino Spera, Igor Todisco, Antonio Trimarchi (the photographic documentation).
Specifically, in the early Sixties of the last century, the staircases in Palazzo Maciocco and Palazzo D'Afflitto were surveyed by Michele Capobianco as part of a teaching laboratory and published - together with the findings of most of the Sanfelician staircases examined here – in three issues of the journal “L’architettura. Cronache e storia” [4, 554-557; 5, 694-697]. The surveys and photographs attached contribute to the data making it possible to carry out a comparison with the significant changes that subsequently occurred. The staircase of Palazzo Santoro was previously studied and then surveyed by the author in 1992 as part of the educational field survey coordinated by Rosa Penta [10, 11]. The architectural survey carried out on these five staircases - whose formal and spatial characteristics from a geometric-configurative point of view refer to the Sanfelician models analyzed here - give a new and innovative contribution due to both the type of comparative study of the similarities and differences as well as the instrumental innovation introduced during the survey campaign that allowed to exploit even more the formal and metric data. Moreover, by virtue of modern modeling vector digital systems, it was possible to see new and unusual views of the staircases, thus confirming the prominent role of representative space of the architecture of the residence.
The architectural survey and analysis of the staircases is currently in press (translated by Sacha Anthony Berardo).

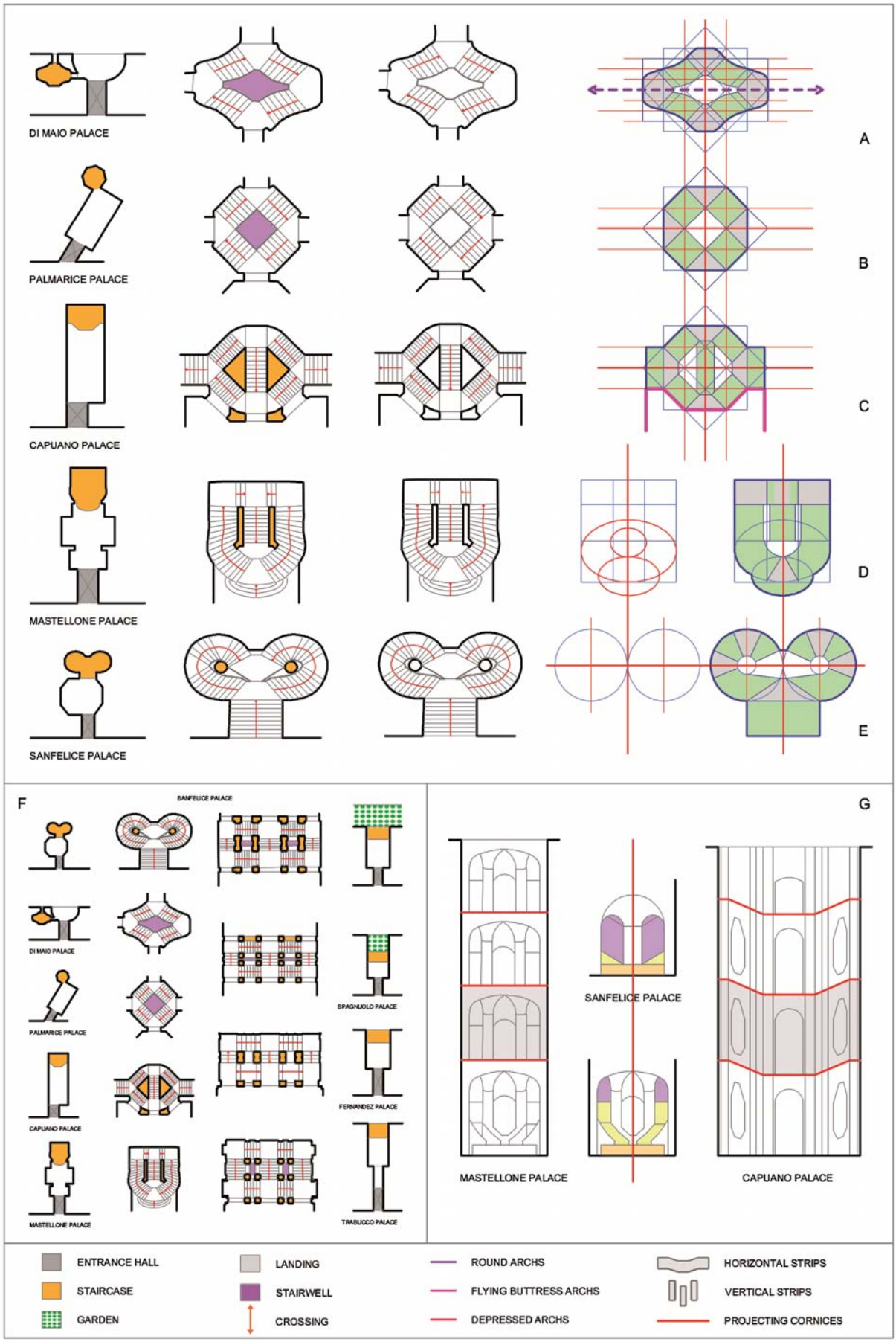

Fig. 4: A-Palazzo Bartolomeo di Majo; B-Palazzo Palmarice; C-Palazzo Capuano-Lauriano; D-Palazzo Mastellone; E-Palazzo Sanfelice; F-Comparative diagrams; G-Comparisons of perspectives.

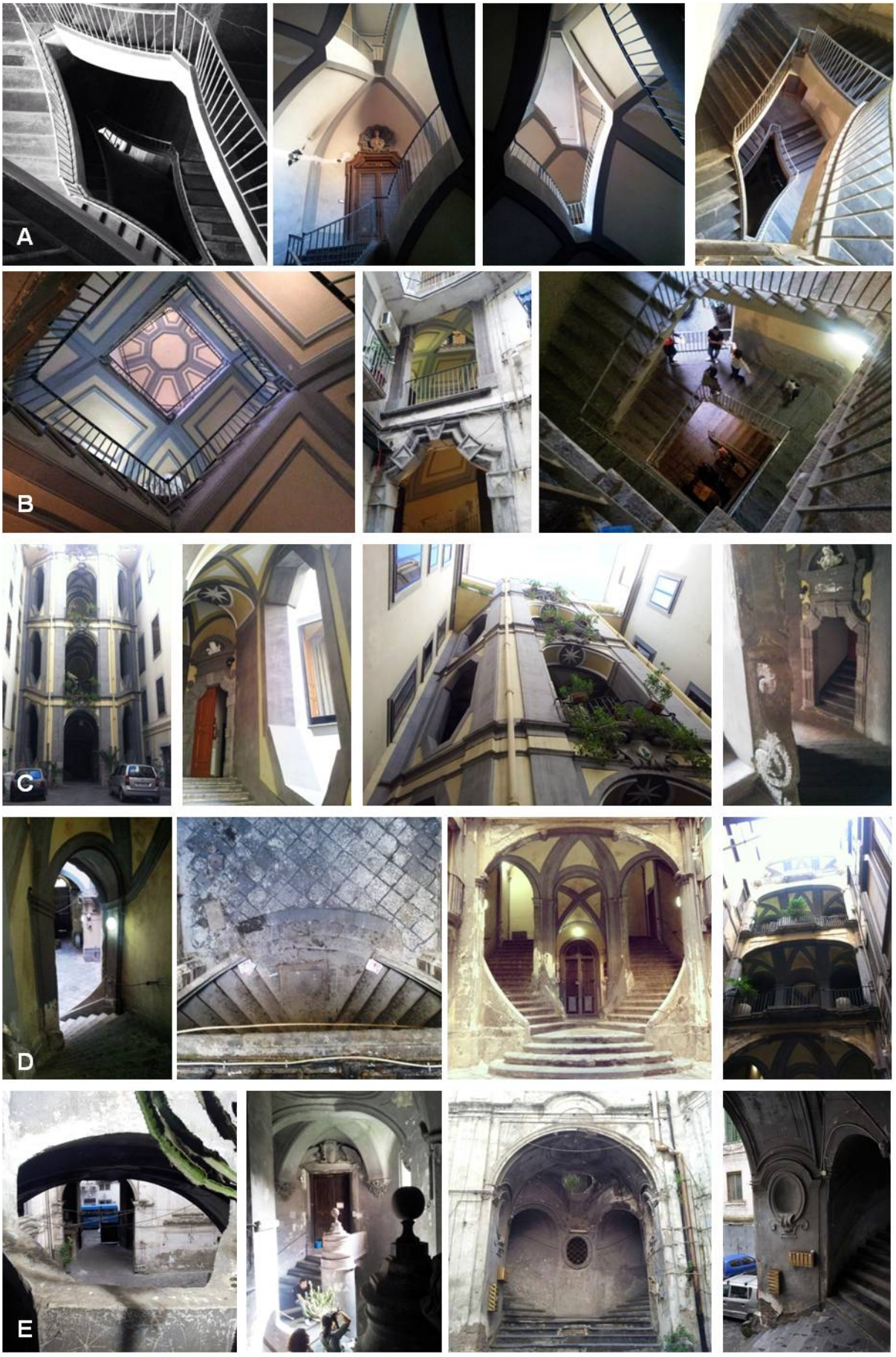

Fig. 5: A-Palazzo Bartolomeo di Majo; B-Palazzo Palmarice; C-Palazzo Capuano-Lauriano; D-Palazzo Mastellone; E-Palazzo Sanfelice

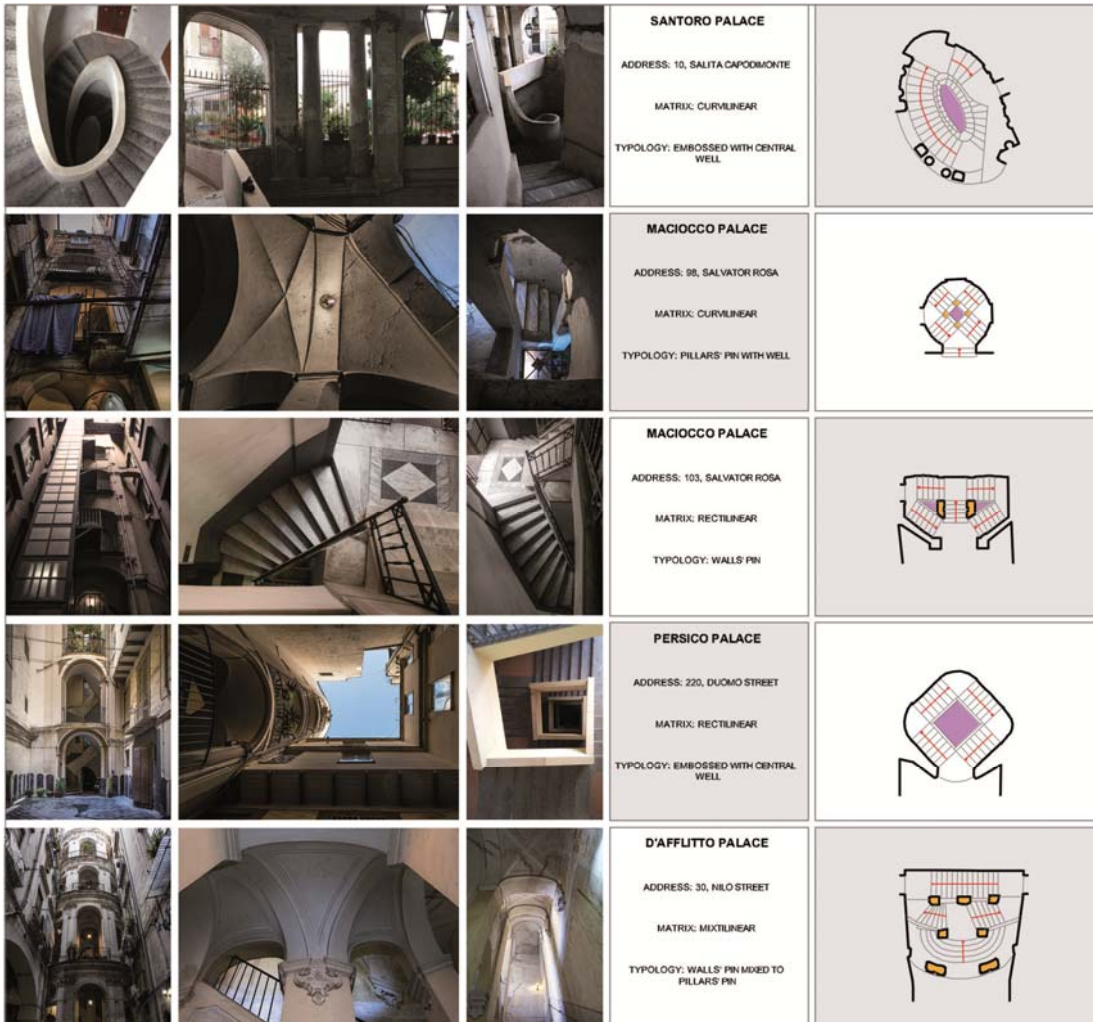

Fig. 6: The staircase as a representative system of architecture (survey campaign coordinated by Ornella Zerlenga, 2013).

Bibliographical References

[1] DE DOMINICI, Bernardo. *Vite dei Pittori, Scultori, ed Architetti Napolitani*. Napoli: 1742.
[2] DONGHI, Daniele. *Manuale dell'architetto*. Torino: Unione Tipografico, 1925. I, 635-675.
[3] CAPOBIANCO, Michele. *Scale settecentesche a Napoli – 1*. In *L'Architettura. Cronache e storia*. 84, VIII, n. 6, ottobre 1962, pp. 400-417.
[4] CAPOBIANCO, Michele. *Scale settecentesche a Napoli - 2*. In *L'Architettura. Cronache e storia*. 86, VIII, n. 8, dicembre 1962, pp. 546-561.
[5] CAPOBIANCO, Michele. *Scale settecentesche a Napoli – 3*. In *L'Architettura. Cronache e storia*. 88, VIII, n. 10, febbraio 1963, pp. 694-705.
[6] GAMBARDELLA, Alfonso. *Note su Ferdinando Sanfelice architetto napoletano*. Napoli: Istituto Editoriale del Mezzogiorno, 1975.
[7] SGROSSO, Anna. PENTA, Rosa. MURO, Maria. DELL'AQUILA, Mariella. *Architettura: disegno e geometria*. Napoli: Massimo, 1977.
[8] SGROSSO, Anna. *Lo spazio rappresentativo dell'architettura*. Napoli. Massimo, 1979.
[9] GAMBARDELLA, Cherubino. *L'architettura delle scale. Disegno, teoria e tecnica*. Genova: Sagep, 1993.
[10] ZERLENGA, Ornella. Il comparto del Crocifisso e il progetto della chiesa di Guglielmo Turi. In BUCCARO, Alfredo. *Il Borgo dei Vergini. Storia e struttura di un ambito urbano*. Napoli: Cuen, 1991, pp. 173-177. ISBN 88-7295-101-1.
[11] ZERLENGA, Ornella. La scala nel banco di tufo. In *Lo spazio del disegno.* Napoli: Il Notiziario Legale S.r.l., 1993, n° 12, pp. 68-78.
[12] BLUNT, Anthony. *Architettura barocca e rococò a Napoli*. Milano: Mondadori Electa, 2006.
[13] ZERLENGA, Ornella. Memories in stone. In GAMBARDELLA, Carmine, *Heritage Architecture LanDesign,* XI Forum Internazionale di Studi 'Le vie dei Mercanti', Aversa-Capri 13-15 giugno 2013. Napoli: La scuola di Pitagora, 2013, n° 39, pp. 245-255, ID 061. ISBN 978-88-6542-290-8.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Casagiove, Santa Maria Capua Vetere: a periphery and a road on centuries of Ancient Capua.

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Abstract
This study is concerned with two moments of analysis and one of design on different and historically dense urban areas, which are undergoing rapid, uncoordinated and not characterizing changes. The dominion of Capua is the scenery and the rule of these areas. This study has compared a long section of back of old rural houses in front of the campaign, on the sidelines of a centuria (Casagiove) and the secondary fronts of some ancient buildings that form a large empty square near a major urban hinge (Santa Maria Capua Vetere). The first-in order to reflect on the fate of tuffaceous skylines that have drawn the prospects and the boundaries of the villages built into the fields for hundreds of years- takes its cue from the areas of study of a doctoral research of the first 90 years, focused on the order that there is a need to give to the things built in urban areas of small and medium size. The second refers to the work of some students of a laboratory of architectural design on the quality of the space strongly characterized by the introversion and its centrality misinterpreted. In binding to the two sites chosen, is finally described, as an example of the method used to interface properly old and new buildings in respect of both analyzes, the project nearing completion of a parish complex on the a small ground of outskirts in Caserta near the agricultural area of the Atellano (Marcianise).

Keywords: Territory, City, Limits, Modifications.

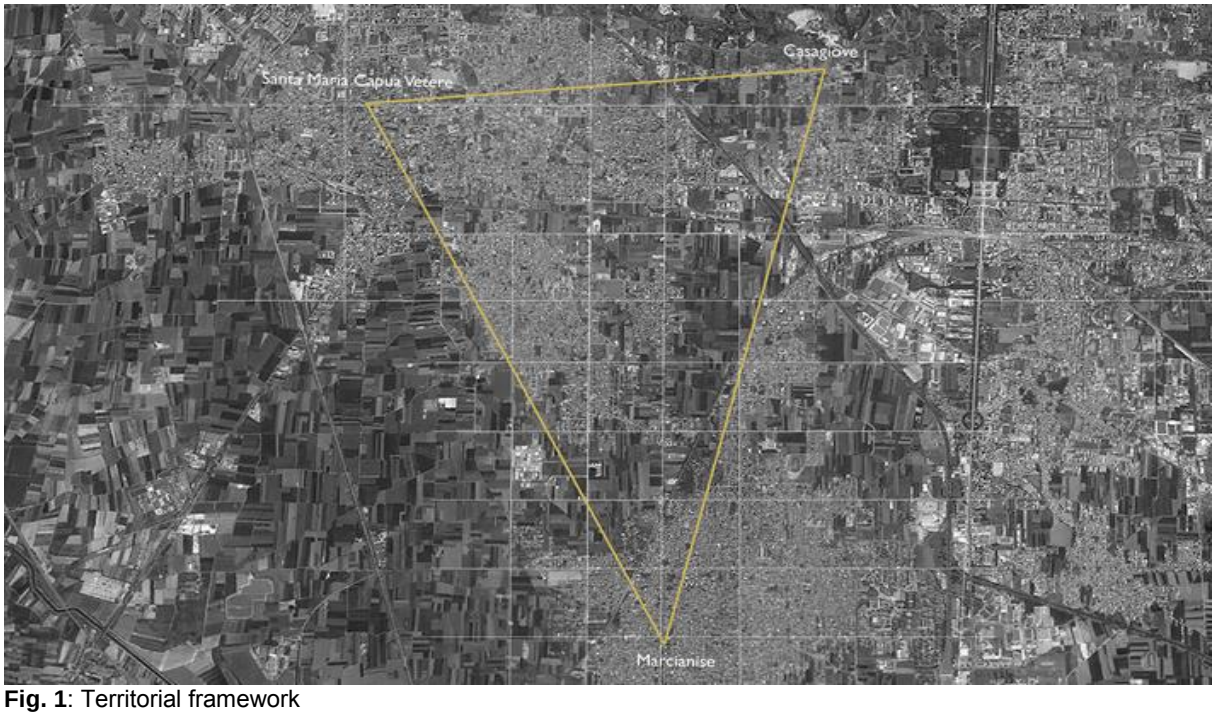

Fig. 1: Territorial framework

1. Reading

The work intends to return to the issues of modification of the inhabited space and, as in the previous study presented at the meeting of Capri (2013), attempts an example of reading of the events that relate to the architecture, in order to assess them. The goal is to add a small piece to the research on the transformation of urban morphology, where they have tried to note down how and what has been built in cities and in their suburbs for the past 30 years; a short period of time characterized by the irrepressible race toward every possible form of residual expansion. These reflections are absolutely necessary, now that the various levels of planning are available almost everywhere and there is a need to give a final functional and formal structure to the territories. Hereunder we will be carefully watching three different episodes. The territory on which a few kilometers north of the Gulf of Naples triangulate, is the dominion of Capua and its polycentric University. The choice derives from the connection that it seemed to be between them according to a brief reasoning. The first two, unresolved but emblematic, respectively in the outskirts of the town of Casagiove and in the urban center of Santa Maria Capua Vetere. The third, a work in progress in the large agricultural municipality of Marcianise, for the problems addressed, shape and arrangements, serves to recall both the previous episodes.

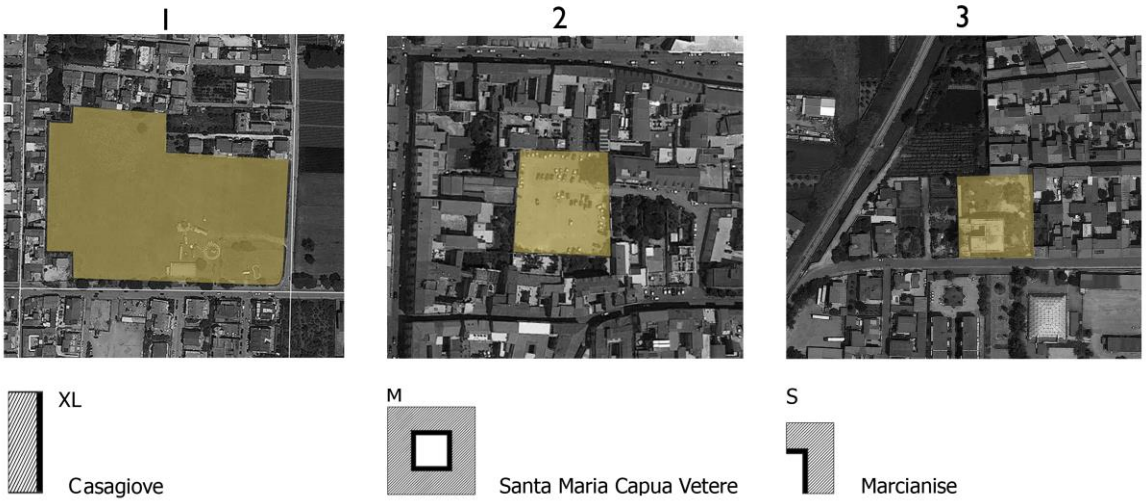

Fig. 2: Case studies

2. Casagiove_XL

In 1992 was completed the drafting of the first doctoral thesis in architectural of the school of Naples, who had read the strength of planning of the centuries that was still alive in the territory of Capua. [1] The paginated and the experience were closed by the idea of design of a small new piece of city, a project to highlight the position of the modules surveyors. Via Luigi Castiello, street of the centuriation, was chosen as the setting because it was the only isolated and densely built road able to express an independent urban quality. It, into his rectum flat route from the south to the mountains Tifatini, today supports a settlement that continues to expand itself westward and a single row of courtyard houses without windows on the the countryside, from the opposite side. Many changes of the urban form have occurred on via Castiello in the twenty-two years thereafter and here we could certainly give a critical testimony of these without fear to be going off topic, however, we preferred to shift the focus and go further the scene of the strong transformations planned and still in progress (the one rearranged in the doctoral project), attracted by the tuffaceous skyline that constitutes the poetic back of the houses built to the east of the road. It is one of many skylines that are in the plain on the margin between the edification and the countryside, but also one of the few to still be almost intact; this and other similar ones tend to be slowly absorbed or replaced by amorphous and unprincipled buildings; just look around to be able to annotate a rich casuistry of variants. It's just the absence of the plaster who has made so dry and suggestive, in its apparent incompleteness, the tuffaceous back of the towns and villages of the area of Caserta. How much testimonial value should be recognized? Which type of formal-morphological energy can be express by these places? How much capacity for change do they have? Since it is clear and visible what awaits them in the future, if we don't preserve their image or

don't program the modification, we must try to assume three realistic ways to address the problem: 1) If they were considered worthy tracks the history of places, the first could be that of the full conservative protection of what remains.

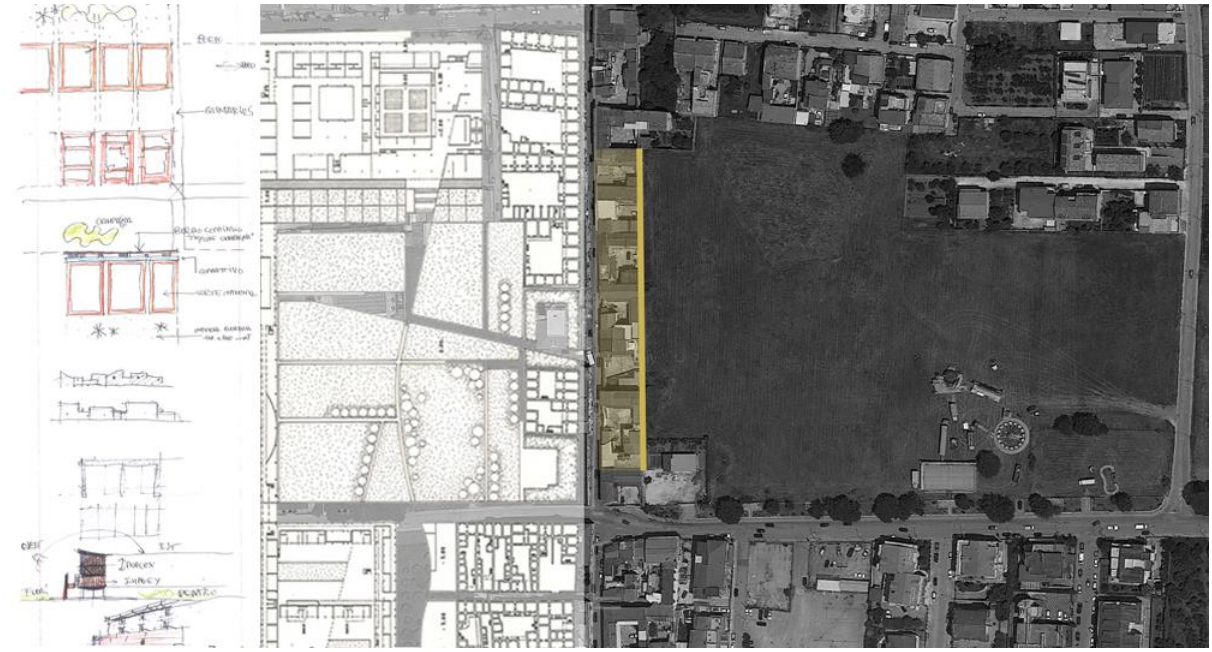

Fig. 3: collage on the right with the study area via Castiello and on the left the image of doctoral research.

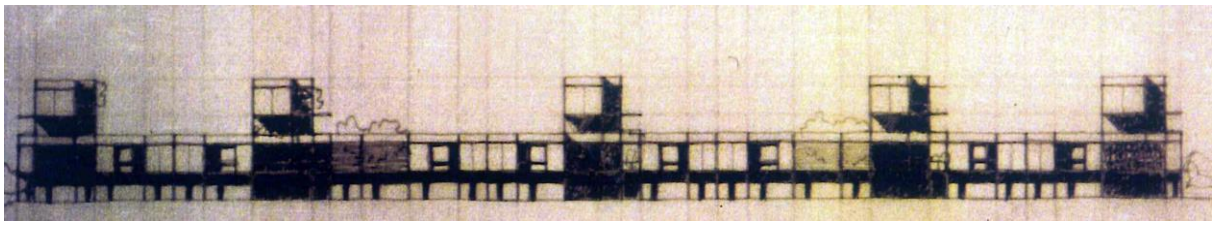

Fig. 4: Skyline of the project of doctoral research.

Obviously in the points where the typical tuffaceous continuity had already been interrupted by demolitions, for the avoidance of false history, it should be sewed up with the signs and the lexicon of our time. 2) Alternately to the inevitable replacements of buildings and to the spurious forms that appear everywhere, a more realistic way to intervene could be to use these walls as a simple fund of support for other buildings with a single overlooking. The buildable volume should be distributed with a single planning action, so as to obtain an artifact (or many connected and functionally different artifacts) similar to what exists for the size and visual impact, but especially bearer of an contemporary image. 3) The third, finally an hybrid, sum of the first two with the Additions of a road, a driveway or any other kind of usable space interposed between the skyline and the new *double face* buildings, which are constructed according to a parcelling of urban architecture of new generation.



Fig. 5: Skyline of Casagiove with the first modifications.



Fig. 6: Skyline of Macerata Campana without modifications.



Fig. 7: Skyline of Capodrise with important modifications.

3. S.Maria Capua Vetere_M

In 2008 in Aversa, the students of a workshop of the architectural design of the third year, conducted a study on some interesting landlocked areas, lateral to an axis of ancient Capua (now Corso Garibaldi of S. Maria Capua Vetere), to check how they could have become useful to the city if reformulated in their spatial and functions. Among those spaces that have been analyzed and designed, we are interested in recall the only one on which faced only rears of buildings and walls of gardens. Exactly the opposite of the previous example, as much for planimetric "collocation" (the others, resembling the walls of a fortified city - this, an unspoken centrality in the dense built of a nineteenth century city), as for planimetric "design" (the other, a long extrovert strip - this, a square introvert enclosure).They have in common only the fact that, today, they're both a "front-back " who has unexpressed potentialities. We start from the important fact that the area was a garden long before it became a public parking lot for about a hundred cars. If we add that the axis corresponds to the maximum hinge of Capua in his

Etruscan phase, it becomes quite clear that it is misunderstood and under-utilized compared to the centrality that it expresses; similar spatialities deserve to have forms and spaces of high quality in order to obtain a satisfactory and full participation of the citizens. Even in the second episode as in the previous, we try to speculate the possible ways to address the problem: 1) The amending act is certainly the simplest; it focuses on philological recovery of its ancient vegetable nature like urban garden, enriched on the margin or inside by small equipments and bio-compatible functions. 2) Another is the one which provides small covering artifacts on the walls of the gardens and on the fronts of blind houses which surround the square, allocating the pavilions obtained from the edification on the perimeter's edge and the new centrality, to the spaces for an excellent and thematic handicraft, or similar functions. 3) The third way, like the first, could start from the redevelopment of the walls and the building, without significant changes or important additions, but this time allowing the objectuality of the architecture to express itself more, convertible with an extreme gesture in a only central building, transparent as the crystal of the pyramid of Pei at the Louvre or open as the lodge of the Market of the Pig in Florence. [2]



Fig. 8: Area of study (S.M.CapuaVetere) with skyline on 2008 and actual situation.

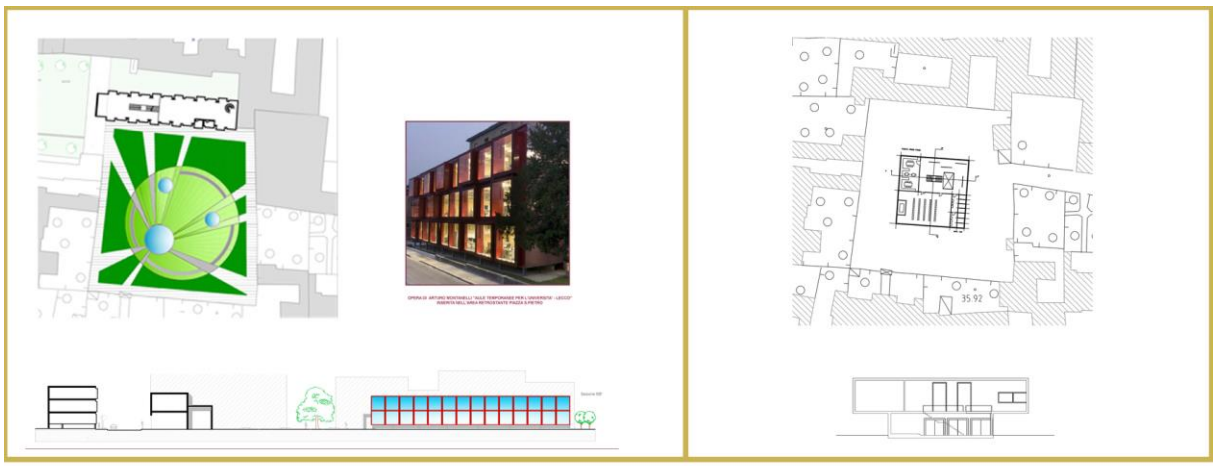

Fig. 9: Two projects of students on the area of study during a architectural workshop.

4. Marcianise_S

In 2007, following an architectural competition was designed, for the populous district of San Giuliano di Marcianise, a parish complex that included the church and the classrooms for catechism. [3] Although not being a spatial dimension as the first example, or an urban one as the second, the small soil to be built is very similar to the others for the correspondence with the centuries and for its square shape. Since it borders for two sides with other properties who have tuffaceous blind fronts, here is the most important of the affinities and, perhaps, a solution to be taken as an example. What would have happened if the neighbors had decided the demolition or change the profile? What should have been done to avoid this risk for the quality of space? In the project have been built on the border with the already existing ones, the classrooms, the ramps and the porches. The danger, at least here, have been averted.





Fig.10: Example area (image above, Marcianise). Skyline of area

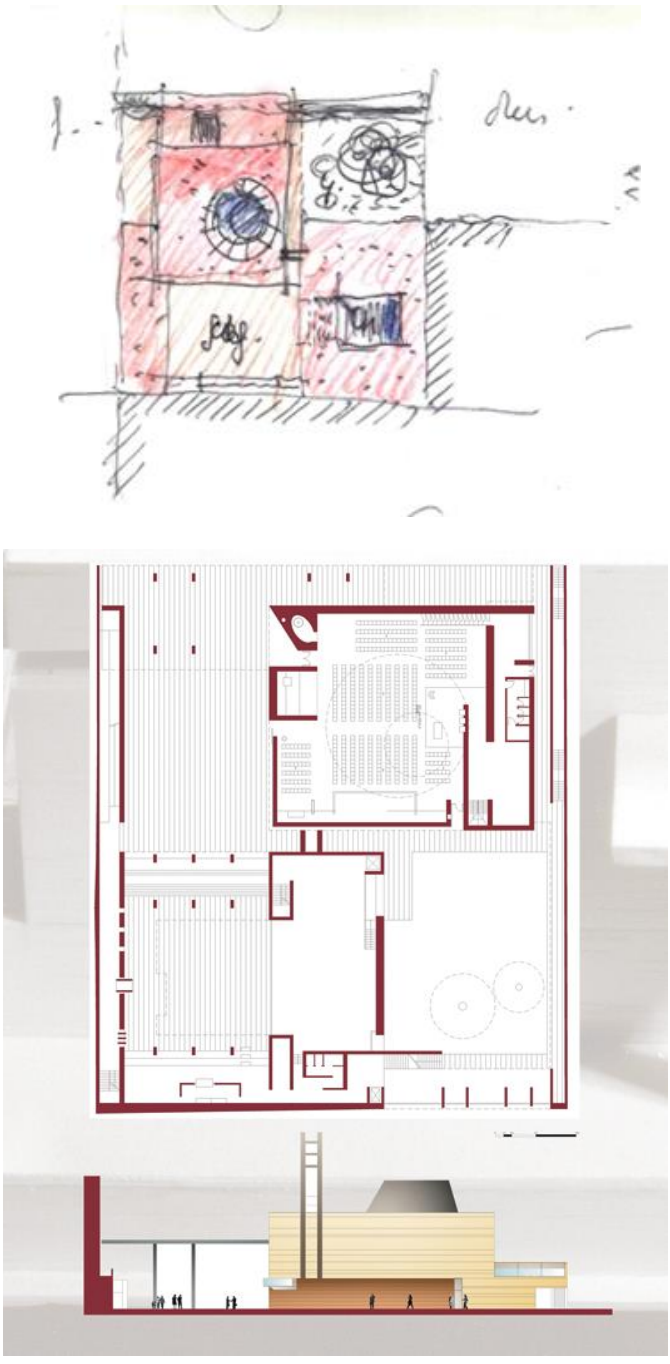

Fig. 11: Project of the San Giuliano's church in Marcianise.

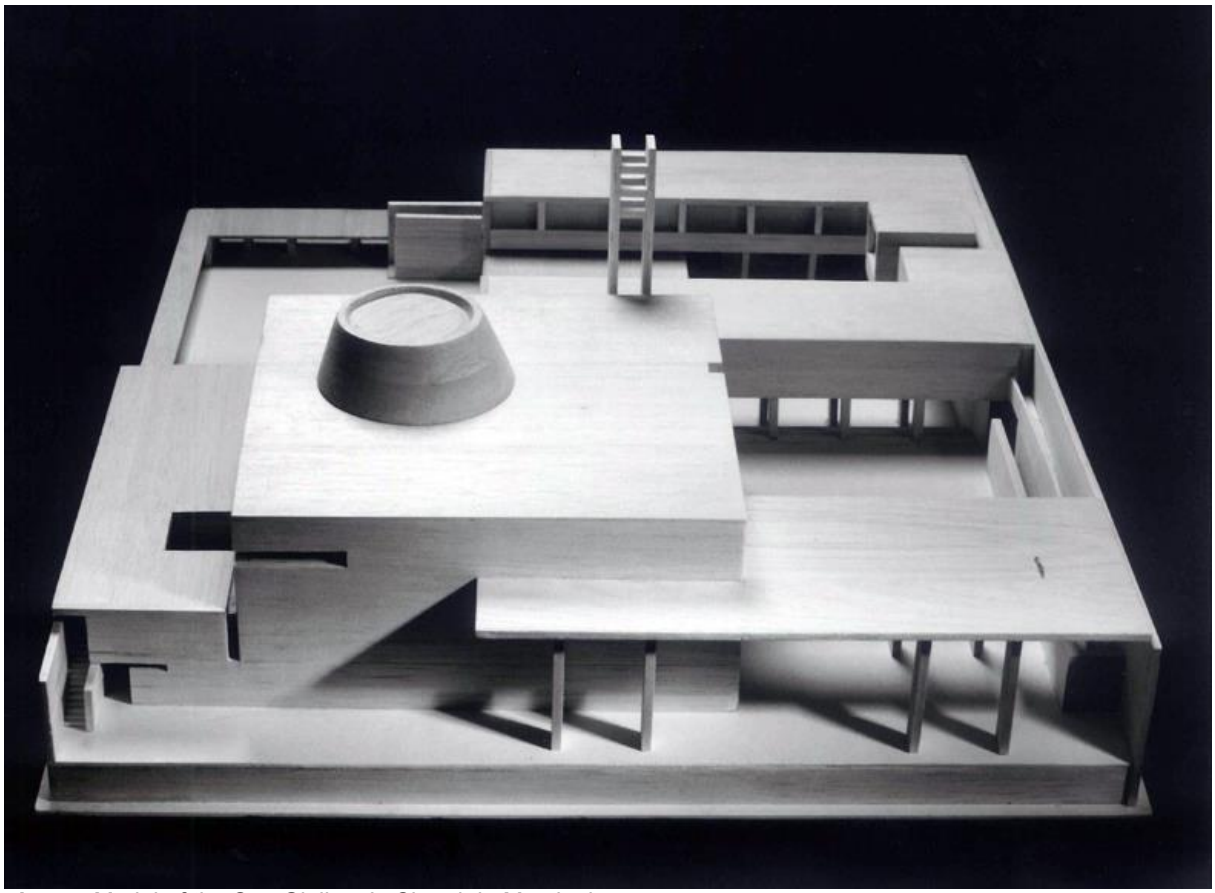

Fig. 12: Model of the San Giuliano's Church in Marcianise.

Notes

[1] RENDINA, Massimiliano. *The territory of Maddaloni, S.Maria Capua Vetere, Capua: identity and recognition of places in architectural design*. Naples: 1992

[2] *Architectural workshop_SUN.* Projects of: 1) V.Broccoletti, A.Mallardo, G.Micillo, C.Tavoletta; 2) G.Capasso, F.Cefali, S.Ciarmiello, A.Pasquariello.

[3] Rendina, Massimiliano (2003). Group winner: M.Rendina (leader), L.Branco, V.Rossetti, C.Treppiccione, T.Izzo, P.Izzo, G.Branco. In Competition of Ideas "Design New Parish Complex San Giuliano Martire" City of Marcianise. Presentation of projects. Single volume, p.9-12

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COMPLEXITY AND LANDSCAPE: INTERACTIONS AND ANALOGIES

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Abstract
Over the last thirty years, the theories on the evolution of the species and natural inheritance of genes have been sources of inspiration for the research of new techniques of stochastic optimization.
"Complexity theory" focuses on the interdisciplinary study of its systems. In its evolution, the study of complex adaptive systems and the emergent phenomena associated with them are of fundamental importance.
Complexity is the property that a modelable system has to show behaviour not all pre-settable (or necessary), although potentially anticipated (or possible) to an intentional observer of this system.
The landscape as a complex system is a topic that has not been explored in sufficient detail.
The purpose of this work is the study of the landscape as a complex adaptive system and its possible scenarios.
Keywords: Landscape, Complex adaptive system

1. Introduction
A great deal of effort involved in the design of fuzzy logic-based applications are expended in the Complexity is the property a modelable system that has to show the behaviour that are not all pre-settable (or necessary), although potentially anticipated (or possible) by an intentional observer of this system.
The complexity of a system can be attributed to:
1. the structure of the system, determined by the number and variability of its components as well as between the local nonlinear relationships that are established;
2. the system's behaviour over time and in relation to its reference, which together determine the ability to make transitions between different regimes, or states of the system;
3. the emergent properties of the system over time. The dynamics of a complex system, its behaviour, is also the lead of the interaction of the three points above.

2. Definition of complexity
There are situations that are decisional situations. In this case, it is more natural to deal with - *Computational complexity* (*Logical depth*) introduced in computer science is defined as the minimum time it takes for a computer to solve a problem. It is a definition closely related to the field of action and a measure that is evidently dependent on the implicit context in the definition, in relation to variables such as the power of the computer used or the characteristics of the calculation software installed. Unlike this setting, computational complexity in the subsequent definition of scholars trying to proceed to a formal explanation of the context, through the indication, within the definition of "conditions" of the *neutrality* of the measurement, as in the case of the complexity of grain.
- The *complexity of the grain* of a system is the length of the shorter message able to describe, at a distance and at a given level of resolution (graininess), a system, provided that the two parties are able to speak the same language and have a comparable level of knowledge and understanding. This definition formalizes the context specifying the conditions that affect the measurement, which include not only the level of knowledge expressed by the parties involved in the message - the more knowledge is different among these, the longer the necessary description of the same message is -

but also the level of "granularity" chosen. The increase of grain, as in the photo, can be compared to an increase of the resolution that the system also determines the increase in the level of complexity or length of the message.
Evidently, this formula is not generally applicable, given that the level of complexity (the length of the message) is significantly affected by the prospect of observation chosen and the different level of knowledge expressed between the two parts of the message.
The notion of complexity or algorithmic computing: the *Algorithmic Information Complexity (AIC)*, associated with the work of Kolgomorov in 1965 and Chaitin in 1974, has its roots in the theory of computation and complexity measure in terms of the simplest algorithm that describes a particular task or phenomenon, given that in the absence of compressible regularity, the simplest algorithm coincides with the description of the same phenomenon. In this case, no reference is directly made to the length of the message, but the length of the computer program capable of printing a string of bits (binary digits 0, 1) by a computer. Compared to the complexity of grain, algorithmic complexity introduces new sources of arbitrariness, not only related to software or hardware, but also to the codification program used. The level of compression, however, is not absolute, but depends on the individual's ability to find a theorem that could allow for further compression. This form of complexity in conclusion does not capture regularity as the lack of regularity of a system.
- In the context of the theory of complex adaptive systems (CAS), Gell -Mann in 1995 suggests a complexity measure that defines "effective" and that, with reference to an adaptive system observes and builds a schema, the length of this scheme. In this case, the observer complete definition does not capture the complexity of the system, just as its regularity. The result is that the actual complexity of a system is maximum when the algorithmic complexity is neither too large nor too small.
- Close to the actual definition of complexity, there is complexity as propsed by Casti in 1986, according to which complexity is the latent properties of a system and which is manifested in the moment of interaction between the observing system (S) and the observed system (O). This type detects the relational nature of the measure; unlike the other, however, it admits that the interaction between the two systems is not bidirectional and unidirectional, admits that the observed object carries some form of influence on the observing system. In the moment of interaction, there are two forms of complexity, design complexity, referring to S, and control complexity, referring to O, to emphasize a role, not a passive object (system) observed on the observing system. It is worth noting that each system is assigned a certain level of complexity, in turn the result of the characteristics of its components. According to Casti, the situation of better interaction between the two systems occurs when both show a similar level of complexity. This implies that the tension to a higher level of complexity as part of a system may be desirable considered by an observant, as a source of further variety in the understanding of the observed reality. Another consequence is that the possibility to manage complexity, by the observing system, passes for the creation of the faithful models of both systems and not only of the observed system. Identification and management complexity are therefore the result of a process of interaction between the two systems. Chaste proposes measuring complexity by the number of non-equivalent descriptions that S can provide for O, where description refers to some form of interaction that S can have with O. A new class of non-equivalent descriptions emerges whenever the system through a bifurcation or creates a new organizational level in its hierarchy.
- LMC complexity was proposed in 1995 by López -Ruiz, Mancini and Calbet as a statistical measure of complexity. It is the product of two quantities: entropy (as formulated by Shannon) and a quantity called imbalance. The latter is a function that reflects the difference of a given probability distribution from a uniform distribution. This product decreases in the two extremes, order and disorder, and therefore can be considered a measure of the complexity, positioned in an intermediate regime between the previous two
- Another definition of complexity stems from biology and artificial intelligence studies and is interested in understanding how relational complexity and density variability of the interaction that takes shape between the agents involved.
All of the above complexity can be considered as partial representations of the same reality, however, they can be used in a complementary manner. In fact, if the first four describe the complexity of the information that circulates in the appearance of content between agents of a system, the fifth and sixth will miss the side represented by the structure of the interaction between agents as shaped by information flows between them. Information content and structure of the interaction may partially describe the complexity that characterizes many systems, such as the enterprise system. For example, assuming that in an enterprise system complexity is in the first instance an expression of the number of individuals, technologies, procedures, and their interdependencies that, for various reasons, come into play in the recruitment, expansion, exploitation of a certain resource or expertise. In this context, a new source of complexity is related to the use and production of resources in the context of highly complex technological systems and humans, as they occur in conditions of high causal ambiguity to the outside observer.

3. Approaches and roots of complexity

The first approaches to complexity were founded with studies of first-order cybernetics in 1942, during the Second World War. The organization goes back to New York for one of the ten conferences sponsored by the Josiah Macy Foundation, which brought together scholars from many disciplines, committed to deepening the problems of self- regulation in the animal and the machine. The cybernetic movement is enshrined as an interdisciplinary movement with the publication of the Wiener fundamental, one of its leading exponents, published in 1948, immediately after the war. Cybernetics focuses on the study of the mechanisms of control and communication present in human and mechanical systems. The term " Cybernetics " comes from the Greek word Kybernetes, meaning steersman. Plato in "The Republic" uses it to describe the element of caution inherent in the art of "governing". In English the word governor is used in two senses, the first in reference to the person who takes decisions in the public interest and the second in relation to the mechanism of a self-regulating valve of a steam engine, which keeps the engine at a constant speed under varying load conditions.

In essence, the base of a control behavior of the type exemplified by the governor of the steam engine is a feedback loop (negative feedback), through which the output of a system is connected to its entry in such a way that the changes in output compared to a standard established or planned for accordingly have a stabilizing compensatory behavior that tends to bring the system's output to this rule. The same mechanism works in different types of systems, even those biological (homeostatic mechanism) and would be the basis of phenomena such as homothermy. In the social sciences the identification of these mechanisms has led to theorizing the purposive behavior of a system - limiting the role of the interaction linear cause-and- effect - according to which the stability, which is its purpose, is regulated by a negative feedback mechanism. In Cybernetics and in particular in that of the second order, that for reasons of space will deal simultaneously with that of first order, although it is next, are deepened also circuits to positive feedback. With them are systems that amplify the oscillations, causing the machine or system to be divergent or have disruptive behavior.

The contribution of Cybernetics in the study of complex systems is evident ; many of the concepts acquired have merged in the maturing body of theoretical complexity. On the other hand, organization theory, political science, cultural anthropology and social psychology for many years have analyzed the social groups as complex communication networks are characterized by a multiplicity of feedback loops. With Cybernetics, there is a structural-functionalist approach, mediated by the behavioural. In essence, the method requires that the observer arrives primarily to modeling the structural and functional organization of the object analysed, and then proceed to the study of the possible states that the organization may take in response to various stimuli in the entry system (social systems are typically open).

In 1954, Von Bertalanffy founded the Society for General Systems Research (SGSR) whose purpose was to encourage the development of theoretical systems, applicable to more than a traditional sector of science. A consequence of the existence of the general properties of the systems according to the author consists in the appearance of structural similarities or isomorphisms in different fields. The isomorphism is therefore much more than a mere analogy. How are such systems defined? And what system is it? They are defined as a complex of interacting elements, which presupposes the existence of n elements n different relationships between the elements and an observer can assess the relationships between the elements. The systems upon which it focuses the author, being a biologist, are open ones. Biology has quite recently understood open systems;

In open systems, living does not occur only a production of entropy due to irreversible processes, but also as a decrease in entropy, and the consequent possibility that the latter reaches negative values. Thus, living systems, maintaining themselves in a steady state, can avoid increases in entropy, and may even develop towards states of increased order and organization. The relationship between order and self-organization, has already been dealt with by Cyernetics, through the concept of order from noise Foerster, and is studied in greater detail not only by Von Bertalanffy, but also by other scholars, such as Lovelock, Maturana and Varela and Ilya Prigogine. For all self- organization, there is the spontaneous emergence of new structures and new forms of behaviour in open systems far from equilibrium, characterized by internal feedback loops and described mathematically by nonlinear equations. In the wake of this concept,in 1967, in a speech on the occasion of a Nobel Symposium in Stockholm, Prigogine, the Russian chemist, provides the first definition of self-organizing structured systems presenting his theory of dissipative structures. The term emphasizes the close association between the paradoxical existence of structure and order on the one hand, and loss and wastage on the other, a phenomenon that occurs due to the presence of mechanisms for feedback from amplification (positive feedback). Prigogine argues that if in the past (Cybernetics) were associated with situations such as a destructive feedback system, dissipative structures then become new sources of order and complexity.

The problem is, however, to identify the relative weight of individual events in a given time, since the system may have a different sensitivity compared to the same stress, both in relation to different combinations of events stressing. Probably the dissipative structures of Prigogine cannot answer all of these questions, however, they can profitably enlighten us about the behaviour of the system over time, when due to the mechanisms mentioned above reaches, a limit of stability, called the bifurcation point, i.e. a radical and unexpected change of the trajectory of the system in the space between the phases. The bifurcation describes a divergent evolutionary path of a system in graphical form. The single line of the fork is a first linear section of the path which then branches, or forks, in correspondence to a certain critical value of some parameter. At this point, the system loses its previous adaptation and must choose between the two paths.
Depending on the case, this may be the time in which the system jumps to a new state of heightened organization, developing a new and more elaborate.
The concept of bifurcation opens the door to the analysis of the historical dimension of the system. Because of bifurcations, complex systems have unpredictable behavior and irreversible. Unpredictable because in a bifurcation point we can not predict which branch will be followed by the system, you can know the possible states that may take, but you can not predict with certainty which of these will actually be taken in a well-defined period of time. Irreversible because the choice of a branch rather than another is an event that could not produce, but having that product determines the subsequent evolution of the system, making it irreversible and bringing out new interactions between agents ordered and coherent system.
All this takes the name of path dependancy, namely the inability to abandon a certain path once undertaken: the state of a system at a certain point t_k brings with it the memory, the living, the path since there peculiar path, but, in turn, it was in t_k affects the future evolutionary trajectories.
Irreversibility and unpredictability characterize, therefore, the behavioural model of the system, so that, by Prigogine onwards, it is not uncommon to find allusions to the science of complexity as emergent behavior of complex systems in non-equilibrium conditions.
Just at the Santa Fe these efforts and enthusiasm of these result in the birth of a new unified science: the science of complexity.
There are many disciplines involved ; copious research of the Santa Fe: all, however, revolve around concepts such as: emergency, non-linearity, self-organization, adaptation, coevolution, experience, learning, multiple equilibria, the edge of chaos

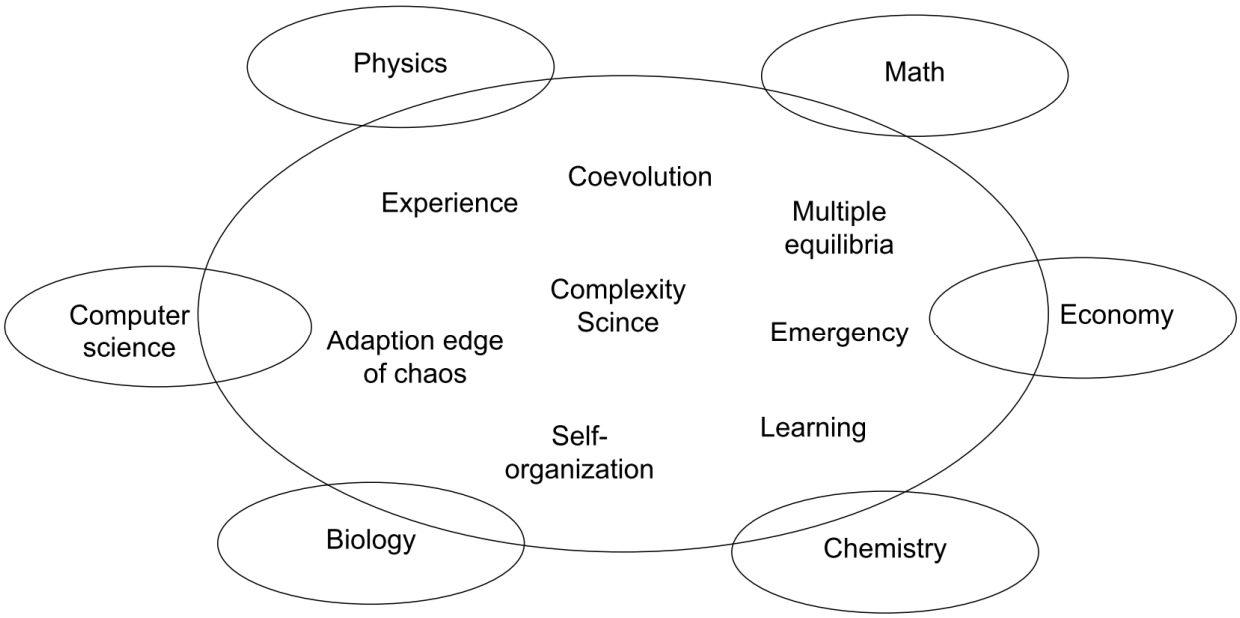


Fig. 1: The research themes of the Santa Fe Institute

If you want to trace a common unit of analysis, this could be construed as being in a complex system, an expression with which they denote any phenomenon that emerges from the interaction of the elements of which it is composed.
The complexity arises because many elements interact simultaneously and are self-organized locally (i.e. from the bottom) ; complexity is therefore in the organization of the elements of the system, or rather in their self-organization; it is the system that selects, who opts for one of the countless combinations in which its members can interact; it is the system that chooses one of the possible models of orderly and consistent interaction, without any intervention of any outside agent in the selection. With the process of self-organization, collective properties emerge, or rather systemic, i.e. properties attributable to the system as a whole, but not owned by any member, by any element individually considered: it is global properties, i.e. non-existent quality and non-deductible logically prior to the formation of the system, and empirically ascertainable only after its formation:
for example, the property of liquidity, which emerges from the interaction of individual molecules of water, but that is not owned by any single molecule.
Emergent phenomena are considered to be associated with the nervous system, the mind, the life associated with any biological system, the so-called " environmental balance " associated ecosystems, and phenomena such as social organization, culture, the economy associated with social systems. At each level, new emergent structures are created and engage in new emerging behavior and one of the main challenges of researchers at Santa Fe is to find the fundamental laws of the emergence.
It is an approach to science and to " do science " bottom-up, which focuses on how the interaction between agents forms ordered structures and patterns of behaviour and consistent. The complexity, in other words, is emerging as a science, a science that deals with phenomena - natural or social - emerging, namely:
- Associated with the operation of a complex system that evolves over time ;
- Generated from the bottom up, that is exclusively due to the local interactions between the system components ;
- Unpredictable, the trend of which is expressible i.e. by means of non-linear equations ;
- Irreducible, that is, independent of the existence and properties of the individual components of the system.
Self-organization, emergence, collective behaviour. How to react and adapt to their environment emergent phenomena? To which part of the environment fit? How does the environment on the system? What structures underlying the adaptation? What are the mechanisms of adaptation? As part of the experience of interacting with the environment " holds " the whole system? What are the limits, obstacles, the system encountered in adapting to the environment? How can they be compared to the different processes of adaptation and assumptions about their dynamics?
John Holland is - one of the world's first PhDs in computer science - to "inject” in the program of the Santa Fe to study the adaptation of complex systems. For Holland, the self-organizing complex systems not only denote mostly non-linear behaviour, but they are adaptive in that they do not just passively respond to events, but shall endeavor to proactively take the best of any situation. The complex adaptive systems (complex adaptive systems, CAS, for example, brains, immune systems, ecologies, cells, developing embryos, cultural organizations, economic and social) seem to be united by some basic properties summarized in the table below.

The complex adaptive system:
It 'an open system
Each agent co-evolves, that is constantly trying to adapt to all the other
Self-organizes spontaneously
It consists of a network of agents operating in parallel
It has positive and negative feedback
It is engaged in a continuous cycle of learning, review and classification of experiences
Its agents have the ability to make assumptions about the future
It is always far from equilibrium
Its evolution is path dependent

In the figure 2 i show a visual, organizational map of complex systems broken into six sub-groups.

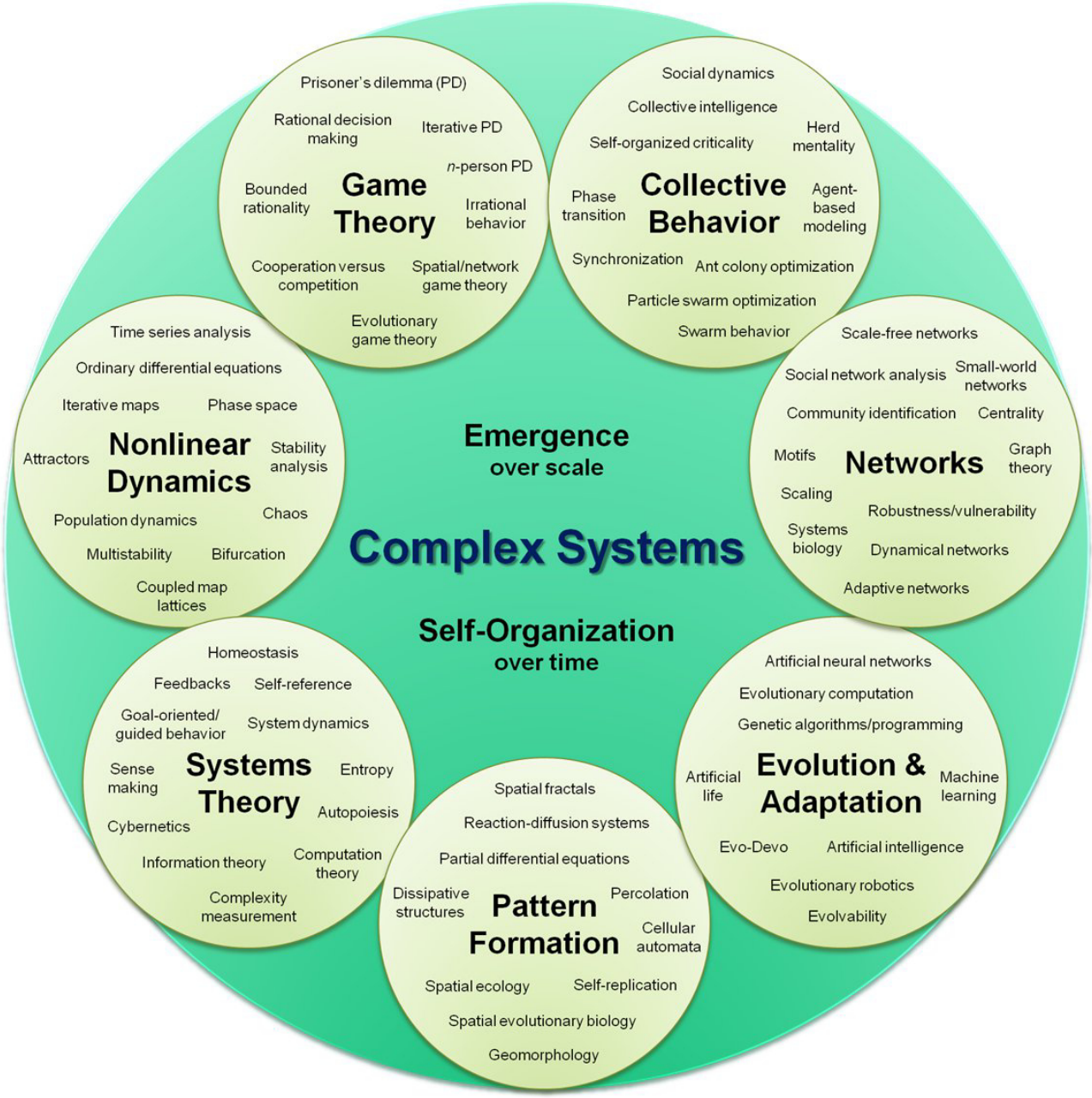


Fig. 2: The complex systems

4. Landscape as a complex adaptive system

In physics, a complex system is a system in which the individual parts are affected by local interactions, short- range, which cause changes in the overall structure.

According to Casti (1994) are considered complex systems not those representable through equations in more unknowns, but those that have a non-linear " trend ", according to Simon (1996), a complex system is formed by a multiplicity of parts which have between them numerous interrelationships (Simon 1996)

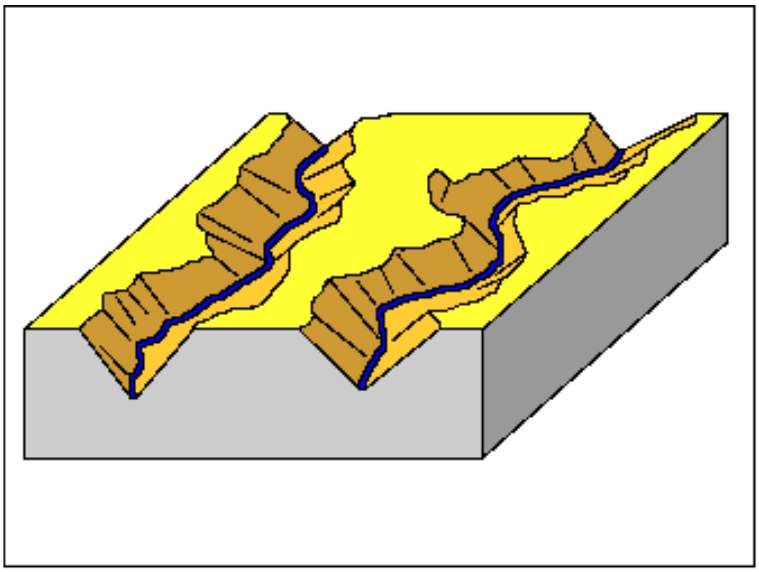
The characteristics of complex systems are:

1) Many components more or less complex: in the more complex systems, subsystems (i.e. components) are themselves high complexity ; components can be "hardware" (molecules, physical processors, cells, individuals) or "software" processing units (virtual) ;

2) Interactions between components: components interact by passing information (in the form of energy, matter, or digital information); the amount of connections and the presence of substructures and recursive feedback loops (so-called "rings") increase the complexity of the system, but the information that the components are exchanged may not be too many (otherwise the system becomes chaotic) nor too little (the system will " crystallize ");

3) Absence of " pyramid " hierarchy: if there is a single component, which alone governs the behaviour of all, the system cannot be complex; its description is, in fact, can easily be reduced to that of the subsystem - leader; different is the case of complex systems " hologram ", in which each

component has information about the system as a whole (for example, each cell contains all the genetic information of the organism to which it belongs).
These are supplemented by a fourth defining characteristic of complex adaptive systems:
4) adaptive interaction with the environment: the system is much more complex, as there are many factors that affect its adaptation to the environment (which must take into account the model): incidence of random factors, learning, interaction with the ' observer of the system, and so on. ; while the system evolves, its subsystems co- evolve by developing strategies for co-adaptation (symbiosis, cooperation, communication, etc..).
The problem of the complexity of the landscape is evident in the light of the gap between theory and practice, a sign of incommensurability between theoretical dimension and operational disciplines such as planning and design.
As defined by Ulrich Beck planning is a professionalization " not - very - successful " because of the weak connection between the theoretical and practical dimension.
The definitions of landscape fail to take into account the diversity of practices and outcomes, not all predictable, nor of their mutual interactions, therefore, that are non- profits; thus it is necessary to establish a closer relationship between theory and practice.
The first hints of complexity theory within planning were found in the 1960s and later the theory of systems defined planning as an ongoing process aimed at controlling and monitoring of complex urban systems was introduced.
The landscape can be considered a complex system not only because it means different things to different people and it means different things at different scales, but mainly because the analysis of the rules and internal logic of each system where the landscape is composed not enough to understand the results, and therefore, are crucial interactions.
It is no coincidence that one of the reasons for the appeal to the broad strategic planning consists in giving coherence to the multiple objectives of the public by establishing an order of priority between the same goals and hypothesizing, checking the veracity, the possible interaction between them.
The landscape is a complex adaptive system because it affects a number of factors that follow rules, different logics, and the interaction that give rise to "other " rules, and adapting to unexpected outcomes, subject to fitness, to the new conditions.
Therefore, apply the complexity of the planning is relevant when you consider the possibility of the unexpected and the landscape as a plurality of objects and subjects, that is, if you consider all the possible outcomes that can arise in complex systems and the natural evolutionary adaptation of the landscape.
In conclusion, the concept of planning, namely the management and evolution of the landscape itself, should not be that of an illusory total control, as the ability to imagine possible futures and adapt to change unexpectedly trying to limit the non-desired outcomes.



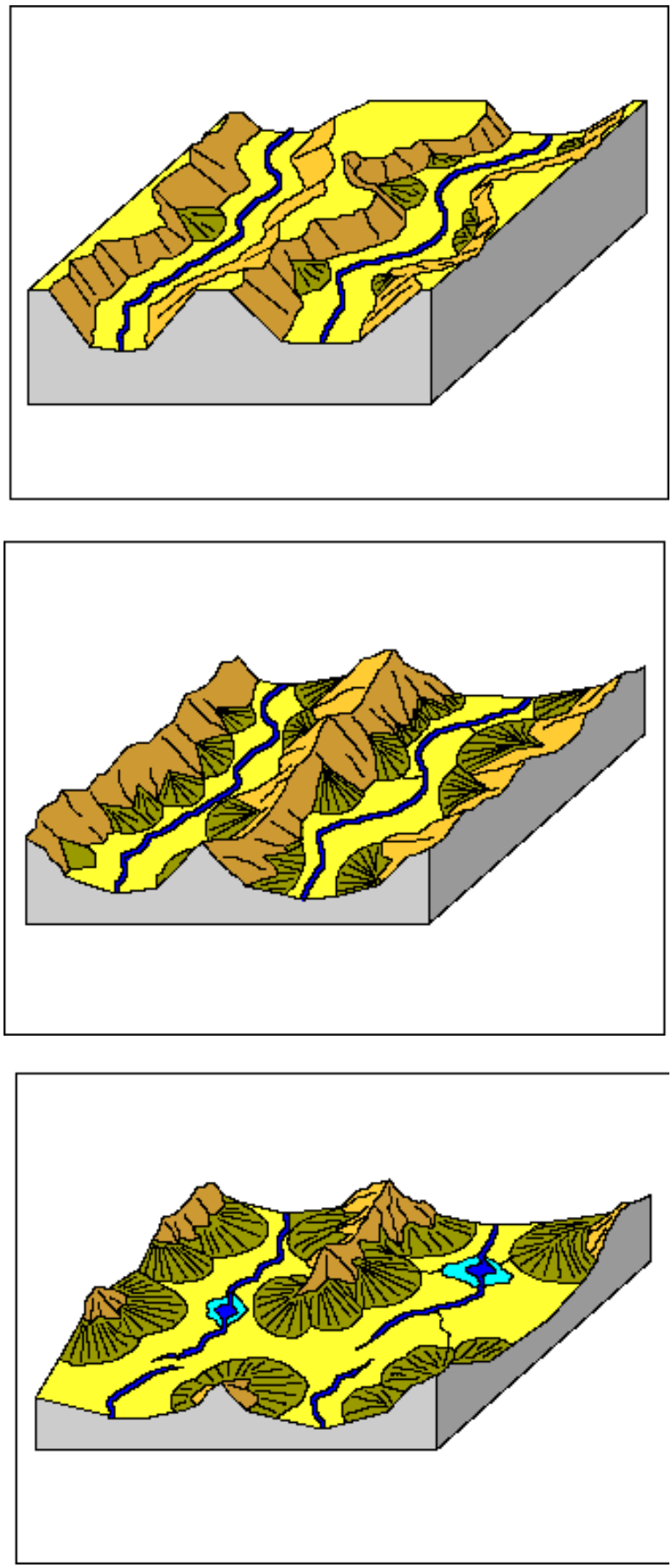


Fig. 3: The evolution of landscape

Bibliographical References

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[1] Faggioni F., Simone C., Le declinazioni della complessità Ordine, caos e sistemi complessi. Sinergie 79/2009, 2009.

[2] Pizzo B., PAesaggio e complessità tra teorie e pratiche. Ri-Vista ricerche per la progettazione del paesaggio, gennaio-giugno 2008, ISSN 1724-6788, Firenze University Press, Firenze.

[3] Engler, Joseph John. Innovation as a complex adaptive system. Master's thesis, University of Iowa, 2009. http://ir.uiowa.edu/etd/233.

[4] http://www.uwgb.edu/dutchs/GeolColBk

[5] MITCHELL, Melanie. An Introduction to Genetic Algorithms. 2nd ed. Massachusetts Institute of Technology, 1996. 201 p.ISBN 0-262-13316-4

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Heritage, Development and Equality: a proposal of indicators to measure the contribution to gender equality in international projects of cooperation for development based on architectural heritage interventions

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Abstract
The international cooperation for development has been working during decades to reduce the inequalities between the persons and the peoples of the world. Within these inequalities those who take place between women and men have to be placed in the first position, provided that women concentrate the 70 % of the world poverty, a fact which we name a feminizing of the poverty. The architectural heritage possesses an important potential as generator of development in the communities where it is located at. This is why the interventions in this heritage must be used in the projects of international cooperation to reduce the inequalities and then to promote the gender equality. But in many cases a great difficulty exists in showing how an intervention in the heritage promotes the development and how it can help to reduce the inequalities between women and men. This brings sometimes to question the convenience of the rehabilitation of heritage facing other one type of projects (education, health, infrastructures…). With the purpose of being able to demonstrate that an intervention in the architectural heritage is capable of generating development and therefore to reduce the inequalities between women and men it is necessary to establish a series of indicators that are capable of measuring the results of these projects of cooperation. In this paper a series of indicators that allows evaluating how the rehabilitation and management of the architectural heritage promotes the gender equality.

Keywords: Development, cooperation, architectural heritage, gender approach, indicators

1. Introduction
According to UNESCO [1], 100.000 persons in the world die every day of hunger. The majority of them are children; in fact, every 5 minutes a 10-year-old child dies as a consequence of a deficient nutrition. This is due to the fact that more than one billion people live nowadays below the threshold of the extreme poverty (less than 1 dollar per day), without access to drinkable water, without a worthy housing and without access to sanitary basic services. It is therefore evident that inequalities between the persons who live the planet exist. But if we were indicating in a map where these inequalities take place, we might observe that they are not distributed the same way in all the countries, and this is why we can affirm that not only inequalities between the persons exist, but also between the peoples of the world.

Other important information related to these inequalities would be that not only they take place of unequal way between the different countries, but also that inside the same geographical zone the poverty always accents in the women. From more than one billion persons who live below the

threshold of the extreme poverty, 70 % are women [2] despite the fact that in the world there are 57 more millions of men than of women. Women live longer but in worse conditions than men. In the case of women, beyond the level of extreme poverty major work in the house, worse conditions of work, major difficulty of access to the education and to medical effective treatments, etc. make the situation worse for them. According to data of 2010 [3], women spend more than twice the time than men do to the domestic tasks. Then, considering the paid work and the non-remunerated one, it can be stated that women work more hours than men. Women continue earning less for the same work. Only 13 of the 500 principal companies worldwide have a woman in the position of general director, and this number does not improve in the public sector, where only 14 women in the whole world hold the presidency or the leadership of the state. Two third parts of the illiterate world population are women, and 54 % of the school absenteeism takes place between the girls. Only a fourth part of the top investigators in the whole world are women. The main reason of death in women worldwide continues being the cardiovascular problems provided that the pharmaceutical companies and the medical researches base their experiments mostly on males. These are the reasons why talking about the poverty feminization is becoming more and more popular [4].

International cooperation for development can be defined as the work that from public and private organisms have been carried out since the middle of the last century to reduce these inequalities [5]. Though in the beginning this cooperation was centered on a purely economic growth, exporting the formula that had worked in the enriched countries where the economic progress had carried the later social well-being, recently it has evolved into a more human aspect of the development once it has been verified that this social well-being was not reached. This is why nowadays we speak about human and sustainable development, which is focused on promoting the growth of the human being in all its aspects: beyond the material well-being a more satisfactory and valuable existence of the human beings has to be considered. At the same time, the growing has to be sustainable in time and not only kept for the period of time that the cooperation lasts, continuing once that the projects of help have finished.

Within this wider context of the concept of development the architectural heritage can play a fundamental role. San Nicolas [6] affirms that the real heritage relies on the system of ideas, on the philosophy that it inspires and supports the objects materiality and the constructions. On the basis of this definition we can assign to the architectural heritage three values: social, scientific and economic. The first one provided that it serves to identify ourselves before third persons as a group. Secondly, it is capable of promoting the knowledge, both cultural and historical. Finally and thanks to the so called cultural tourism, it is capable of generating economic growth. It will be the exercise of these three values what will allow us to generate the desired human and sustainable development by means of the intervention in the architectural heritage.

2. How architectural heritage can be integrated in the projects of cooperation

If in its wider sense heritage is the set of goods inherited from the past, consequently the architectural heritage can be defined as the set of built-up goods, of any nature, to which every society attributes or in which every company recognizes a cultural value. But this is a dynamic definition, since the cultural values are changeable; this implies that the concept itself of architectural heritage is under permanent construction and that the objects that integrate this heritage form an opened set, capable of modification and, especially, of new incorporations.

Traditionally the idea of architectural heritage has been assimilated to the idea of "monument" by his historical and artistic values and, in short, worth being preserved by its usefulness or potential of use. Nowadays the concept has been extended including other properties and buildings till now not considered. As an example we can mention the popular - traditional architecture and the buildings related to handcrafted or even industrial activities in disuse. Also in another aspect, not less important, there is the architectural heritage conceived as a part of the whole, that is to say, the architectural sets which are urban centers of historical character, monumental sets, urban plots, gardens, etc.

Heritage in general and therefore the architectural heritage are in itself a treasure of incalculable value that gives coherence to the idiosyncrasy of the peoples and at the same time it is the reference to the interpretation of the history. This is due to the fact that the heritage concentrates three types of values, as previously said. The first value, the social one, makes heritage useful to identify ourselves before third persons, gives internal cohesion and representation of a group. The second one is a scientific value, for its potential to generate historical and cultural knowledge. The last one of the values, the economic one, is the one that nowadays turns out to be more evident provided that the heritage is

turning into one of the most important engines of the economic local and regional growth by means of the tourism.

These three values given to the architectural heritage are those that need to be exercised to generate development from them. First as an important factor of economic development; it is well known that the strengthening of cultural industries or the heritage conservation by means of the cooperation are elements that can improve the living conditions of a community, even more today thanks to the cultural tourism, a new element that the cultural cooperation has to bear in mind.

Despite this, the economic factors are not, or they shouldn't be, the only ones that the cultural cooperation bears in mind; this might redound to a vision of the architectural heritage exclusively as an end, not as a way. If we recognize the instrumental paper of the culture in the development of the societies, then culture cannot be limited to being a factor of economic progress; it has to be reaffirmed also as form of preservation of values and traditions, access to the knowledge and increasing of the capacity of intervention of the persons in the cultural community life. The question is, definitively, that the intervention in the architectural heritage operates as a factor of empowerment of the recipient society.

We can say that with the intervention in the architectural heritage the objective is to contribute to the improvement of the living conditions of the persons, for which the actions go beyond the mere physical intervention, promoting and facilitating the socio-economic structures for a sustainable utilization of this heritage put in value. This way, the general aim is complemented with the transverse aims to promote the equality between men and women, to respect the environment, to contribute to the democratic governability and to promote the human rights and the respect to the cultural diversity. Therefore the value enhancement of heritage involves cultural, economic and social aspects; that in addition complement each other with the institutional strengthening, the valuation and social appropriation, and the formation.

3. The gender approach in projects of cooperation

As defined by the OXFAM organization in 1997 the word sex refers to the description of the biological difference between women and men. The concept "gender" designates what in every society is assumed to be characteristic of each of the sexes, referring to the social construction of the fact of being woman and man, to the interrelationship between both and the different relations of power / subordination in which these interrelationships appear.

The System Sex - Gender historically has generated a situation that discriminates the women so much in the public sphere since in the private one, in economic, political, social and cultural aspects and that, historically, has located the intervention of the men in the productive area and that of the women, in the reproductive one.

The gender equality supposes the full and universal right of men and women to the possession of the citizenship, so much in the political area as in social and civil. The way of obtaining the gender equality is the so-called gender equity, understood as the justice in the treatment to women and men according to their respective needs. The aim underneath does not mean that women and men have to turn in equal, but their rights, responsibilities and opportunities should not be determined by the biological differences. It is important to clarify that it is not the same differences than inequality. Precisely with the gender equity we are raising the introduction of differential treatments that could help us to correct inequalities, which will allow men and women to enjoy the equality in terms of rights, benefits, obligations and opportunities.

According to the Program of United Nations for the Development (PUND), a series of conditions have to be given to enhance the gender mainstreaming:

- Political Will that turns into an institutional commitment related to the strategy, in which sufficient human and financial resources are destined.
- Not to disregard the specific actions directed women in favor of the aim to obtain the equality of kind.
- To agree and to unify between all the implied actors what, when, since, by whom and for whom of the strategy.
- To elaborate and to spread suitable tools of analysis and planning, as well as to promote the formation and the knowledge around the institutional mechanisms, information and research, which help to identify gender inequalities to be able to advance.

Another term that is necessary to stand out is that empowerment of women, understood as the self-affirmation of the capacities of the women for their participation, in conditions of equality, in the processes of decisions taking and in the access to the power. Through empowerment, women access to the information, knowledge, social networks, financial resources and processes of decision taking.

4. How to measure the contribution of an intervention in architectural heritage in the reduction of feminine poverty

Apart from the objective of a project of cooperation for development, there are some aspects or values that have to be considered to obtain a transformation beyond the purpose of the project. These values, called transverse lines, are three: respect and consolidation of the human rights, governance and reinforcement of the social fabric; promotion of the sustainability; and gender approach.

The planning of our actions has to bear these aspects in mind and, not only this, but also it has to be given as an example. In this sense, the activities developed in the framework of the project, the used methodologies, etc. have to be coherent with these values, whichever is the object of our project, even if it is an intervention in the architectural heritage.

To verify the measure in which our project is contributing to the gender equality, including activities and actions that contemplate this aspect, it will be necessary to establish a system of follow-up and evaluation. According to the Development Cooperation Directorate (DCD-DAC) of the OECD, the evaluation is the systematic and objective appraisal of a project, program or politics in process or concluded, of its design, putting in practice and results, as well as of his relevancy, efficiency, impact and viability for the development. An evaluation will have to provide credible and useful information, which allows incorporating the educations learned in the process of decisions-taking of beneficiaries and donors. The evaluation also refers to the process of determining the value or the significance of an activity, politics or program.

It is therefore, the analysis of the results and effects of a project, during it or once its execution has finished, used in order to learn from the experience. In this sense, it is necessary that the evaluation is seen as a useful tool and not as a load, thinking that it is going to be of great help for us to take decisions as for example:

- To continue or to end the project.
- To improve the procedures.
- To add or to eliminate technologies.
- To establish other projects in similar realities

Given the importance of the evaluation, it shouldn't be confused with other activities or phases of the cycle of the project, to avoid the mistake of thinking that other actions cover already the expectations and aims of the evaluation. It would be easy to think that the follow-up or the audits constitute already an evaluation. But it is not like that, we distinguish in the evaluation other activities such as:

- A research: though similar methodologies are in use, the end is not the same.
- The follow-up: as before mentioned, the evaluation is a punctual action though it can be realized in a constant way along project, whereas the follow-up is a continued action. The aim of the follow-up is, on the one hand, to bring the control of the execution and, of one other hand, to be able to take decisions that allow to re-lead the execution. The evaluation, on the other hand, will be carried out in different stages of the project, not only during the execution, and the aim it is to learn and to be able to take decisions that allow the reorientation of the processes. The evaluation will use the reports of follow-up to analyze and to evaluate the execution.
- An audit: it is centered on the accounts and uses the budget as document
- An opinion: the evaluation is more than an opinion; we could say that it is a well-taken opinion, which is based on an exhaustive and objective work.

Therefore, to measure the contribution of the intervention in heritage to the gender approach, the evaluation has to be realized in every phase of the project, from his identification up to his effects and when time has passed from his conclusion. To evaluate every aspect of the project (from the inputs up to the specific aim, going through its logic of intervention, evolution and formulation) indicators have to be used by his respective check sources.

It is thus how in every phase of the project of cooperation specific indicators will have to be established to assure that the gender approach is contemplated. This way in the phase of analysis the existing situation will be identified with the intention of creating a vision of the desired situation and of selecting the strategies that will be applied to obtain it [7]. It will turn out indispensable to contemplate the current situation of women, their specific problematic and the wanted situation for this group with the purpose to give response to their needs and interests. Then it will turn out indispensable to establish exclusive meetings with the women of the community in order that they could explain their problems without the submission of the males who in general should recover the organizational tasks and of control in the settlements. Also it will be vital for the success of the program to identify women's associations of local area that they could collaborate with the project and use as link of union with the feminine population

In the phase of design, when the idea of the project constructed in the previous stage takes shape and turns into a plan orientated to his execution, the information obtained in the previous phase regarding the situation and expectations of the women there will have to be contemplated particularly. Taking into consideration the necessary and sufficient conditions to obtain the aims (what we name a vertical logic), we will have to decide what we try to obtain, the hypotheses and important interests that could escape to the project and to be capital for the success of the project regarding the gender approach. As we will see later, this will be the most important part for the success of the project and thus for the achievement of the aims regarding gender. Then, it turns out indispensable not only to identify the effects of the project to be measured, but also the necessary resources identifying the indicators and the pertinent check sources.

It will be in the phase of programming where the activities to realize to reach the aims raised in the project of cooperation will be identified, to plan them in time and to assign them budget. It will turn out therefore necessary to design, to plan and budget activities to guarantee the success of the project regarding gender. These will have to be based on two aspects, in one hand in increasing sensitivity of the masculine population regarding equality and on the other hand the strengthening or empowerment of the women in favor of his rights, benefits, obligations and opportunities.

As previously said, the most important phase in the evaluation of a project of cooperation will be the measure of its effects in the way that much in short than in the long term. A project formulated in a correct way won’t be useful if it does not generate a measurable change in the society, which has been called "wanted situation". To be able to measure these changes or to evaluate the results of the project, indicators must be established that allow us to measure periodically the changes provoked as an effect of the project.

From the works developed by Revert and Carrascosa [8] with the purpose of measuring the contribution of an intervention in the architectural heritage to reduce the inequalities that take place in the so called feminizing of the poverty, we can establish the following indicators:

- To measure the number of activities generated around the patrimonial rehabilitated good that promote the values gender equality
- To measure the number of women who are employed at activities linked to the rehabilitated heritage
- To measure the number of women who direct activities linked to the rehabilitated heritage
- To measure the free time got by women as a consequence of activities generated or services facilitated by the patrimonial rehabilitated good that liberate them of domestic work
- To measure the career and/or professional training received by women in activities realized around the rehabilitated heritage

5. Conclusions

Facing the problem of the poverty and the urgency of action in certain regions (epidemics, hunger, wars ...), it might be understood that to deal with the architectural heritage in projects of cooperation is slightly opportune. It is necessary to emphasize that we’re not speaking of putting the heritage as the subject of the cooperation for development, but, on the contrary, that heritage has to turn into the resource that will have the purpose to contribute to the human and sustainable development.

Facing the problem of the feminization of the poverty, it is evident that any project of cooperation must contemplate the gender approach. If the rehabilitation of heritage is the strategy to obtain the aim of the project, how can we know if this intervention is promoting the equality of women and men? It turns out indispensable therefore to establish a tool capable of measuring the contribution of an intervention in the architectural heritage in the gender equality. Not only to demonstrate the attainment of the aims of the project, but even more to notice in front of other options or types of interventions, the viability of the rehabilitation of the heritage and his relevancy to generate development and to reduce the inequalities between women and men.

This is the reason why with the present paper the need to define a list of indicators that relate heritage, development and equality is emphasized. These indicators will allow to demonstrate the repercussion and the dimension of the valorization of the architectural heritage and the potential of management as a generator of development and equality in the communities of the impoverished countries.

Bibliographical References

[1] UNDP. *Human Development Report 2013. The Rise of the South: Human Progress in a Diverse World.* United Nations Development Programme. New York, 2013.

[2] The World Bank web: http://data.worldbank.org/

[3] UNESCO. *The World's Women. Trends and Statistics.* United Nations publication. New York, 2010.

[4] UNESCO. *Entender la probreza desde la perspectiva de género.* Publicación de las Naciones Unidas. Santiago de Chile, 2004.

[5] CALABUIG TORMO, C. and GÓMEZ-TORRES, M.L. *La cooperación Internacional para el Desarrollo*. Editorial de la UPV. València, 2010.

[6] SAN NICOLÁS PEDRÁZ M.P. et al. *Patrimonio, Museos y Arqueología*. Ed. UNED. Madrid, 2008.

[7] FERRERO, G. *Identificació i formulació de projectes de cooperació al desenvolupament: Gestió del cicle del projecte i mètode del marc lògic*. Editorial de la UPV. València, 2009.

[8] REVERT ROLDÁN X. and CARRASCO VALLÉS E. *Desarrollo humano y gestión del patrimonio: propuesta de indicadores desde las metas de los objetivos de desarrollo del milenio.* Paper presented at IV International Congress "Cultural Heritage and Development Cooperation". Seville, 2010.

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Route 66: analysis of a famed cultural corridor in the United States and implications for heritage tourism

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Abstract
The highway Route 66 in the United States is an extremely rich and diverse historic and cultural corridor that attracts significant tourism, including many international travelers. This paper summarizes a study by Rutgers University that analyzed the so called "Mother Road" with a focus on its historic preservation, economic landscape, and heritage tourism. Highlights of the study include: mapping of the Route 66 corridor utilizing Geographic Information Systems (GIS) and using the GIS resource to develop the first-ever census-based profile of who lives along the Mother Road; completion of the first-ever national survey of travelers along Route 66; and analysis of the economic contribution of Route 66. The overall study points to the benefits of heritage tourism (e.g., the "branding" of sites and considerable traveler spending) as well as the challenges of such tourism (e.g., over- commercialism and adverse effects to historic sites).

Keywords: preservation, heritage tourism, economic impact

1. Introduction, History, and Study Framework
Running about 2,400 miles from Chicago, Illinois, to Santa Monica, California (see Figure 1), Route 66 is an American and international icon, myth, carnival, and pilgrimage. Gestated in the booming 1920s, and completed in 1937, during the 1960s and 1970s, Route 66 became less important for highway travel as people flocked to the more efficient ribbons of concrete of the multi-lane interstate highway system which was begun in 1956. The final section of Route 66 was bypassed in 1985.

But transportation engineers do not rule the heart and the siren call of the Mother Road and its special sense of place, personality, and time continues to lure legions of United States and international tourists. To cite just one example, the Route 66 Museum of Clinton, Oklahoma (a community of about 9,000 located approximately 100 miles west of Oklahoma City) attracted about 35,000 visitors in 2009 (almost four times the local population), including about 10,000 international visitors.

The preservation of Route 66 is being abetted by national and state governmental and volunteer associations dedicated to that goal**. (**See Table 1 for examples of contemporary Route 66 preservation.) Indeed, there is much to preserve and cherish as is evident from the sample of Mother Road sites in Table 2. Despite these efforts to maintain the iconic sites and highway, many preservation challenges still remain as attested to by such actions as the World Monuments Fund (WMF) listing Route 66 on its 2008 World Monument Watch.

This paper summarizes research by Rutgers, The State University of New Jersey [1], which analyzed Route 66 with a focus on its historic preservation, economic landscape, and heritage tourism. The study included such original research as mapping of the Route 66 corridor in GIS form and related census (2000) socio-economic analysis, the completion of the first-ever national survey of travelers along Route 66 (a probe based on 100,000 questionnaires distributed along the highway's full 2,400

miles with some 4,200 responses), mapping of the Route 66 corridor in GIS form and related census (2000) analysis, survey of 25 Main Street (combined historic preservation and economic development) programs and 33 museums along the Mother Road, completion of 25 in-depth case studies of iconic Route 66 sites (some summarized in Table 2), and implementation of input-output models to quantify the economic contribution of Route 66.

We highlight some of this research below.

2. Who Lives Along The Route? : a reconnaissance GIS-census analysis

While there is much interest in Route 66, the profile of those living along the Route has never been examined – a crucial mission. To quantify this profile, Rutgers University mapped the full 2,400-mile Mother Road in GIS form (the first time this has been done in GIS), and following this, identified the census tracts (1,206 in total) located on or within one mile of Route 66 (termed the "Route 66 Corridor"). Using the most current United States census data available at the time of our analysis (2000), the following are some of the study's major finding concerning who lives along the Route.

1. About 5.5 million person people live within 1 mile of Route 66 (the Route 66 Corridor), about the same number of people who live in the entire states of Arizona or Minnesota.

2. Compared to the United States as a whole, the Route 66 Corridor has fewer whites (Corridor–68 percent; U.S.–75 percent) and blacks (Corridor–8 percent; U.S.–12 percent) but more American Indians (3 percent versus 1 percent) and "other" and "two races or more" (16 percent versus 8 percent).

3. About a quarter of the people living in the Route 66 Corridor population is Hispanic, identical to the Hispanic representation (25 percent) among the total population of the eight Route 66 states, but is approximately double the Hispanic share (13 percent) of the total United States population as of 2000.

4. There is tremendous demographic diversity within the Route 66 Corridor. For example, about 15 percent of the population in the Route 66 Corridor in Arizona and New Mexico is American Indian (for the entire corridor it is 3 percent), as compared with less than 1 percent in California, Illinois, Kansas, Missouri, and Texas. The New Mexico Route 66 Corridor has the highest percentage of Hispanics (42 percent), followed by California and Texas (both 32 percent), Arizona (25 percent), Illinois (12 percent), and finally Kansas, Missouri and Oklahoma each with less than 10 percent.

5. There are about 2.039 million households in the Route 66 Corridor. Their median income is $40,760 (close to the national median household income of $41,994 and similar to the eight Route 66 state household median income of $40,082).

6. The aggregate income of all the households in the Route 66 Corridor amounts to a significant $112 billion.

7. There are definite economic challenges confronting the Route 66 Corridor population. About 820,000 persons, slightly more than one-seventh (15 percent) of the population, earned an income under the officially designated poverty level, and almost 200,000 persons, or about 7 percent of the civilian labor force, was unemployed. These poverty and unemployment figures as of 2000 (as is all the data in this section) exceeded the nation's incidence of poverty (12 percent) and unemployment rate (6 percent) at that time.

8. There are approximately 2.220 million housing units in the Route 66 Corridor. Almost 0.182 million of these (8 percent) are vacant, similar to the vacancy share in both the eight Route 66 states and the entire nation.

9. The above data points to challenges and opportunities for the Mother Road. Challenges include a not-insignificant share of poverty and unemployment, and the difficult task of what to do with almost 200,000 empty housing units. Yet there is much opportunity. The $112 billion in aggregate household income translates into about $80 billion of household consumption (e.g., for food, housing, clothing, transportation, and healthcare), and capturing more of those billions on or near the Mother Road would be of great economic benefit. The census analysis

also points to the need to better synthesize celebration of the Mother Road with the history and culture of Hispanics and American Indians, as these two groups comprise not-insignificant shares of the Route 66 Corridor population west of the Mississippi.

The GIS analysis of Route 66 expands our knowledge of this corridor from anecdote to factual profile. It more broadly points to the value of GIS in better understanding a historic and cultural resource.

3. Who Travels Along the Route?: findings from the first comprehensice route 66 traveler survey

Travel is one of the most significant industries in the United States (about $1.5 trillion nationally and about 8 million jobs). In turn, heritage and cultural tourism is an important and growing component of the total travel industry (at least 20% of total U.S. person trip volume). Thus, it is instructive to examine travelers to Route 66.

In collaboration with the *Route 66 Pulse* (a free periodical newspaper distributed along the 2,400 miles of the Mother Road) and a panel of Route 66 experts in both the public and private sectors, Rutgers has conducted the most extensive survey to date of travelers on Route 66.

Approximately 100,000 surveys were distributed along the entire road (inserted into two issues of the *Route 66 Pulse* and also made available in "kiosks" at 33 popular Mother Road-associated travel destinations suggested by an expert panel) between June 2009 and June 2010 (to cover year round travel behavior). A total of 4,178 surveys were returned.

The four-page intercept survey contained a total of about 30 questions concerning the travelers' residence and socioeconomic profile, trip expenditure characteristics, and traveler perspectives on Route 66 (e.g. attractions and challenges). The following reports some key survey findings.

3.1 Route 66 Traveler Origins

Route 66 draws visitors from a broad geography and the 4,178 interviews included travelers from all 50 U.S. states and about 40 foreign countries. About 84.7 percent of the 4,160 respondents (with respondent residence data) indicated a current U.S. residence, while 15.3 percent came from abroad. Not surprisingly among the U.S. travelers, residents of the eight states through which the Mother Road passes were heavily represented (i.e. 6 of 10) in the survey. Of the international responses, the most were European and Canadian in origin. (Recall: the questionnaire was English-only, so this may have affected the above-cited international origins.) Of the European-based respondents, the largest number came from the United Kingdom, Germany, the Netherlands and Italy.

We acknowledge again that the English-only questionnaire may have deterred participation by international travelers. In fact, log book entries (visitors voluntarily signing a log book on entering a site or museum and indicating their place of origin) from well-known Route 66 sites often indicate a high share of international visitors, such as 30% at the Ariston Café in Illinois, 33% in the Route 66 museum in Oklahoma and 56% at the Round Barn in Oklahoma.

3.2 Route 66 Traveler Profile

From the survey response, the socioeconomic profile of the Route 66 traveler is:

1. Overwhelmingly (97 percent) white in race.

2. Overwhelmingly (97 percent) *not* Hispanic in ethnicity (recall however, the English-only version of the survey).

3. Overwhelmingly middle-age (median of about 55 years) with a prominent senior contingent (46 percent were 60 years or older) and a younger cohort as well (about one-ninth were 20 to 39 years of age).

4. Typically well educated (about 30 percent have started or finished undergraduate college and an approximately equal share have started/completed graduate work), with some exceptions (about one-eighth have either just attended or graduated high school).

5. Employed in many occupations (about one-fifth are in service, sales, transportation and maintenance), though the most popular occupation category by far (36 percent) is management and professional (the latter management/professional finding comporting with the typically more advanced educational attainment noted earlier). Of note is that about four-tenths of the Route 66 travelers are retired.

6. Generally of middle-income (median household income of about $62,500), though there is a considerable range in household earnings (about 8 percent earn $25,000 or less annually, while almost one-quarter earn $100,000 or more per year).

7. Compared to the persons living in the Route 66 Corridor (derived from the 2000 Census and described earlier), the Route 66 traveler (derived from our survey), is: far more likely to be white in race; has a much lower share of Hispanic ethnicity; has more years of schooling; is far more likely to be either retired, or if employed, is working as a professional or manager; and is more affluent from an income standpoint.

8. Comparing the Route 66 traveler to heritage and cultural travelers more broadly (the latter information derived from the Travel Industry Association of America and Rutgers research on other studies) shows many similarities. For instance, both groups are decidedly middle-aged, are well educated, are relatively affluent and are disproportionately either retired or work in professional/managerial occupations.

3.3 Route 66 Trip Characteristics, Traveler Perspectives and Trip Expenditures

1. The bulk of the respondents, 77.5 percent, indicated vacation or leisure to be one of the purposes of their Route 66 trip; 21.0 percent indicated they would visiting friends or relatives; while others cited "other" or a combination of objectives.

2. The respondents included both those for whom travel along Route 66 was the primary objective (38.6 percent) as well as those (47.7 percent) viewing Route 66 as one of several objectives or (13.7 percent) as not a guiding objective at all (the latter, an "accidental" Route 66 traveler).

3. The most important Route 66 characteristics cited by the respondents was "historic sites/monuments"; "notable places/landmarks"; and "landscape." Rated just below these three traits, but still important were: "small towns"; "U.S. history"; "National Parks"; "vintage restaurants and motels"; "Gateway to the West"; "car/motorcycle cruising"; and "navigating highways." The least significant characteristics were "bars/nightclubs" and "entertainment/amusement." Not surprisingly given the above, about six-tenths of the respondents had also visited other destinations noted for "Americana."

4. About nine-tenths of respondents indicated a least some data in at least one of eleven questionnaire-specified spending categories (lodging/camping, eating and drinking establishments, other food/snack/beverage, airfare, auto and RV rental, auto repair, other transport, gasoline and oil, admission to museums, other admissions and all other).

5. The spending per trip (Route 66 portion) for all purposes is in the range of $1,500 to $2,000. Of that sum, the largest expenses are for lodging, eating/drinking and direct travel-related trip outlays (for airfare, auto/RV rental and gasoline and oil).

6. What is the total spending of all Route 66 travelers, not just the outlays of the respondents to the Rutgers survey? *That educated estimate is conservatively (a lower rather than higher estimate) $38 million per year.*

4. Economic Findings Viewed From Macro and Micro Perspectives

It is instructive to view economic impact findings from both a broad or macro "lens" as well as a more narrowly focused "micro" lens. Input-output (I-O) analysis personifies a macro lens because it can translate spending in a given place to a broader economic consequence, including multiplier or ripple effects, at a more encompassing geography (e.g., to the extra-local state and national levels).

The Rutgers study specifies the total economic effects of Route 66-related spending through a state-of-the-art I-O model developed by Rutgers University, termed the Preservation Economic Impact Model (PEIM), and it quantifies the following from the Route 66-related spending:

1. **Jobs**: employment, both part- and full-time, by place of work, estimated using the typical job characteristics of each industry;
2. **Income**: "earned" or labor income, specifically wages, salaries, and proprietors' income;
3. **Wealth**: value added—the subnational equivalent of gross domestic product (GDP);
4. **Output**: the value of shipments, which is reported in the Economic Census;
5. **Taxes**: federal, state, and local tax revenues generated by the activity; and
6. **In-State Wealth**: wealth less federal taxes.

This study applies the PEIM to the different components of Route 66 spending. *Annual* direct economic effects from Route 66 spending include, at a minimum, $38 million in tourism spending, $67 million in Main Street (local efforts to combine historic preservation and downtown economic development) spending, and $27 million in Route 66-connected museum spending—for a total of $132 million. Further, the one cumulative long-term Route 66 spending program that was examined by Rutgers, the Main Street-related activity occurring in Route 66-located communities, had produced $923 million in direct economic effects (adjusted for inflation) over the life of the Main Street initiative.

The results in the Summary of Economic Activity and Benefits on Route 66 show that the *Mother Road nurtures the economic pocket book of jobs, income, and wealth as well as the heart!* When multiplier effects are taken into account from the $132 million annual Route 66 investment, the total annual impacts to the *nation* (United States) include a net economic gain of 2,401 jobs, $90 million in income, $262 million in overall output, $127 million in Gross Domestic Product (GDP), and $37 million in tax revenues.

Meanwhile, with regard to the $923 million in cumulative effects from the aggregate Main Street investment on Route 66, that investment contributed 15,606 jobs to the *national* economy, as well as $1.817 billion in industrial output, $908 million in gross domestic product, $687 million in earned income, and $276 million in taxes.

While the I-O model-indicated economic effects are not very large compared to the huge overall United States economy, the Route 66 economic contribution is *relatively and contextually* very important. Compared to new construction and such stimulus favorites as investing in highways, *historic preservation—such as historic rehabilitation of Route 66 properties—is a reasonably comparable, if not superior, economic pump-primer*.

Another consideration of what comprises a "good investment" is the relative comparison of historic preservation investment versus investment in such sectors of the economy as manufacturing, data processing and finance. On this basis, historic preservation, such as that occurring on Route 66, typically has economic advantages. *Preservation generally has more economic stimulus "bang for the buck"* (in this case, per $1 million of investment), especially concerning job creation.

Turning from a macro lens view of the economic significance of Route 66 spending as personified by the input-output results described above, to a micro lens perspective, what does Route 66 spending mean in the immediate community in which it takes place? *It is on this contextual local level that Route 66 economic activities have their greatest impact. As documented time and time again in the 25 case studies conducted by Rutgers (Table 2), in many smaller communities along Route 66, tourism related to the Mother Road is one of the most significant, if not the only "economic game in town."* The restored Route 66-themed motel, restaurant, and gift shop may not have a high-dollar business volume (especially relative to the much larger regional and state economies), yet they anchor the downtown in many small communities and change the perceived image of a place from a dowager town abandoned by the interstate to a community with a Route 66-linked past and future.

5. The Broader Lessons From Route 66

The analysis employed by Rutgers in analyzing Route 66 (GIS, traveler survey and economic impact models) can and have been used in considering other heritage and cultural resources. More broadly,

to the extent that our investigation more generally speaks to the larger subject of heritage tourism, we infer both exciting possibilities mingled with challenges.

1. The potential visitor draw of heritage travel is powerful. In time after time, the Route 66 sites, often located in challenging locations (e.g., require circuitous drives and do not have direct air access) drew large numbers of travelers and the lion's share of these travelers came from afar (including not a small share of international visitors).

2. Linked to the above observation, is the powerful economic activity and benefit (especially measured contextually) flowing from large influxes of heritage travelers (let alone the place-making enhancement of a community sought out in this fashion).

3. While these observations have a positive spin, there is a challenge of cultural management. The flipside of many visitors is wear and tear on the places visited and the host community. A local "authentic" cultural place bearing the imprint a founder's vision or a donor's largesse may have long term staying issues as these individuals exit the stage. There is also a thin line between fresh authenticity and repetition of a successful model.

Figure 1: Map of route 66 in the United States



Source: http://www.historic66.com/pictures/copyright/us-map.gif

Table 1: Examples of Contemporary Route 66 Preservation Efforts

1985	• Route 66 is officially decommissioned, and all highway markers are removed.
1987	• February - The Historic Route 66 Association of Arizona is formed.
1989	• Route 66 Association of Missouri, Route 66 Association of Illinois, and the Oklahoma Route 66 Association are founded. • Kaibab National Forest (USFS) sponsors a National Register of Historic Places Multiple Property Listing for Historic U.S. 66 in Arizona, including five segments of Route 66 listed on the National Register.
1990	• New Mexico Route 66 Association, Kansas Historic Route 66 Association, and California Historic Route 66 Association are founded. • California passes legislation designating "State Historic Highway 66," making signage permissible on the decommissioned route. • Governor of Missouri signs legislation that designates Old U.S. Highway 66 as a historic highway in Missouri, making signage permissible on the decommissioned route. • 101st Congress passes Route 66 Study Act to study methods to commemorate Route 66.
1991	• Texas Old Route 66 Association forms.
1992	• New Mexico State Historic Preservation Office undertakes a historic Route 66 property survey and Multiple Property Documentation Form (MPDF) with National Register nominations.
1994	• Arizona Route 66 is designated an Arizona Scenic Historic Byway. • New Mexico Route 66 is designated a New Mexico Scenic and Historic Byway.
1995	• National Historic Route 66 Federation forms to preserve Route 66 across the country. • New Historic Route 66 signs are put up, documenting the different historic alignments in Illinois.
1996	• Arizona State Historic Preservation Office (SHPO) undertakes a historic Route 66 property survey and MPDF.
1997	• Illinois State Historic Preservation Office and Department of Transportation complete a historic Route 66 property survey, MPDF and Programmatic Agreement with Illinois DOT.
Late 1990s	• Illinois Route 66 is designated a "State Heritage Tourism Project." Illinois Route 66 Heritage Project, Inc. develops to manage the initiative. • Oklahoma Route 66 designated a State Scenic Byway. • Bureau of Land Management designates a 42-mile section of Route 66 through their lands between Kingman and Topock as *Historic Route 66 Back Country Byway.*
1999	• 106th Congress passes the Route 66 Corridor Preservation Act to preserve the cultural resources of the Route 66 corridor and to authorize the Secretary of the Interior to provide assistance. • September 11, 1999 - The new Route 66 State Park opens on what was once the town site of Times Beach, Missouri.
2000	• Route 66 in New Mexico is designated a National Scenic Byway.
2001	• The National Park Service Route 66 Corridor Preservation Program is established as a result of the Route 66 Corridor Preservation Act.
2002	• The California Route 66 Preservation Foundation is formed to *develop resources for the preservation and benefit of the Route 66 corridor in California.*
2005	• Illinois Historic Route 66 is designated a National Scenic Byway as a result of efforts by the Illinois Route 66 Heritage Project, Inc. • Arizona Route 66 is designated a National Scenic Byway.
2009	• Route 66 Corridor Preservation Program is reauthorized for another 10 years. • Oklahoma Route 66 designated a National Scenic Byway. • Arizona Route 66 is designated an All American Road.

Table 2: Sample of Route 66 Iconic Sites

Case Study and Location	*Description*
Palms Grill Atlanta, IL	History of iconic downtown restaurant (name inspired by the founder's fascination with Los Angeles, California), built in 1934, that was restored with period details in the late 2000s and once again serves as a local café and anchor for the downtown.
Pontiac Murals Pontiac, IL	Including a famous Route 66 shield mural on the back of the Route 66 Museum in Pontiac, this town has embraced a mural program to spur tourism and enhance its economic fortunes. The total of about 20 murals (on individuals/subjects ranging from Abraham Lincoln to a famous local candy store—"Palace of Sweets") attracts about 20,000 annually.
Shea's Gas Station Springfield, IL	A time capsule of an early (oldest portion from the 1920s) local neighborhood filling station (encompassing Marathon and Philips 66 components), with thousands of period-correct oil-company-related memorabilia (signs, pumps, and marketing materials). Facility was operated for decades by proprietor William Shea; he converted it to a family-run museum in 1995.
The Mother Road Festival Springfield, IL	This festival is a three-day event that has been held each September since 2001. With nearly 80,000 visitors and 1,000 classic cars on display, it is one of the biggest car shows in the mid-western United States. The event combines classic car culture, Route 66, and the historic downtown (Springfield) Main Street themes.
Round Barn Arcadia, OK	Built in 1898, collapsed in 1988, a retired carpenter (Luke Robinson), an intrepid "Over the Hill Gang" (senior 60s group) and other local volunteers help restore (in 1992) the most powerful reminder of Arcadia's frontier roots and one of the most recognizable historic sites (an authentic round barn with a 60-foot diameter) in Oklahoma and along Route 66.
Route 66 Museum Clinton, OK	Originally opened in 1968 as the Museum of the Western Trails, this institution reoriented to a focus on Route 66 from 1995 onward. One of the nation's largest (10,000 square feet of exhibit space) museums on the Mother Road, the history of Route 66 is conveyed decade-by-decade (over six decades) starting in the 1920s.
Rock Café Stroud, OK	History of the Rock Café (opened in 1939, incorporating stones excavated from original Route 66 construction), with a focus on operation by its current owner, Dawn Welch. Details rebuilding of restaurant after 2008 fire and current significant national/international visitor patronage.
Conoco Station Shamrock, TX	History of the 1936 architecturally unique (Art Deco 100 foot tower) Conoco gas station (and U-Drop Inn), and its changing fortunes (prospered for decades, closed 1997, and restored/reopened in early 2000s as a museum).
Blue Swallow Motel Tucumcari, NM	History and continued operation of a historic (built 1939) and iconic motor court-style motel with a world-famous blue-lit neon sign. The motel is perhaps the oldest vintage motor court still in operation on Route 66.
Cool Springs Kingman, AZ	History of the Cool Springs Camp (opened 1926), its prosperous early decades and family-run operation, demise (destroyed by fire in 1966 and blown up in a movie shoot in 1991), and recent (mid-2000s) rebirth as a snack and gift shop.
La Posada Hotel Winslow, AZ	Connected to famous personalities (Fred Harvey—the mastermind behind the "Harvey Houses"—and noted architect, Mary Elizabeth Jane Coulter), this historic jewel of a hotel, which opened in 1930, described as the "finest small hostel in the southwest" closed in 1957, but was recently (late 1990s) reopened and brought back to its original splendor.

Bibliographical References

[1] Rutgers University. Route 66 Economic Impact Study. A study conducted by Rutgers, The State University of New Jersey in collaboration with the National Park Service, Route 66 Corridor Preservation Program, and World Monuments Fund. Study funded by American Express. New Brunswick, NJ. 2011.

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Macro reality of complex territorial identity. Pompeii among sign, track and history

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Abstract
A phenomenon of great interest is the "modern" Pompeii, which was city founded ex novo in the early twentieth century. This phenomenon was driven by social and human motivations related to a territorial plant that has a characteristic vocation of different entities, measurement, communication and historical relationship. Three are the receptive poles that can be abstracted through the versatile richness to capitalize and to put in a network with the territorial system considered in its macro area of interest: The ancient Pompeii, that the archaeological, the religious and the productive Pompeii. Translatable poles into stream axes and paths where one can transcribe a mutation by a process of gathering fragments of history, of paths and of representation of the scenarios derived from the city announced. The city as a structured reality - and the sum of the individual fragments that form itself. This consists of a 'text' which, as a whole, can be written, read and interpreted as a complex system of signs, drawings, and messages all posts inside of a semiotic perspective; or in a more general 'aesthetics of reception and perception', which can be understood as the "reverb messages on social behavior and cultural behavior, on projects and subsequent production to their appearance." Today, as in the historicity, a renewed attention to the relationship that is established between the city and the community of its users, which in turn play the role of privileged recipients of the aesthetic message that the city produces, but also that of the undisputed architects and protagonists of its continue invention.

Keywords: Pompei, modern, signs, complex system.

1. The city of Pompei "urban": historical references
author: Pasquale VAIANO

The city of Pompei "monument", hibernated by the eruption in 79 d.C., and contained in the archeological boundaries, clashes with the city of Pompei "urban", risen around the Sanctuary since 1875 and known all over the world for its devotion to the Madonna del Rosario. The founder of the nineteenth-century city, the lawyer Bartolo Longo, was entirely aware about the enormous responsibility that the new urban structure must had to the ancient centre, an organism devoid of vitality but preserver of the extraordinary artistic, architectural and urban statements. In fact, what today appears like a building fabric devoid of quality, resulting of an expensive guided by property speculation since the end of the Second World War, conceals interesting architectural fragments and urban reasoning. To Longo is attributed the adjective of "urban planner" because of his refined accuracy used for the rational and knowledgeable planning of the new city. The first stone laid was a spiritual stone; the lawyer, husband of the countess De Fusco, worried about the spread of the faith all over the Valle, to prevent the legends linked to Pompei, the city of the ruins, considered as a profane place and as the "land of false Gods". In 1873 Longo organized the first celebration for the Madonna del Rosario and after a while began the magnificent construction, starting from the structural and architectural recycling of the ancient Salvatore's chapel[2].

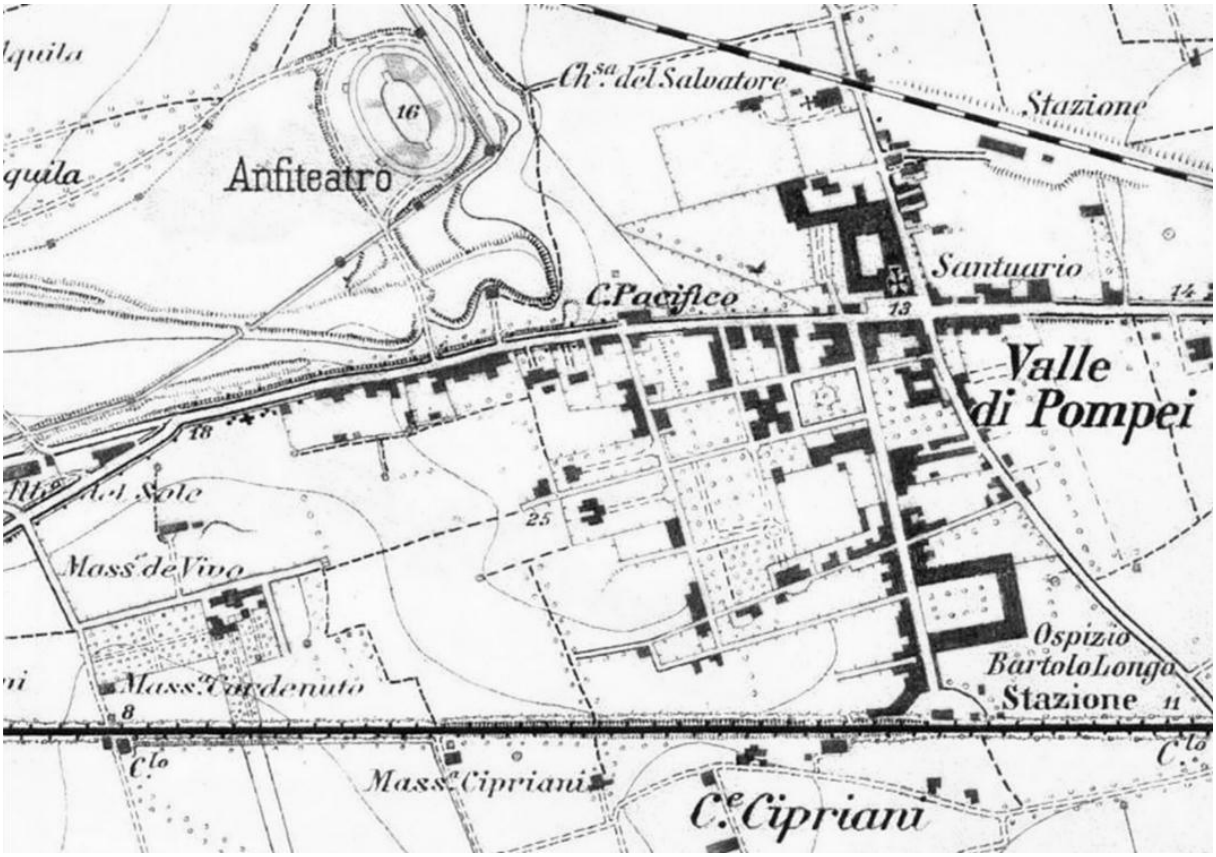

Fig. 1: Valle di Pompei, topographic map, IGM, cart. 80/cat. 9618, 1906.

Endowed with great entrepreneurial attitude and with the help of the Bishop of Nola, Longo adverted «a competition of a coin per month, to build a catholic temple devoted to God on the land of the false People», that allowed him to raise economic energies indispensable to build the Sanctuary. The cultural model taken as example was Lourdes, the most important religious center in the Europe, after the apparitions of the Virgin Mary in Massabielle's cave. The 8th of May 1876, at 11 am, the works for the construction of the Sanctuary began, a few meters from the north of SS. Salvatore's chapel. The project of the shape of the building was edited by Antonio Cua, professor in the Neapolitan university, while the architect Giovanni Rispoli dealt with the realization of the façade with the atrium and with the "cupola maiolicata a losanghe" using black and white colors[1]. Thanks to this collaboration, arose a perfect harmony between Rispoli and Longo, so that he put the planning of a great part of the buildings destined to the new city, into the hands of the technical, who became the architect of the Valle of Pompei. Longo, in 1891, describing the "rising city" New Pompei, affirmed that the disposition of public and charitable buildings which arose around the Sanctuary wasn't casual but it was respectful of Giovanni Rispoli's parameters of rationality and adornment [4].

The crossroads of the ancient vectors of the traffic direction of the Regia Via delle Calabrie and of the street which link Castellammare to Nola, became the centerpiece of the new settling system, establishing a criteria of orthogonal urban redevelopment, popular in the second half of the nineteenth century.

The primordial nucleus arose in 1884 with the building of the Collettoria Postale, the Scuola Tipografica and the first wooden railroad station. Similarly, the expansion of the built-up area happened through the use of house cell iterated until the assembly of a unique village destined to the workers of the New Pompei. Bartolo Longo's vision, in fact, doesn't seem extempore or utopian; on the contrary his vision appears in agreement to the proposals of the new urban and productive settlements elaborated in that period in other cities. Some documents show the relationships of the lawyer with the industrialist Alessandro Rossi – inventor of the Nuova Schio – who instituted a village connected to the wool factories of his own property, to give an appropriate residence to his workers [5].

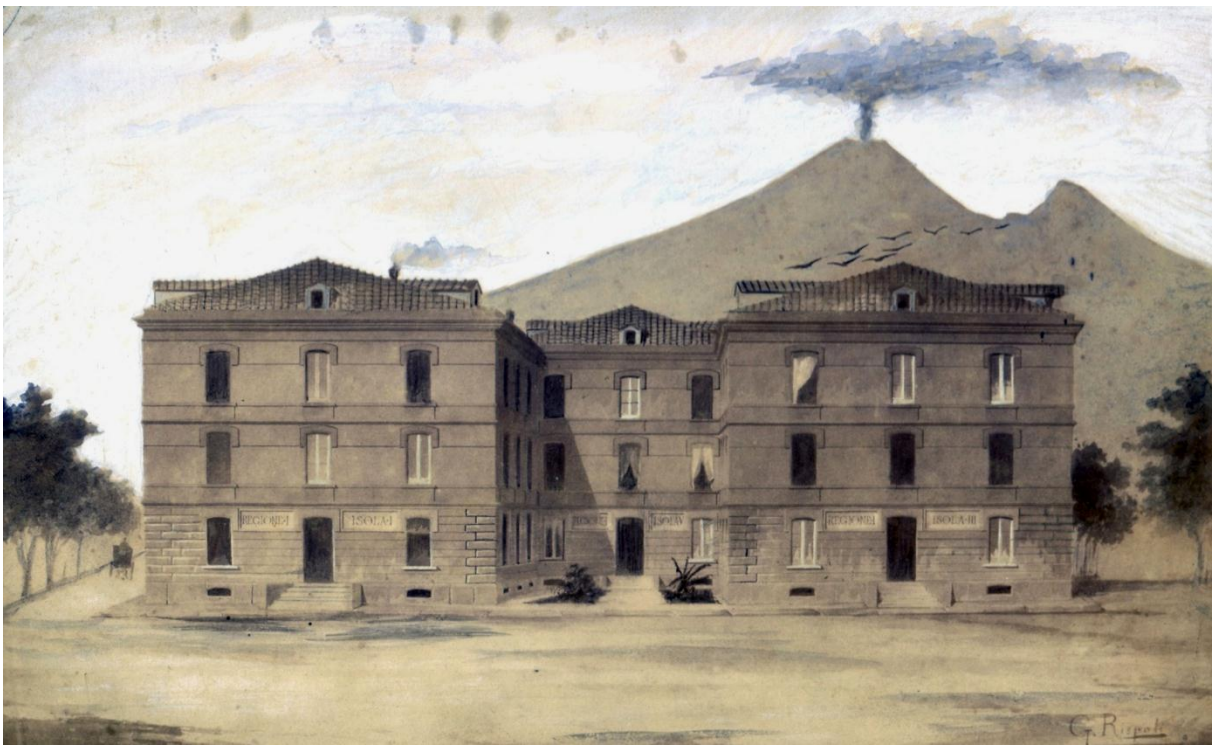

Fig. 2: Giovanni Rispoli, perspective view of the workers houses.

The Neapolitan architect Giovanni Rispoli, who knew about the European phenomenon of the workers – village, projected a district of workers – houses, applying well advanced constructive criterions, getting inspiration from the village destined to the workers in Berlino e Vienna.
The allotment of the workers district, measured nearly 1760 square meters, divided in five similar buildings, measured nearly 18x14 meters, to form a chessboard. One of these buildings was in the center of the block, while the other four were at the rectangle's vertexes, so that the perimetral buildings were opened on the public streets while the central building was opened on the spaces external to the houses. In this way, four courtyards were formed. Rispoli projected the neighborhood using a rectangular shape, producing combinations and proportions similar to a square, determinate by a system of parallel and orthogonal axis which established not only the neighborhood's constitution but also the public spaces of the streets and the square. The rectangular shape close to the square of the workers – village, organized as hinge around the free central space of the square, would have defined the square of the last one. At the same way, the geometric shape connotative the individual worker – land would have defined the interior design and, consequently, the external one of the courtyard. The whole worker-village was the expression of a unitary project, which established symbolic and functional connections with the other buildings of the New Pompei.
Due to economic and financial difficulties, in 1888 was realized only one block with its own square instead of the realization of more workers' blocks [3].
The volume's articulation, the geometric purity of the structure, the simplified architectonic language of the facades ease the building's stateliness, harmoniously integrating it to the surrounding landscape.

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2. Flux of wealth

author: Rossella BICCO

A new challenge for “modern” Pompei is to redefine a production model of value through the application of new projects, prompts, or models that are effective and sustainable and transform promoters, agents and protagonists, into methods of social innovation, that generate the basis for the creation of wealth and value, not necessarily or exclusively economic.
Today an identity cannot be considered as individual or stand alone, but seen in its macro area. The success of any choice is connected to the support services and to the infrastructure both social and material that surround them as do the interactions of the agents referred to previously. Integrating the point of view of the stakeholder is necessary to the development of an effective strategy, far from the utilitarian approach or of greenwashing techniques.
If the final target of the territorial authority is to create value, the process must be sustainable and long lasting in that they include and satisfy the various stakeholders, that bring functional resources to the long term project. This means that the procedures have to valorize and consolidate the collaboration and insure its sustainability. This is not limited to the sharing of the created value but the creation of the shared value. The theme of shared value was formalized in 2010 by Michael Porter and Mark Kramer, influential researchers of business management, and shown for the first time in the 2011 issue of the Harvard Business Review. The basis of the new concept is that all of the territorial agents have to work to converge the territorial interests to meet those of the individual agents: to create economic value that at the same time creates territorial and social wealth also. A new point of view regards the valorization of the know how available in the territory that has not been exploited. To identify and make available each ones added value, each ones know how, the infrastructure, the management systems using a reticular and multi directional logic: business – university - territory.
Pompei is an international and national centre of excellence included in the UNESCO classification since 1997, its touristic pole generates a flux of tourism that is second only to the capital. The tourist sector is without a doubt the territorial sector with the most potential. At the moment it is hardly exploited and the primary indicator of this is the length of the stay of the visitors of the cathedral and the archeological site. The analysis of the visitor flux and the regeneration of the flux helps us study and understand how to positively channel the cultural process that takes place with the visitors who come thanks to the riches of such a well known territory.
“*il viaggiatore, che vuole in poche ore visitare il Santuario, innalzato in onore della Vergine del Rosario su questo pezzo di cielo lanciato in terra, come chiamarono i poeti la zona perivesuviana, si presenti alla stazione di Napoli e chieda un biglietto di andata e ritorno per Valle di Pompei, che è la stazione che segue immediatamente a quella di Pompei […] tutta quella grandezza pagana finì. Quella grandezza non oltrepassava la tomba, e nulla sapeva dei futuri destini dell’umana specie. […] silenzio diciotto volte secolare grava sopra di essi! Non sono passati che cinque minuti, ed il fischio della locomotiva lo scuote e lo avverte che ha lasciato la stazione della Pompei che è morta, e si appressa alla stazione della Pompei che risorge”.*
As said by Bartolo Longo in his essay about the dualistic aspect of a religious city, “reborn” with a covered city.
A wider but less articulated analysis of the territory quickly brings to our attention the many agricultural greenhouses in the area, in fact both agriculture and horticulture are strong characteristics of Pompei, especially those of small businesses. Therefore it becomes necessary and indispensible to revitalize and add value to this sector as our target and definite programmed interventions we can re organize and elevate the awareness of the visitors and transform even the proponed production into a unique wealth. Not only a religious tourism or archaeological but a well informed tourist that will be brought to read the city as a part of the whole territory in which it relates.



Fig. 3: Ortofoto con poli, flussi, percorsi e sistema dei collegamenti della città di Pompei



Fig. 4: Composizione fotografica rappresentativa per la città di Pompei di “memoria e ricordo”

3. Pompei between the Future, Tracks, Identification and Legend

“Le città come i sogni sono costruite di desideri e di paure.”

Italo Calvino, “Le città invisibili”1972

author: Ludovico MASCIA

The “Urban dimension” in its entirety refers to a definition that can be conceived and redesigned as a complex organism of elements and signifiers collocated within a generalized reconfiguration linked to a new and impromptu concept of “aesthetics of reception”. Thus, we try to relate the city as a vector and the community of its users representative of a modular value that is indispensable. (Fig.5) The latter in turn play the role of privileged recipients of the aesthetic, generative, communicative message, that the macro-territorial system of the city structure produces.

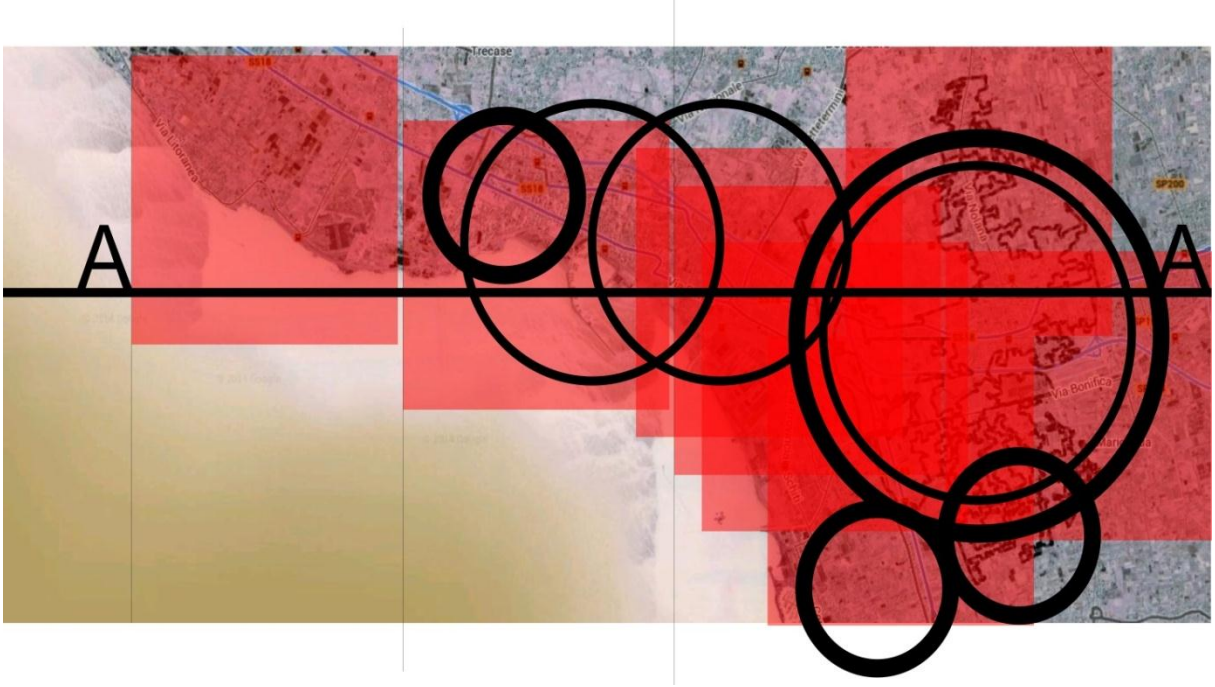

Fig. 5: The district of Pompeii. Areas of territorial influence.

The users of this space, in addition to being undisputed architects of this change and inventive reading thanks to the correct practice of receiving, listening, modifying, transmitting and using, propose a new method of observation and translation to the city in a direction that favours communication between the text and reader. The status of the aesthetic restitution is determined by the attitudes of relocation and redefinition of urban spaces, that at the end of the cyclic process are configured as construction actions of the image, which in turn is identificative of the city, not only as a non-active reception of its own becoming.(fig. 6) It is the urban dimension not only as an “object” but conceived as integral skills and reading. Thus, a reading of the “vision of the city”, that contemporary Pompeii now provides the different users of its community is carried out as well as an analysis of the real possibility that this vision has to be configured into an identity. Few places in the world have a such a strong and widespread image as Pompeii, but very few places in the world are suffering, like Pompeii, a well-structured and deep-rooted lack of identity linked to the idea of the city. Crushed between the evocative power of the myth of antiquity and the irrepressible strength of the spiritual “Marian pilgrimage”, the city struggles to compete with its “own” identity. There is a feeling that it is difficult to define one.

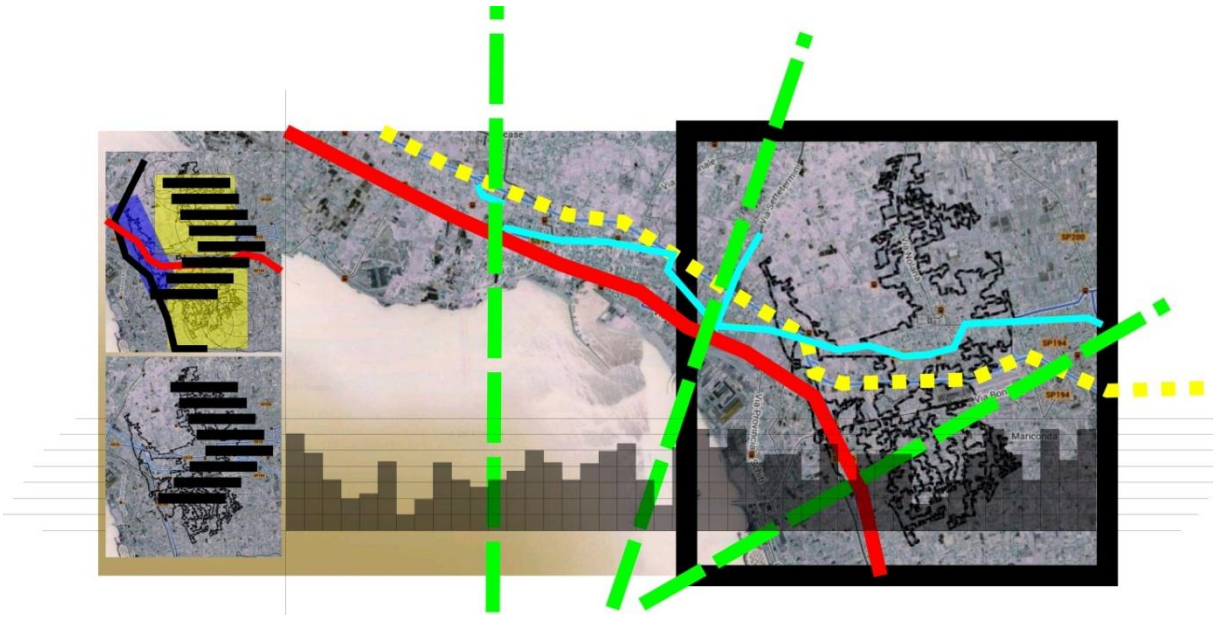

Fig. 6: The district of Pompeii. Display complex dynamics of territorial development and orientation

The work carried out is an attempt to identify reading routes and “writing” processes of the city, capable of recovering the traces of a possible path of identity developed along different lines, using unexplored points of view, in the belief that, in the absence of a strong “collective memory” it makes sense to put in place a “collective memory” supported by shared projects upon which to build common strategies and common identity processes.From the early stages of the analysis, it soon became clear that the scenario related not to a few elements of particularity in the “vision of the city” described in the specific context of Pompeii. First, with regards to the temporal dimension: the city, as laminated textual systems, is always characterized by a complex temporality, scanned by a succession of phases, solutions, waste but there is no doubt that the city of Pompeii appears, from this point of view, a special case, since it is spread over a significantly discontinuous time axis. (Fig.7) Looking at the urban settlement, as observed from the point of view of

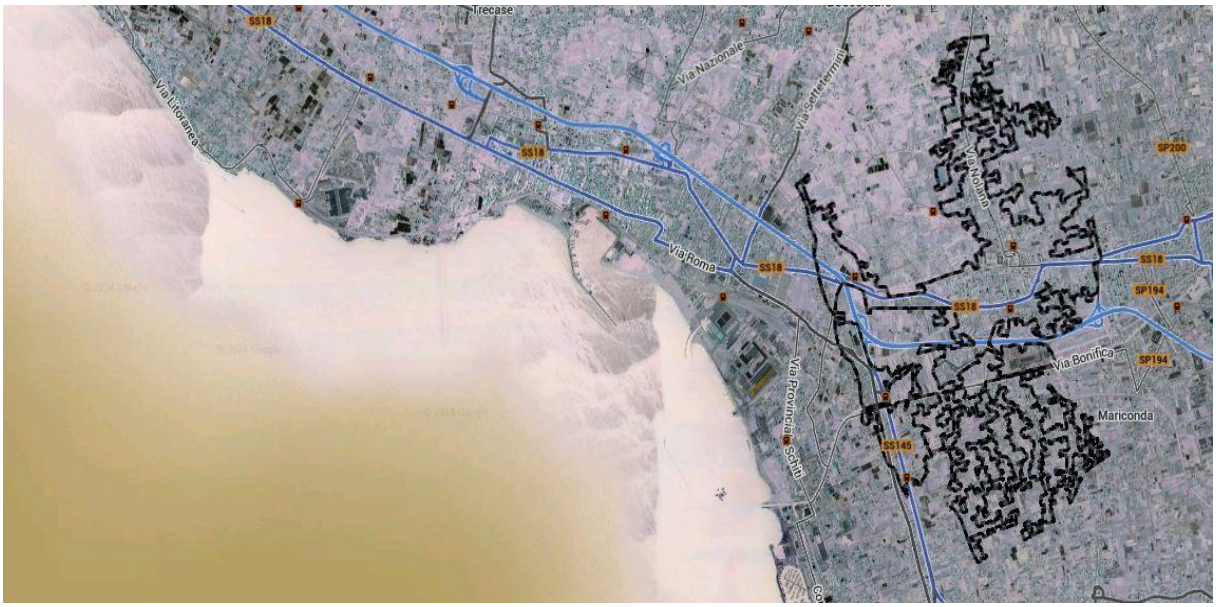

Fig.7: The district of Pompeii. visual layout of competence.



Fig.8: The district of Pompeii. Relations with the graphic visual coast marine.

Luncy, there is a definition of “representability of places” that is the “quality that gives a physical object a high probability of evoking a vigorous image in every observer”.Looking at the city of Pompeii from this particular point of view, it is possible to draw some other consideration useful in identifying possible visual design strategies. Pompeii is characterized by a large number of highly connotative “signs” that give it, apparently, from a physical-environmental and symbolic point of view, a heightened visibility and recognition: the profile of Vesuvius upon which the ruins of the archaeological site stand; the “limits” (ancient, but also recent) that define the “physical break” of the excavation area from the rest of the urban fabric; the bell tower of the shrine, which is a key visual reference not only for the city but for all the neighboring towns; the rhythmic sound of the call to prayer that fills the space itself and marks the time so surreally, especially when seen in relation to the adjacent and promiscuous commerce of sacred and profane images that characterizes the High Street of the city and that among souvenirs, the greenhouses that occupy a considerable area of the town and that accompany it, clearly characterizing the path of those visual approaches to the city by highway or railway, ... powerful signs, if read in their individuality and when analyzed by point of view of their “meaning” and their “identity”. (Fig. 8) However, for the purposes of the definition of “figuration” of the urban image, reading them from a “structural” point of view is less convincing and that from that particular point of view that investigates the ability of individual signs to be shown in the “system” and therefore able to trigger spatial relationships to establish a strong and clear reference to visual and emotional orientation to the users. Proposing several research ideas and project, aimed at the analysis of the perception that the city itself and the construction of possible narrative paths that can promote a reading in an alternative way to the strong bond that binds Pompeii to its stereotype, knowing how to reach the elaboration of project proposals that, in terms of communication strategies, projects, visual identity, experimentation with new languages and detection of unusual scenarios, propose measures that can aim with a new aspect, the potential notes as well as more unusual ones highlighted by trails in the sense previously identified. An exercise of transcription within a new universe of meaning that the city has in terms of image and imagery and all that the imagination of the new scenarios is able to “set up” to help overcome the clichés of Pompeii that characterize the collective judgment, but also to return to the city to itself, giving a sense to areas of neglect, guilty of careless neglect or deterioration. (Fig. 9) The intent is to think of new communication plans, visual identity plans that try to represent the idea of multiplicity and the presence of distinct aspects of identity and the different elements of interest.

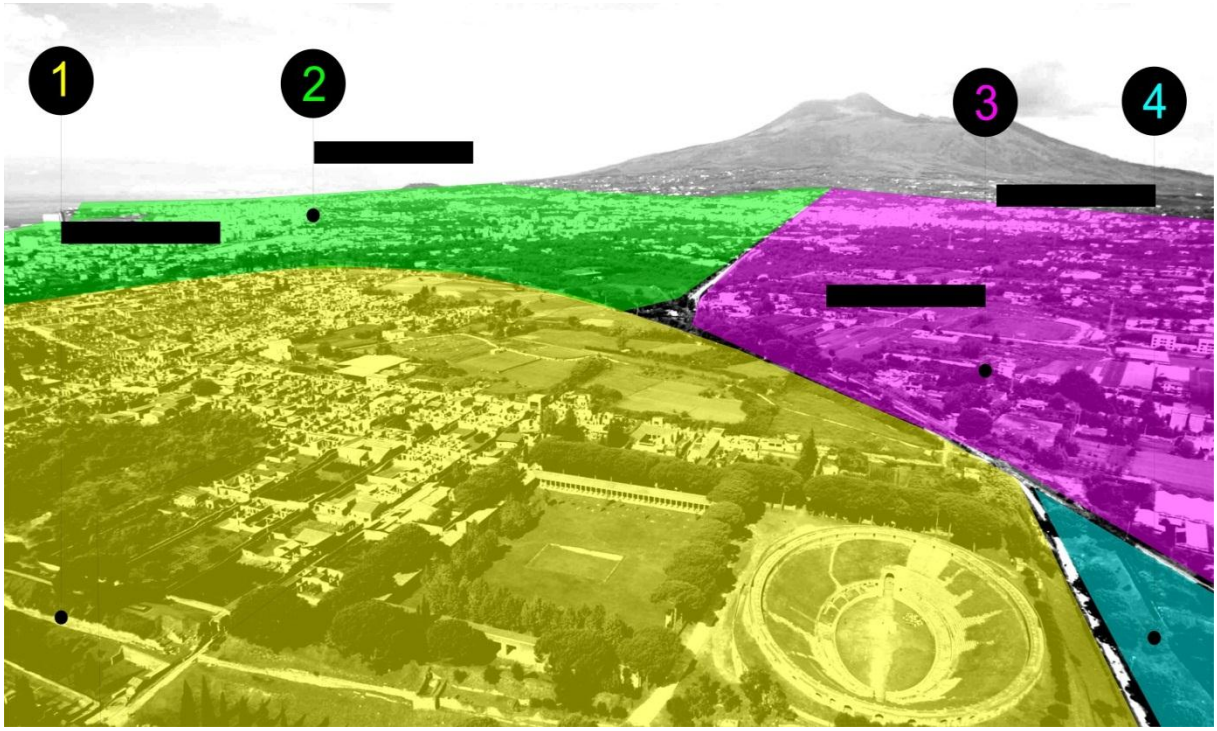

Fig. 9: The district of Pompeii. Historicized view of the relatively subdivision in areas of compensation.

The identity of the territory is in some way identified with the architectural and environmental heritage and the whole geographical area is enclosed, as if in a kind of “visual synecdoche”, in some of its qualifying, exciting, evocative elements. It is believed in the contribution of spatial analysis to return to such a layered city logotipical identification, semantic attitude, wanting to leverage the communication of abstract values linked to the idea of “effusive” liveliness and power, a cultural and natural heritage that does not want to only be secure, but that purports to spread and expand as a shared value, vital and creative potential for the entire territory.

Bibliographical References

[1] CARILLO, Saverio. *Gustavo Giovannoni, Spirito Maria Chiapetta e l'Ampliamento del pontificio Santuario di Pompei,* in «Arte Cristiana» Rivista internazionale di storia dell'arte e di arti liturgiche, anno LXXXVII, volume LXXXVII, Maggio-Giugno 1999, fascicolo 792*,* Scuola Beato Angelico, Milano 1999.

[2] IULIANO, Marco. *Bartolo Longo e il territorio,* in M. Iuliano e S. G. Federico (curatela), *Bartolo Longo "urbanista" a Valle di Pompei 1876-1926*, Edizioni Scientifiche Italiane, Napoli 2000.

[3] DI VIRGILIO, Michele. *Le Case Operaie di Valle di Pompei*, tesi di laurea in discipline storiche per l'architettura, relatore prof. Danila Jacazzi, correlatore prof. Riccardo Serraglio, Facoltà di Architettura della Seconda Università degli Studi di Napoli, a.a. 2009-2010.

[4] SERRAGLIO, Riccardo. *Le "comode, nette, belle ed igieniche" Case Operaie della Nuova Pompei,* in C. Gambardella (curatela), *Atlante di Pompei*, «Fabbrica della Conoscenza» numero trentacinque della collana fondata e diretta da Carmine Gambardella, La scuola di Pitagora editrice, Napoli 2012.

[5] SERRAGLIO, Riccardo. *Architetture per i lavoratori tra Napoli e Caserta: Progetti e realizzazioni dal XVIII al XX secolo,* in «Fabbrica della Conoscenza» numero trentacinque della collana fondata e diretta da Carmine Gambardella, La scuola di Pitagora editrice, Napoli 2012.

[6] CENTRO STUDI E RICERCHE CIVITA. Indicatori turistici delle principali città d'arte italiane Firenze, Napoli.

[7] CORSI, Ermanno. La prima autostrada del Sud Napoli, Pompei, Salerno 1925-1985. Ercolano: La Buona Stampa, Napoli 1985.

[8] LYNCH, Kevin. *L'immagine della città*, Marsilio, Venezia 2006 (first ed. *The Image of the City*, MIT Chicago 1960).

[9] DERRIDA, Jacques*. La scrittura e la differenza*, Einaudi, Torino1971, (first ed. *L'Ecriture et la Difference*, Parigi, 1967).

[10] RULLANI, Enzo. *La Fabbrica dell'immateriale*, Carocci, Roma 2004.

[11] *Di-segni di identità. Il progetto di 'comunicazione' nelle politiche culturali* in C. Gambardella e S. Martusciello, a cura di, Disegno come topologia della mente, atti del "Terzo Forum internazionale di Studi Levie dei Mercanti", Capri 6-7-8 giugno 2005 e anche in Dal valore astratto al valore condiviso. Misura e identità nella comunicazione per i beni culturali, in C. Gambardella, a cura di, Misura e Identità, atti del convegno tenuto 9-10-11-novembre 2006- Napoli, Istituto Italiano Studi filosofici.

[12] CARERI, Francesco. *Walkscape. Camminare come pratica estetica*, Einaudi, Torino, 2006.

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BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

ARCHIPELAGO CITY: AN INHABITED DESERT?

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Abstract
How to determine the identity of an archipelago city? Before the existence of the atlas there were 'isolari' (insulaires) where the entire planet seemed like a collection of fragments of sizes and shapes as varied as possible.
In contemporary times, the transition from a fabric of blocks to a more jumbled "urban substance", which variously compacted composes and breaks down above all the margins of the city into fragments and pieces of land, marks in today's settlement framework of the periphery the loss of threads, rules and orders and opens the peri-urban territory up to new configurations.
As a counterpoint, the absence of real city systems and interconnected community spaces in these archipelagos make an urgent need for a new paradigm of investigation, which may make up for the separation between territory and built environment.
The purpose of this study is to advance understanding on the management of this "geography of the indescribable", in Boeri's lexicon, namely that entire part of the metropolis that needs to be represented according to new spatial orders. Although many are calling for a new charter for the contemporary metropolis and the centre-periphery dichotomy is considered an obsolete way of observing urban phenomena, the real dialogue between historical city and periphery, the former dense, homogenous and continuous, afflicted by excess, accumulation and a glut of signs and meanings and the latter torn and disconnected, without history and identity, is still an open issue.
A case study on french *tissu pavillonnaire* (in the city of Saint-Chamond) will provide a more deep comprehension of the archipelago city phenomenon.

Keywords: Public space, suburb, sprawl, close reading, wake density

1. From Urban Dissolution to Human Desert
How to determine the identity of an archipelago city? Before the existence of the atlas there were 'isolari' (insulaires) where the entire planet seemed like a collection of fragments of sizes and shapes as varied as possible.
In contemporary times, the transition from a fabric of blocks to a more jumbled "urban substance", which variously compacted composes and breaks down above all the margins of the city into fragments and pieces of land, marks in today's settlement framework of the periphery the loss of threads, rules and orders and opens the peri-urban territory up to new configurations.
The break up of the city, a pre-eminent theme in studies on the quality of the contemporary urban fabric, goes hand in hand with this reflection on an extremely widespread housing *milieu* in the West. *Pavillonnaire* in French, residential suburb in English, this term designates a settlement framework that is structured on an elementary housing cell, the *pavillon* or detached house, a monad incorporated in the fairly regular weave of a parcelling-out of the land, indifferent to the surrounding connective urban tissue. Fencing, separating walls, gates, barriers and high hedge rows are the spatial correlatives of this housing principle based on seclusion.

The reduction in the quality and quantity of human exchanges, along with the spread of the molecular enclave, has altered the meaning of the urban space and reduced the reasons to walk among it, to frequent it and to use it.
The desert as an image of a sterile and monochrome reality, associated in the title of this study to the notion of city archipelago, represents the critical point of the living dimension of this kind of *milieu*, connoted by a meagre human presence (in the streets as well as in the contact spaces) and a lack of activities.
It is the loss of sociality as the primary axis of urbanity that this metaphor seeks to convey. The very idea of desert is drawn on here to define the impossibility or too powerful inertia for transformation, in the sense of dissipating the possibilities of transforming structures grounded in the repetition of typological motifs and the introversion of spatial motifs.
"There is deep-seated and invisible *anticity*, which does not challenge the cities we live in, but rather erodes them from within. Without making grand gestures, moving pervasively within the mechanisms of reproduction of contemporary urban space; it undoes the connections, wears down the nodes, compromises its very working. The *anticity* that is most worrying today does not arise from marginalisation and revolt, but from the fragmentation and dissipation of the vital energies flowing through every ambient of city life. It is not born out of the extreme exacerbation of community living conditions, but from the triumph of mediocrity and banal repetition in the space of a few housing models: the one-family home in the centre of a lot, the warehouse, the terraced house, the apartment block, the shopping centre. A sequence of solitary and grouped buildings without any clear logic, without any relationship of need." [1]
Stefano Boeri, taking up once again the theme of the scattered city in *Anticittà* [2], incisively represents the attributes of a city system that evolves by fragmenting itself. In his urban allegory, the malaise of a "liquid society"[3] (Bauman 2000) is expressed in the stigma of an epidemic that corrupts the systems of connections from within and alters the urban synapses.



Fig. 1: Dan Graham, "Row Houses" 1966

1.2 After Sprawl. Public spaces in liquid cities

As in Dan Graham's famous images on the uniformity of American suburbs [4], the solitude of the buildings described here bears the watermark of the unsolved dilemma of a lack of spaces of relation as the connoting feature of the city-archipelago. If the public square and the block can no longer perform the role of matrixes in the city space, then the absence of an articulation of open spaces and

of contact, in their capacity as public places, is the glaring manifestation of a further mechanism of social disintegration.
The idea of a ground project [5] (Vigano 2010) as the place and occasion for mediating between the players in the decision making process of *vivre ensemble* can also be seen as an action of building a sagacious juxtaposition of different systems of use and multiple spatial practices.
The role of community spaces, in reformulating a collective dimension of housing, would be determining in renewing the housing fabric, as is recognised by studies on the sociology of visual communication[6]. It has long been shown how both the human and city landscape are interdependent, and just how strong are the repercussions of socio-cultural transformations in urban planning.
If already in the 1950s Siegfried Giedion highlighted the need to humanise the new city settlements, those based on repeating the prototype of the "family cell", a re-education towards collective life then seems even more necessary today.
In a passage of his *Architecture et vie collective*, Giedon illustrates the rift between thought and sensibility as the hallmark of the planning culture of the age "(...) *le droit à l'éducation de la vie emotionnelle des masses n'existe pas, ou bien il est consideré comme accessoire et abandonné aux spéculateurs et aux agitateurs sous prétexte qu'il s'agit là de propagande politique*." [7] The right to an education of emotional and sentimental life corresponds to a need for cultural and social emancipation. An urban project that does not address its actions towards the community involved in the transformations, more so than towards the transformations themselves, is unthinkable. The link with the land, according to Augustin Berque, takes place through the oikumene. The oikumene is the true human dwelling.
In Paolo Amaldi's perspective, it is in the deviation between designed project, namely planned, and lived space, that the unease of our age is established: "(...) cette opposition entre espace vécu et espace dessiné est aussi une façon de nommer et de pointer du doigt les instruments modernes de planification qui se sont largement dévéloppés dans l'après-guerre, lesquels tendent à gérer et organiser le territoire en plan, en neutralisant la dimension temporelle et le vécu quotidien." [8]



Fig. 1: Meggie Schneider, Douze Dîners. Partager une table dans l'espace public, 2011. Les Olympiades, Paris



Fig. 1: Meggie Schneider, Douze Dîners. Partager une table dans l'espace public, 2012. Ivry-sur-Seine (with Stefan Shankland, Atelier / Trans305, Ivry-sur-Seine)

2 Exploring the archipelago/ Traversing the frontiers. A case study

Situated on the metropolitan axis connecting Lyon to Saint-Eienne, the city of Saint-Chamond is a polycentric conurbation of about 35.000 inhabitants. Over the last few decades, it has suffered the consequences of a general break-up of the city model based on the establishment of industrial zones on the city margins.

Saint-Chamond is a city "*en attente*" awaiting reconversion, environmental clean-up and renewal. Its urban fabric, bearing the traces of a recent industrial past, opens out in "friches" or brownlands that are frayed along diverging lines as far as the Pilat regional natural park. Almost a century ago, Frank Lloyd Wright in his "The Disappearing City" talked of the forces tearing the city apart in terms of emancipating energies. "The lovers of space" could start off again, in this urbanity hallmarked by the interpolation of the tropes of the city with those of the country, precisely with these "(...) forces exercising pressure on the city."[9]

The multitude of frontiers opening up like fault lines between the city archipelago that have become so widespread in the last century throughout the southern part of the city and the large territorial systems made up by the vast Pilat regional natural park, by the disused industrial zones on the Gier river and by the rail network, amplify the natural friction between resistant and ephemeral structures, between strong and weak appurtenance.

Today on these fringes, together with the system of broad scars of disuse, there is an archipelago of "family capsules", detached villas, marked by sporadic connecting points between urban life and nature. This molecular system has introverted the idea of open habitable space and established a lifestyle based on estrangement with respect to the collective city space and on individual movement by car.

The individualist model of "*maison en milieu d'ilot*" (house in the middle of the lot) seems little sustainable today; architects, researchers and town planners are all hastening to redefine the settlement rules of this urban fabric urged on by the twofold need of physically and visually reconnecting up with the large natural park and intensifying, albeit ineffectualy, the density of the lots.

The challenge begun by the municipality to reinforce the settlement framework with a weak densification, through the directives of the latest PLU [10] (2013) and adoption of a BIMBY (*build in my backyard*) program [11], encounters a series of dilemmas acting on different scales. These range from the difficulty of guaranteeing a landscape coherence to the disordered periurban archipelago, to the dialogue to be restored with the traces of the past, from the torn mesh of detached housing that has become denser on the ridges or along roadways, to the large *maisons de maître* (mansions/country

house) with their big abandoned gardens and endless enclosure walls, today largely perceived as "*un devoir de mémoire*" (duty of remembrance).
What kind of intervention might favour a process of regeneration of urban fabric? What are the devices to implement and to promote a process of sustainable densification? To favour the tactics of adaptation rather than the huge overblown strategic plans, to support and stimulate processes of self-organization and self-regulation, to consider public space as the device to reactivate spatial practices, at the same time redefining the notion of 'residential area' – all these could be the lines of an eco-sustainable procedure.
In the periurban archipelago without any order or hierarchy, the idea of public space deserves reworking; in other words, a different positioning in the framework of urban devices that preside over transformations. The public space as an open, relational configuration, encouraging the activation of networks and exchanges, as a vehicle for flexibility, evolutionary adaptation, active metamorphosis, would seem to be the most coherent answer in this scenario.
There are many examples in the contemporary planning panorama. The concept of Deep Planning by Vab Berkel & Bos is an eminent departure point for planning theories based on adaptability to the environment and self-organisation. The principle they postulated of 'continuous difference' opens up the world of architecture to the concept of mutation following self-regulating processes. While James Wines is once again proposing the ecological paradigm of the 90s, formulating an interpretation of architecture as a system of 'passages', MVRDV through their projects (as Data Town, Private KM3-3D, etc.) are putting forward an idea of the city based on a new alliance (that of Ilya Prigogine) between nature and technology, according to principles of self-sustaining architecture. Flexibility, lightness, mobility, ecosystem is their paradigm.

2.2 The living suburbs: how to represent the transformation

\\ Atelier S7|D1 « Dynamiques architecturales et urbaines » 2013/2014
"Le projet de l'espace public comme enjeux d'une densification douce"
Ecole Nationale Supérieure d'Architecture de Saint-Etienne. Directrice de l'atelier: Silvana Segapeli Partenaires associés à l'atelier: Arnaud Carré, DDT-Loire, Cédric Boussuge, CEREMA Centre-Est

"We do not have to be afraid of the change, but rather try to understand its principle: the imagination produces the present, and mutually, the present product the imagination. As we shall see it, the change shows itself by the interaction repeated by the imagination and the present." *Moo Do Chul Hahk*, Hwang Kee

This Laboratory, in partnership with local actors *Direction départementale des territoires/DDT-Loire* (sustainable territorial development) and *Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement/CEREMA-Direction Territoriale Centre-Est* (The Centre of Technical Studies and Equipment), has enabled students in the workshop on architectonic and city design of the Master "*Materialités Contemporaines, Art, Paysage*", to (re)interpret the notion of urban plan and (re)define interdependent connections between public space and architecture, urban fabric and nature.
The planning process workshop began with a phase of exploring the territory, called "*Pratiques exploratoires de l'espace*". Understanding the terms *transurbanza [12]*, (walking/knowing), *erranza* (city roaming), walkabout, drift, city walk, has led to defining a set of protocols to observe the city archipelago and has formed the basis of a collective and cooperative work. The sensitive reading of this *milieu* presented the challenge of a subjective, emotional representation of the real situation. Cartography as a system of visibility, one of the possible systems, somewhere between icon and diagram, was the theme leading to a work of accumulting material, of comparing different viewpoints, of different receptive regimens. Reading the human landscape in order to represent both the visible as much as the indecipherable, the latency as much as the transformation, has steered the entire first series of reflections.
In his long artistic career, Bill Viola has cut a very precise groove in the field of representing transformation. His videos delicately reveal the mystery of time as an accumulation of passages, in which there is a mutation, an evolutionary condition in each precise moment. In the desert of Chott-el-Djerid, with an extremely sensitive 800 millimetre telephoto lens, the transformations of a drop of water depict a desert of multiple colours as never seen before.
Breaking with the dictatorship of the zenith-view paradigm of the system of interpreting the city, closing up the distance between object and observer and starting off again from the body as the foundation of both reception and understanding, appeared from the start as the main criteria of the sensitive approach.



Fig. 2: Saint-Chamond and the Natural Parc of Pilat (image: Silvana Segapeli)

The walk as aesthetic practice is a way of rediscovering the role of the body in the space, from one *milieu* to another. A reading of the unstable spaces through the series of traces, evocative signs and invisible thresholds has allowed identifying 'ambiances' of a different matrix.
Learning to observe, to listen to sensations and emotions, integrate individual codes with the shared codes of representation, to be aware of the statute of the observer as an individual but also part of the observed surroundings, extend the perceptive process by multiplying the observation points and extracting the object from the automatism of perception (Shklovsky 1917) these are, in brief, the motives leading to the compiling of sensitive living maps.

Bibliographical References

[1] BOERI Stefano, *L'anticittà*, Roma-Bari: Laterza, 2011
[2] BOERI Stefano, *op. cit.*
[3] BAUMAN Zygmunt, *Liquid Modernity*, Cambridge: Polity, 2000
[4] GRAHAM Dan, "Row Houses, Row of Sweater in Discount Store" 1966
[5] VIGANO, Paola. *Territori dell'urbanistica*, Roma: Officina Edizioni, 2010
[6] KRASE Jerome, *Seeing Cities Change: Local Culture and Class*. Farnham: Ashgate, 2012
[7] GIEDION Siegfried, *Architecture et vie collective,* (Translated by GEORGES Pauline), Paris: Denoël 1980, 224 p. Translation of original *Architektur und Gemeinschaft*
"The right to education of the emotional life of the masses does not exist, or it is considered incidental and abandoned to speculators and the agitators on the pretext that it is political propaganda"
[8] AMALDI Paolo, *Architecture - Profondeur – Mouvement*, Gollion: Infolio, 2012, 495 p.
[9] WRIGHT Frank Lloyd, *La ville évanescente*, Gollio: Infolio 2013, p.170, (Translated by MASSU Claude), New York: F.W. Payson 1932, 224 p. (Translation of original *The disappearing City*)
[10] Local urban planning project
[11] http://www.blog.la27eregion.fr/BIMBY-Build-In-My-Back-yard
BIMBY (Build In My Back yard) : shifting to an alternative approach of urban sprawl, is a project supported by French National Research Agency, headed by David Miet (CETE Paris Region) and Benoit Le Foll (CETE of Normandy and Center Regions). Challenge : Single-family homes to gain ground while curbing urban sprawl

It would appear that the urban sprawl phenomenon has come up short on both the city planning and political fronts. Suburban area development has often been considered the root of all evil, conjuring up increased grid and energy spending, considerable, commute- driven pollution, and damage to biodiversity and farmland. Unable to resist the phenomenon pandemic any longer, France seems to have joined the movement : Out of 34 million housing properties, over half (19 million) are single-family residences, and 160,000 pop up each year. What will it take to change how we view this growing trend that has taken root over the past few decades, and put a positive spin back on this type of construction, which continues to rank among those preferred in over 80% of French households ? Such is the goal set forth by research-action program Build In My Back Yard (BIMBY).

[12] CARERI Francesco, *Walkscapes. Camminare come pratica estetica*, Torino: Einaudi, 2006

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
Aversa / Capri, 12,13,14 June 2014

Technical and scientific protocol for the multitemporal airborne surveying

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Abstract
This paper presents a first technical-scientific step on the multitemporary airborne surveying activities (2012-2013) for the discretization of the cannabis' cultivation in natural, off and inaccessible environment. These activities were conducted by a university-military team of the Department of Architecture and Industrial Design "L. Vanvitelli" of the Second University of Naples (SUN) and of Gruppo Esplorazione Aeromarittima (GEA-GdiF) of Guardia di Finanza. After verifying the scientific procedures planned, and experiencing the technical and operational protocol at the air task in Albanian territory (2012), the attention has been given to multi-temporal reading, and the intersection of the data acquired - through the platform sensors, specially configured - and stored in a geodatabase. The integrated interpretation of the data produced a territory's theming, based on the previous experience, the subsequent oriented planning of flights - also with a view to also with a view to resource optimization – and based on the discretization of tree species in relation to geomorphological data in support of the signature spectral.
During the last airborne surveying activity (2013) in Albanian territory, it was also used a high resolution photographic camera added visible information to spectral information (scientific type). The visible information are especially useful for communicating the procedures and the results achieved to the institutional bodies of the Republic of Albania.
The comparative results of the two years of remote sensing led to a greater awareness and understanding of the specific nature of the Albanian territory, and of the techniques and temporal processes of cannabis' cultivation, so to highlight a series of items for study and ex-ante control the phenomenon's evolution.

Keywords: Airborne Remote Sensing, Hyperspectral survey, Thermal survey, GIS, multitemporary analysis.

1. Research methodology (Carmine Gambardella)
The research originated from the fact that any action aimed at the defence and development of natural and man-made environments cannot be separated from an activity of multi-dimensional knowledge-based discretization of the traces that characterize the Territory, understood as heterogeneous "signs" of anthropogenic modification and multiform vegetation presence.
The multi-sensor airborne survey in national and international territory interested synergistically researchers and professors of the Department of Architecture and Industrial Design "L. Vanvitelli " of the Second University of Naples, and the Officers and NCOs of the Aeromarittima Exploration Group (GEA) of Naval Air Operational Command of the Guardia di Finanza. In particular, this operative-scientific partnership has been validated with the Convention for remote sensing activities by airborne

sensors between the Headquarter of the Guardia di Finanza and the Centro Regionale di Competenza BENECON S.C.aR.L., signed on March 21, 2011 and extended on February 25, 2014 .

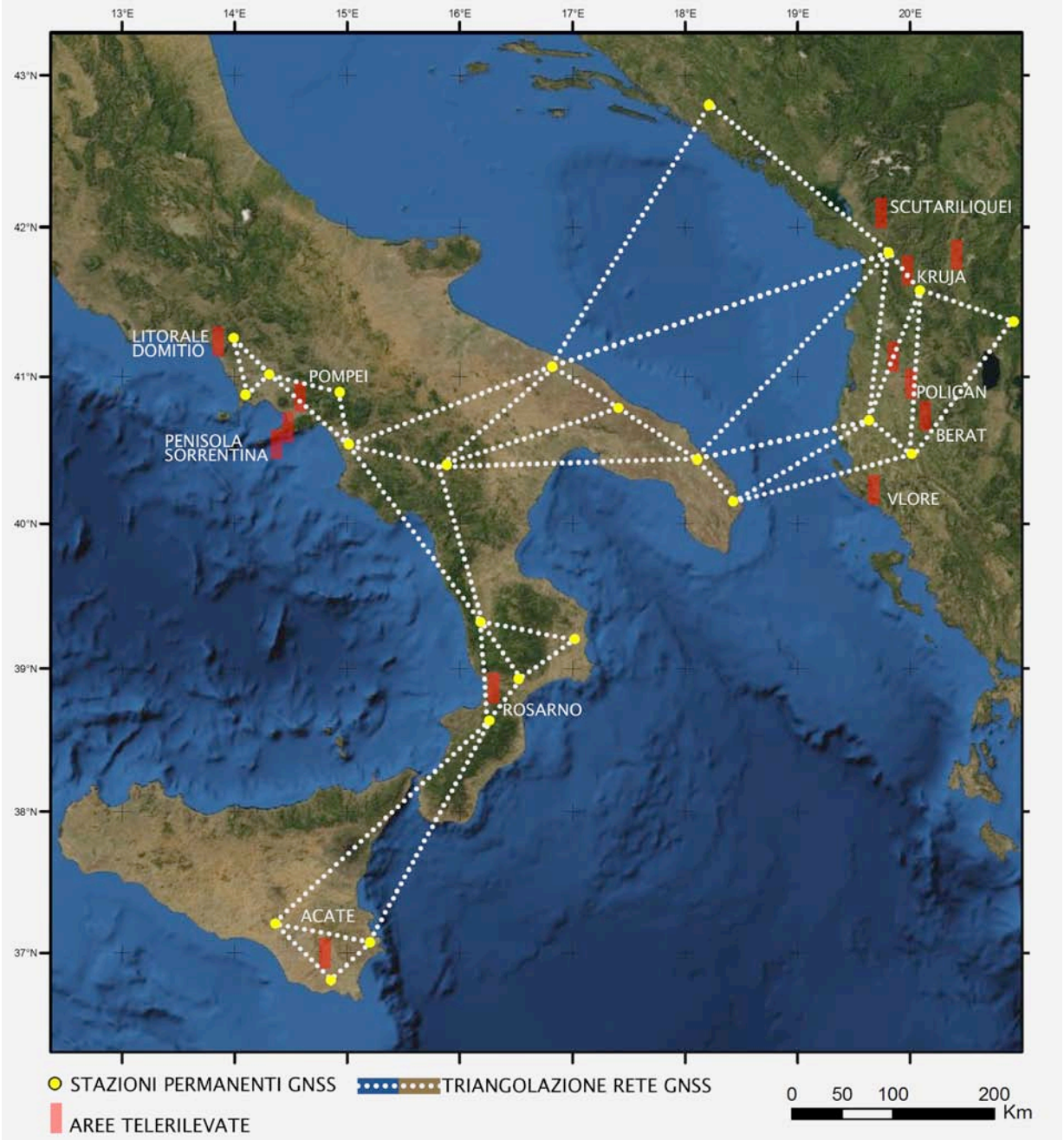


Fig. 1: The multi-sensor airborne survey in national and international territory.

The aerial exploration in Albanian territory, which is the object of these notes, began in June of 2012 as part of "Operating Protocol between The Public Security Department of the Italian Home Office and the Central Department of the National Police of Albania", signed on May 16, 2012 in the city of Tirana. The mission of airborne remote sensing on the Balkan territory continued in June 2013, following the renewal of the Operational Protocol and is currently in progress.
The airborne surveying (2012-2013) in Albanian territory was aimed at the characterization and the discretization of the cannabis' cultivation in natural, off and inaccessible environment. The multi-sensor platform - experimented with different instruments and aeronautical configurations - integrates active and passive sensors, for the airborne remote sensing, that allow for the scanning of geometric and spectral components of the Territory. The LIDAR sensor provides the discrete morphology (cloud of points) of the territory overflow, the aerophotogrammetric camera, the hyperspectral and the

thermal sensors record - each for its own technological declinations - the electromagnetic reflection of the territory in the segment between ultraviolet, visible and infrared thermal.

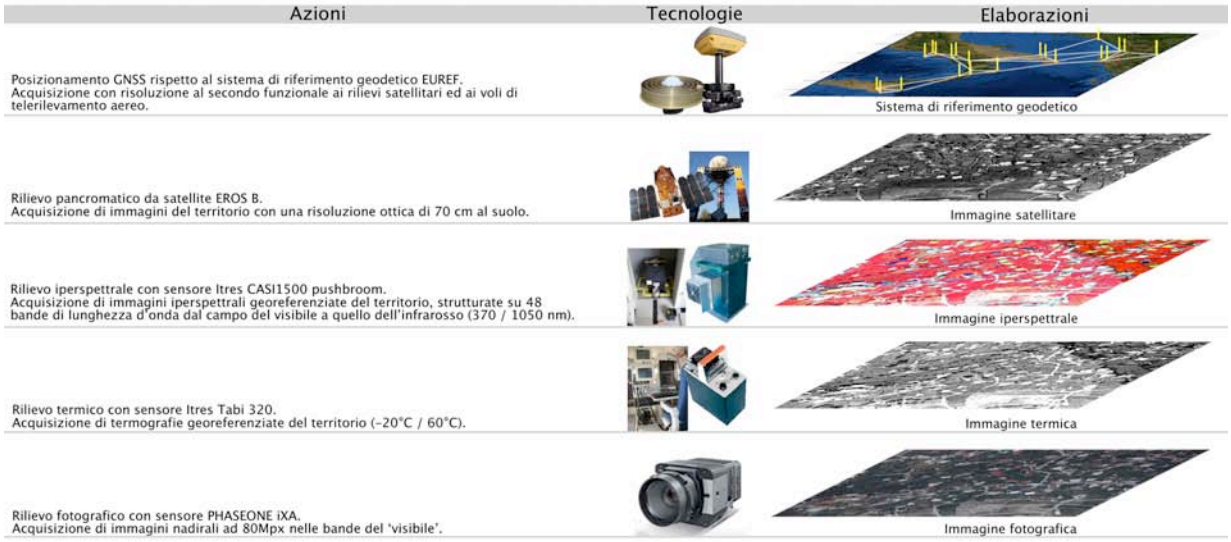


Fig. 2: Airborne platform sensors.

The "model" resulting from the integration of the acquired data in a single geographic reference system , contains in digital form, the dimension of the visible and invisible, tangible and intangible heritage of the area examined. The syncretic analysis, selective and simultaneous of the data opens up avenues (itinerary) of research in relation to specific discretization expectations. According to this methodology, the spectral analysis of the vegetation from near-infrared to thermal infrared allowed for the discrimination of particular tree species according to the principles of indirect survey.
Those technological professional and scientific synergies, between the University and GEA-GdiF, are outlining an experimental definition of a technical-operational Protocol on multi-dimensional Territory knowledge as an essential instrument for a deeper economic-financial investigation and its relation to the socio-urban fabric to achieve fiscal equity and social justice.

Protocollo tecnico-operativo per il telerilevamento aereo con sensori iperspettrale e termico

1. installazione della piattaforma sensoristica
2. calibrazione geometrica dei sensori componenti la piattaforma
3. architettura del GIS
3. progetto di telerilevamento iperspettrale e termico
4. attività di telerilevamento iperspettrale e termico
5. redazione delle carte tematiche e lettura critica integrata dei dati

Fig. 3: The technical-operational Protocol.

The operative-scientific partnership by applying the technical-operational Protocol in Albanian territory (2012-2013 has achieved a great results for the mapping and identification of illegal plantations. In particular, at the end of the aerial missions completed in two years (2012 and 2013), the activity of remote sensing was conducted on more than 15% of the area of the country. The hyperspectral survey and high-resolution photographic analysis of vegetation have detected more than 325 hectares of land planted with cannabis.

2. Geographic Information System: a tool for multi-temporal analysis (Nicola Pisacane)

The different steps related to the mission of remote sensing survey for the detection of cannabis crops are supported and recorded through the use of a GIS platform. The possibility offered by these systems to manage all the data produced and collected throughout the mission led to subsequent processing operations useful to police tasks connected with the activities of remote sensing. The integration of data acquired during two missions (years 2012 and 2013) and during the same annual mission through geoprocessing tools for information and maps allows comparison, merging and analysis of complex land data.
The activities previously described through the operating protocol involved the take-over of maps of the national territory of Albania. In particular, the scheduling of airborne missions with hyperspectral sensor were carried out on the LFC-Europe (Low Flying Chart) map. The LFC map is realized to support the aerial operations at low altitudes. The navigation maps are all in the format CADRG (Compressed ARC Digitized Raster Graphics), a raster format for scanned maps published by United State of America - National Geospatial-Intelligence Agency (NGA-USA). This map format has been designed to meet the requirements of digital cartography. Its structure is particularly suited to load-on-demand and allows you to select the coverage that is best adapted to a given display scale. In particular some maps used for this mission are taken from series Italian CADRG produced by CIGA-Italian Air Force, Ministry of Defence in 2012. In particular we use the map 5NINM3134 which cover Italy territory but also other States on Mediterranean sea.
The flight planning, designed in accordance with air navigation standards and produced in close collaboration among the researchers team and the one of Italian Guardia di Finanza, is totally prepared on GIS platform through the identification and representation of flight run lines and the table display of the coordinates of start and end of each run lines and start and stop operation of recording with ITRES CASI 1500 hyperspectral sensor. Multi-temporal analysis, subject of this research, has been possible also thanks to similar flight plans missions in two different annuity and within the same year, in order to carry out a diachronic comparison of the same territories from one year to another, both in the evolution of farming from planting to harvest. When planning air missions, the import within GIS of information about the land orography, through the Albanian territory Digital Elevation Model (DEM) with a resolution of about 30x30 cm, allowed to define not only the average flight altitude but also the average land altitude for each run line, as well as the ground resolution of the digital data acquired and consequently its metrical accuracy necessary for the subsequent operation of identification of the plantations and multi-temporal comparison.

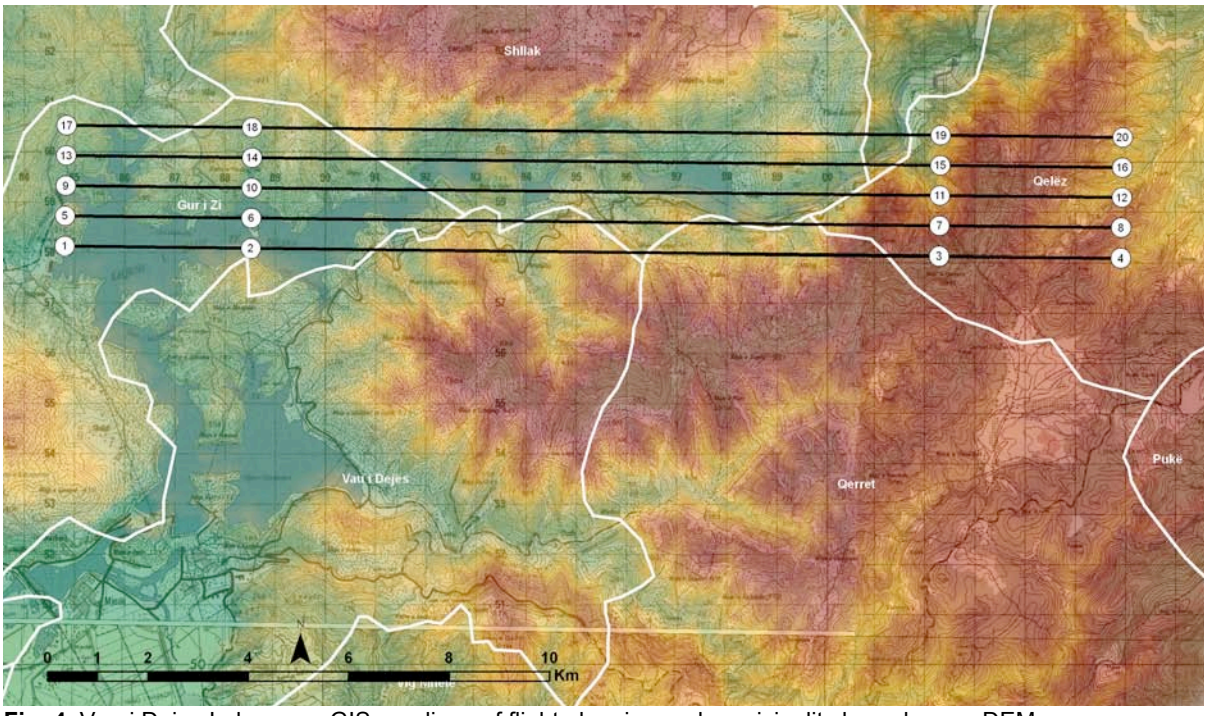


Fig. 4: Vau i Dejes Lake area. GIS: run lines of flight planning and municipality boundary on DEM map.

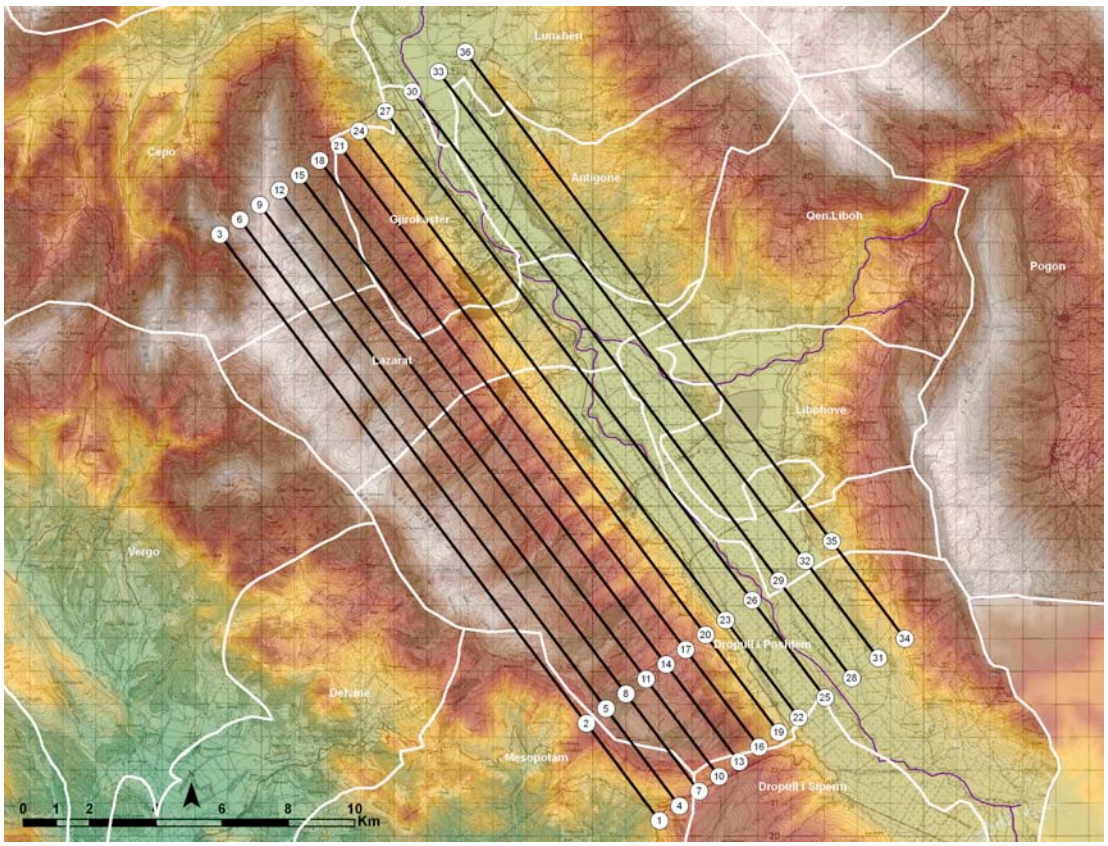


Fig. 5: Lazarat area. GIS: run lines of flight planning and municipality boundary on DEM map.

Inside GIS system are also imported vector layers with national spatial data. From different sources, in fact, we have acquired information about the hierarchy of the administrative division of the territory (country, district, municipality), as well as roads and waterways. These information are also crucial to identify the areas of interest on which investigate together with the indications of "risk levels" (probable presence of plantations) provided by the Albanian police. The presence of access roads to plantations, as well as waterways to supply irrigation pools may represent a further clue in the search operations.

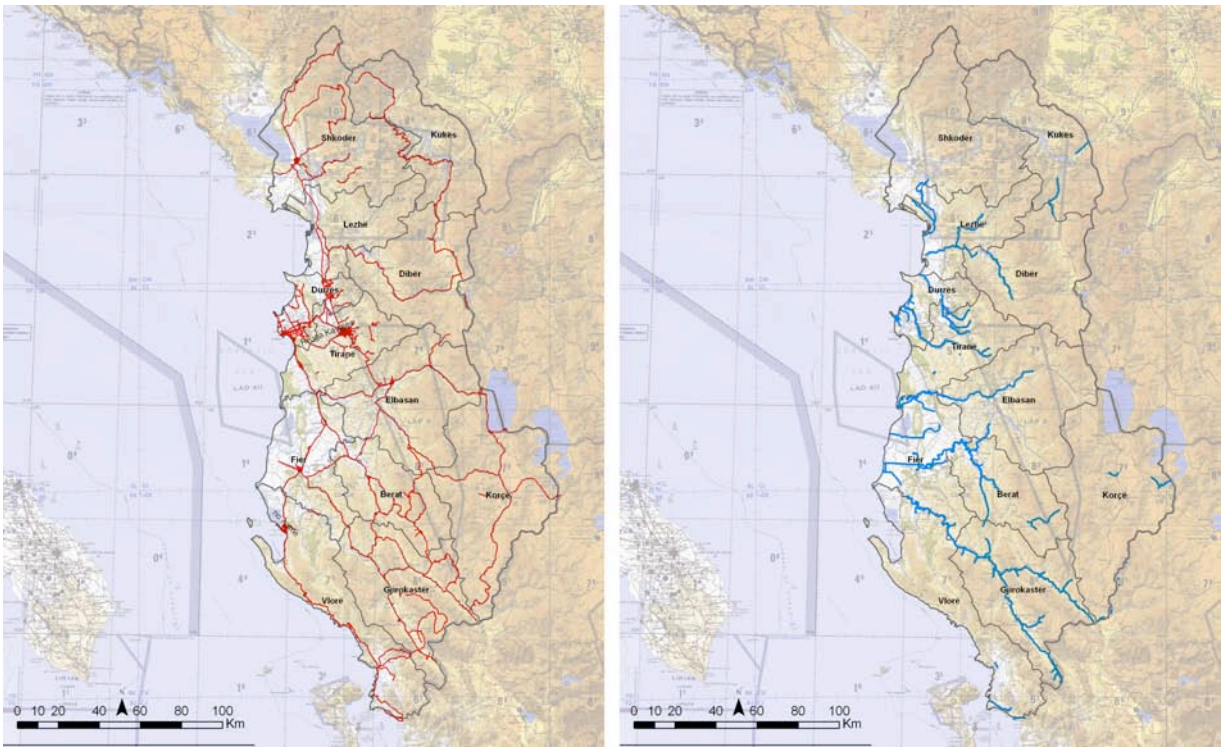


Fig. 6: GIS: road and district boundary layers on aerial navigation map (at left); GIS: waterways and district boundary layers on aerial navigation map (at right).

The flight planning has also been supplemented by further data, such as, for example, weather conditions and their evolution in the short and medium term in order to plan and execute flight activities in full compliance with the operating parameters of ITRES CASI 1500 sensor and high resolution camera to guarantee the best quality of the hyperspectral and photographic data acquired. In addition, all flight plans have been exported from the GIS platform into an interchange formats for tablet device used by the pilots, through dedicated applications, during the flight missions. During these operations are also recorded all mission data and traced the flight patterns with GPS tablet device supplied to the flight crews. Furthermore the platform has been implemented with the data for the thermal environmental factor because high temperatures could interfere with sensors and with the permanence of the crews in thermal stress.

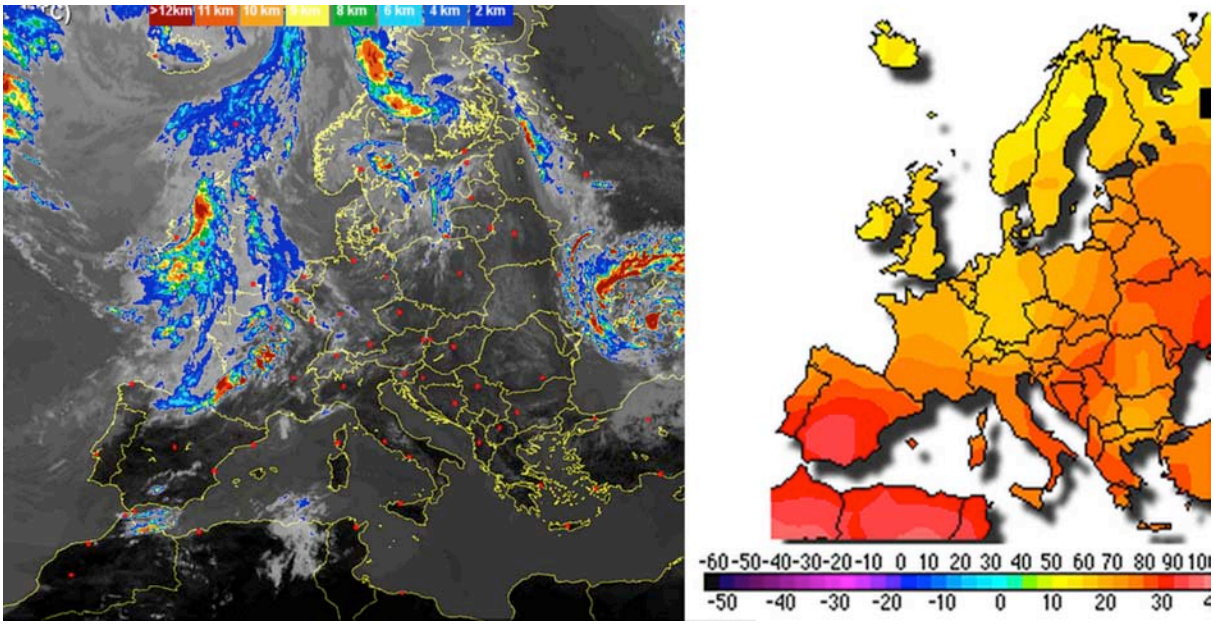


Fig. 7: Weather condition and thermal environmental factors.



Fig. 8: Flight pattern and data mission on tablet device.

During the stage of hyperspectral data acquired processing, after airborne mission, the flown run lines are examined and identified the areas with the possible presence of cannabis plantations. The analysis, carried out through the ENVI software for processing and analyzing hyperspectral image, is aimed at the perimeter of the areas in which the analysis of spectral signature and the comparison with the high resolution photographic image leads to the identification of plantations. In these areas, through software processing, are drawn the Region of Interest (RoI) corresponding to the geometrical georeferred perimeter of plantation on hyperspectral map. The seamless integration between the different platforms and compatibility of geographic data products has allowed the interchange of data among the management software of the hyperspectral data and GIS platform. The import of the RoI, previously drawn on GIS platform, has allowed all subsequent geographical analysis, as well as the creation of the database associated to the graphical data of the perimeter.
This method has followed two procedures with some little differences of calculations for two different geographical areas: the city of Lazarat and other areas identified in the Albanian country. The very different intensity of cultivation in the two areas has meant that the procedures were not the same, also in order to proceed to the multi-temporal data comparison between two years missions.
For Lazarat municipality, emblematic case of intensive cannabis cultivation, the perimeter has referred to the whole urban area and peripheral one, excluding the few non-cultivated areas, buildings and roads. The perimeter was carried out directly on GIS in which has been mosaicked all run lines of hyperspectral images of the interested area, as well as high resolution photographic and a satellite image from Earth Remote Observation System-B (EROS-B), performed on the same day of aerial survey. At same time we verify the spectral signature of the data acquired with CASI sensor and we cross these information with photographic images. Of this large cultivated area we calculate the extension and for some sample areas calculate the number of plants and the average number of plants per square meter and then estimated the total number of plants and the amount of production.

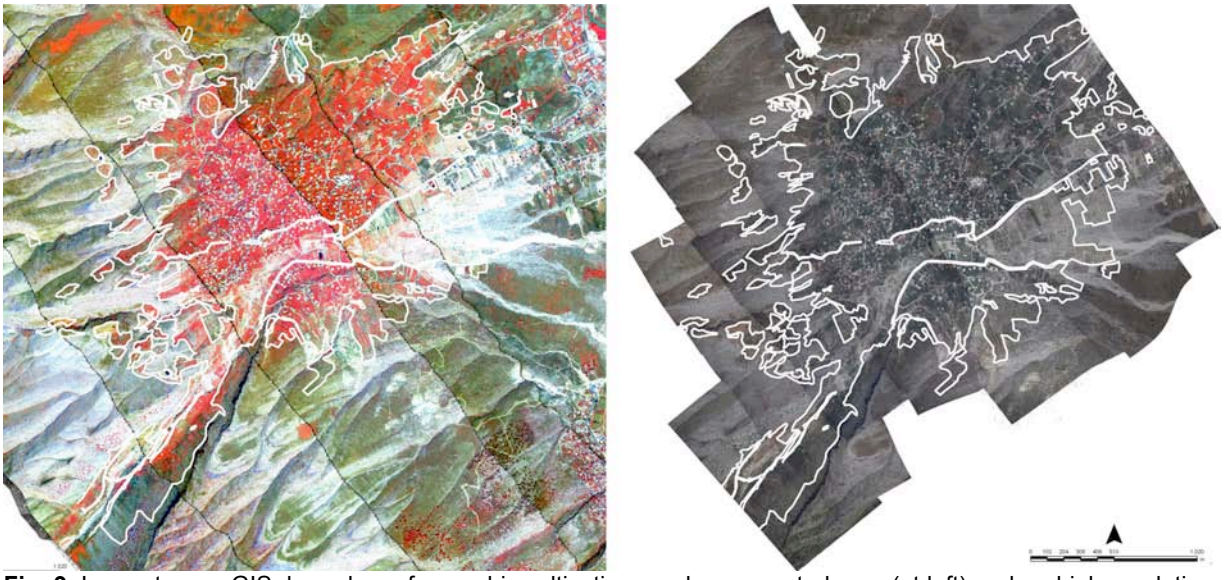


Fig. 9: Lazarat area. GIS: boundary of cannabis cultivations on hyperspectral map (at left) and on high resolution camera image (at right).

The other part of Albanian country, affected by the same phenomena but not so intensive, has been surveyed and analyzed with a similar process for perimeter, but directly in the hyperspectral data analysis software and subsequently exported in GIS. The analysis of the data, however, has been applied to areas very parceled. In particular, the 2013 year mission has led to the census of 304 plantations with average size of 150 square meters. For these plantations, often localized in areas deliberately concealed, sometimes wooded or with a complex orography, it is identified the centroid of each RoI, calculate the geographic coordinates of these points and prepared a report in which for each plantation, in addition to the above data, is compared the hyperspectral image with high resolution one. In order to facilitate the sharing of geographical location of the plantation were generated placemarks in .kml format, coded with the same standard used for the geographic database, viewable on Google Earth.



Fig. 10: GIS: boundary of Albanian district and centroid of cannabis cultivations on aerial navigation map (at left); placemarks on cannabis cultivations in Google Earth (at right).

3. From the airborne remote sensing to the multitemporal data analysis: the case study of the Vau i Dejes Lake in the Prefecture of Shkodra, Albania. (Alessandra Avella)

The integrated interpretation of information acquired during the airborne missions carried out in the Albanian territory in the years 2012 and 2013, allowed the multitemporal analysis and characterization of the area surveyed. In particular, the testing of multi-temporal analysis (2012-2013) was performed on the territory that comprises the Vau i Dejes Lake in the Prefecture of Shkodra - the subject of these notes - through the application of the technical and operational Protocol for the integration of optical data, hyperspectral and thermal data by airborne multi-sensor platform. The Protocol was validated by the university-military research group during airborne surveying carried out since 2010 in national and international contexts.

In this Protocol, the first activity is the acquisition and systematization of either numerical or rasterized maps, official orthophotos, and three-dimensional models of each geodetic certified reference of the territory, archived in UTM-ED50 coordinates in relation in the time-zone to which it belongs. Most of the mapping products were provided, before the air mission of 2012, by the CIGA (Aeronautical Geotopographic Information Centre) of the Italian Air Force, in order to “structure” the geographical data base upon which to plan airborne surveys, systematize the acquired data, project the homologous information on the corresponding layers, diachronically analyze the recorded data in a cyclic process of targeted analysis and full verification of the information.

The aim of the first step of the research consisted in the acquisition of hyperspectra, thermal and photographic images aimed at the analysis of the Albanian territory in relation to the selection of the areas that are more suitable to the illicit cultivation of cannabis because of the morphology, the orography of the territory, the distance from city centers, the localization in natural inaccessible and unaffordable contexts.

The multi-sensor platform - experimented with different instrument and aeronautical configurations - installed on board the Piaggio P168 of the ‘Gruppo Esplorazione Aeromarittima’ of the Guardia di Finanza - integrates active and passive sensors for airborne remote sensing that, by the recording of the electromagnetic 'responses' of the natural and built environment, allow the scanning and the return of data necessary for the representation of the territory in the visible range and in the thermal and hyperspectral field.

In 2012, the sensors employed to acquire images and auxiliary position and orientation data were: the CASI-1500 characterized by a CCD of 1500 elements (pixels) for the part of the spectral range VIS-NIR; the TABI-320 for the thermal component; the POS/AV, useful to determine the geospatial position and the attitude of the aircraft, integrates an inertial unit with the GPS data and provides the

position and orientation data offset. The POS calculates in real time the position data (latitude, longitude and altitude) and the external orientation.

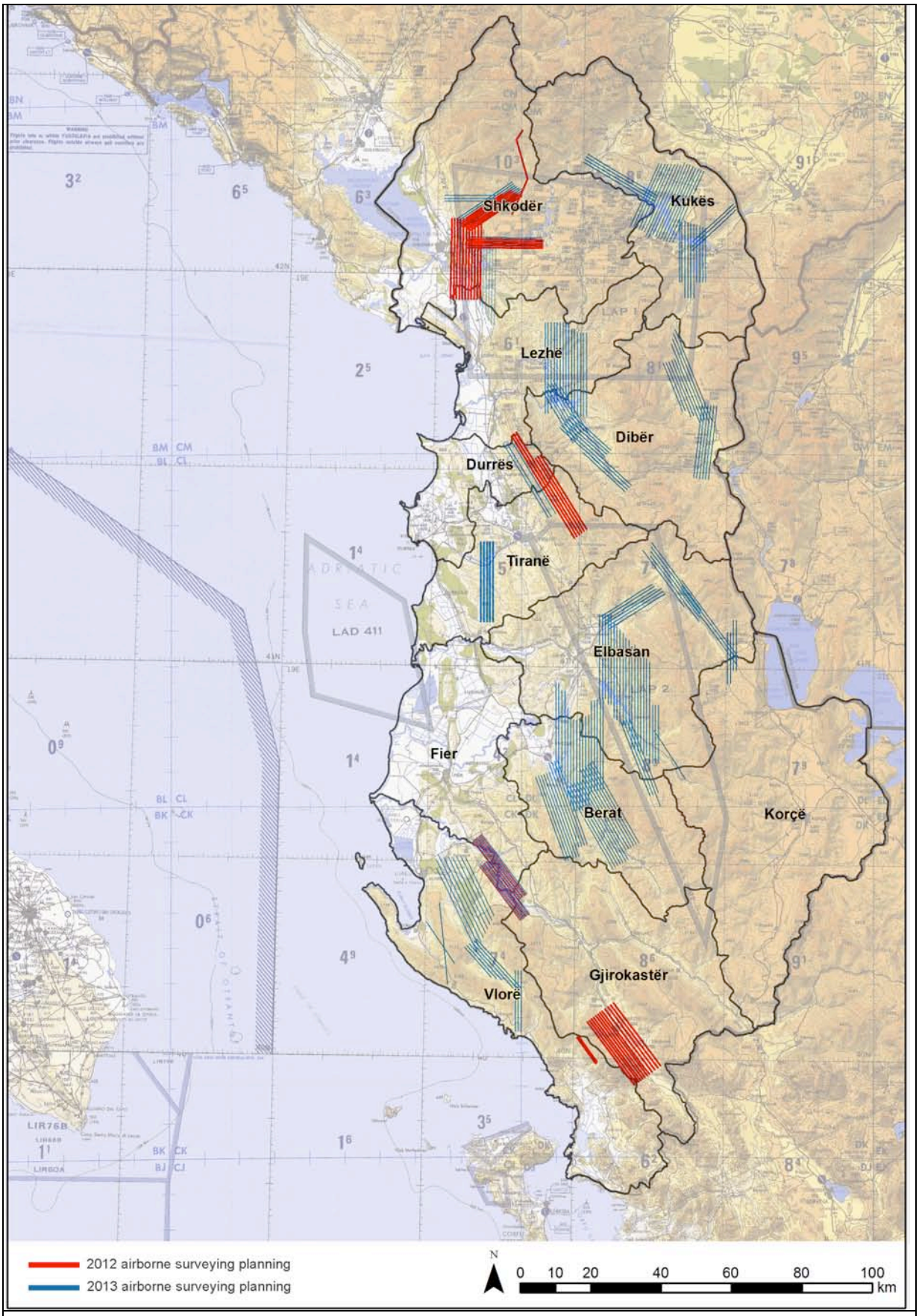
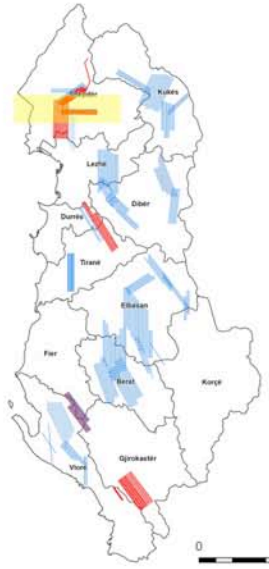


Fig. 11: 2012-2013 airborne surveying planning.

It should be noted that the registration data from the GPS during the flights is an essential prerequisite for the success of the air mission, as well as the efficiency of the aircraft and of the sensors installed on board. In 2013, the multisensor platform has changed: the airborne remote sensing was performed using the same CASI-1500 hyperspectral sensor and adding the PhaseOne iXA sensor that captures orthogonal images to 80Mpx in the 'true color' bands.
The process of geometric calibration of the sensors is performed in order to determine the exact orientation of the sensors in relation to the reference system of the inertial unit that acquires the attitude information of the aircraft during image acquisition. This process precedes the airborne surveying and the following pre-processing data. The airborne remote acquisition campaign was articulated in the following phases: identification of the territory to fly over, definition of the channels and of their spectral ranges of acquisition; planning and execution of the territory scanning; pre-processing of the information acquired; production of thematic maps in relation to possible discretization and the comparative analysis and multi-temporal remote sensing data.
These notes describe the activity of the multitemporal remote sensing (2012-2013) performed in the territory that includes the Vau i Dejes Lake in the Prefecture of Shkodra and in the city of Lazarat. The aerial survey was carried out in both cases by applying the methodological approach of the technical and operational Protocol. The case study of the Vau i Dejes Lake, analyzed in this paragraph, and the city of Lazarat, examined in the following paragraph, have been appropriately selected from the aerial missions planned and performed during these two years over Albanian territory, which was overflown and surveyed for about 15% of its surface.
The multitemporal analysis is comparable for the homogeneity of the following circumstances: the date of acquisition (18 july 2012 | 19 july 2013), planning and execution of the flight, configuration of the hyperspectral sensor; all related to the same Protocol. The decision to test the multi-temporal analysis on these portions of the Balkan territory depended on factors linked to the environmental condition: the selected case studies are paradigmatic of the two most prevalent types of illicit cultivation of cannabis plantations: in situations of impervious and inaccessible nature, those located in the Prefecture of Shkodra, in typically urban context, those in the city of Lazarat.
The Vau i Dejës Lake (Prefecture of Shkodra) and the city of Lazarat (Prefecture of Gjirokastra) have different latitude, orography and environmental conditions. The first is located in the northwest Albania, the second in the south of the country. Located at the foot of a mountainous woodland, the Vau i Dejës Lake is situated at the exit of a gorge between the hill of Laç with an elevation of 367 m and Boka with an elevation of 464 m. The hydrographic network is represented by the Vau i Dejës artificial Lake, Drin River and several streams, the most important being the Gomsiqe brook and the Zazlli brook. All these flow from the mountain of Gomsiqe. Therefore, this study area is blooming and inaccessible for the abundant presence of water and the steep hilly orography. In addition, If one adds that the Vau i Dejës Lake was a strategic area because it was the crossing point of ancient roads connecting the east and the west, it is possible to understand why in this territory were detected numerous cannabis' illegal cultivations.
The morphology and the orography of the studied area, which has approximately an extension of 46 km^2, affect the definition of the navigation files, of the hyperspectral and thermal setting files and of the planning of the flight data acquisition. The hyperspectral setting file is aimed at maximizing the number of spectral bands that can be acquired depending on the conditions imposed by the spatial resolution of the pixel to the ground and the integration time required to detect the radiant energy reflected from the ground The CASI-1500's configuration was set by a spectrum width 408 and 955nm, which is divided into 13 identical bands. The TABI-320's configuration was set by a spectrum width 958 and 1200nm. TABI-320 was used only in the first aircraft missions (2012). The photographic camera PhaseOne iXA with very high resolution, used according to the configuration set by the specific techniques of the sensor, acquired in the 'true color' bands (701 (R), 546 (G), 455 (B) nm).
In Shkodra territory, the remote sensing mission performed at 120 knots (flight speed) from an altitude of 5400 feet above ground, in order to achieve 0,80 square meter pixels. Note that once the flying altitude is known, this value must be added to the average altitude of the terrain (measured ASL - Above Sea Level) to determine the altitude that the aircraft must fly at (ASL) to achieve the specified resolution. To define the flight mission was necessary to plan the scan 'runline' in order to ensure coverage of the study area, and the resolution on the ground corresponding to a pixel size equivalent to that defined in the configuration set. Specifically, for the remote sensing flight on the studied area of Shkodra, were planned 6 identical runlines, taking into account the configuration settings, the acquisition characteristics of the CASI sensor and the morphology and altitude of the territory. For this reason, sections of the landscape are executed for each scan runline. These have a direction as much as possible parallel to the land orography in such a way that it is possible to evaluate the flight height on each "leg" as far as the land height changes. The orography of the studied area conditions, in inverse proportion, the equidistance parameter of the scan runline: the more the orography is steep, as in the territory of Skutari, the lower is the equidistance between the scan runlines.

The parameters surveying set for the remote sensing flight on the studied territory are described in tabular form in the following graph.



Place: Vau i Dejes Lake, Prefecture of Shkodra		
	2012	**2013**
Date:	July 18th	July 19th
Airborne sensors:	CASI 1500 + TABI 320	CASI 1500 + PHASEONE iXA
Wavelength segment:	408-955nm + 958-1200nm	408-955nm + 701(R); 546(G); 455(B) nm
Acquisition time in flight:	6 minutes	6 minutes
Scanned area:	46 km^2	44km^2
Ground size pixel:	0,80 meters	0,80 meters
Storage scanned data:	13 GB	13 GB + 140 GB
Processing time:	5 hours	5 hours
Storage processing data:	18 GB	18 GB + 140 GB
Cannabis' plantations detected:	17 plantations	122 plantations

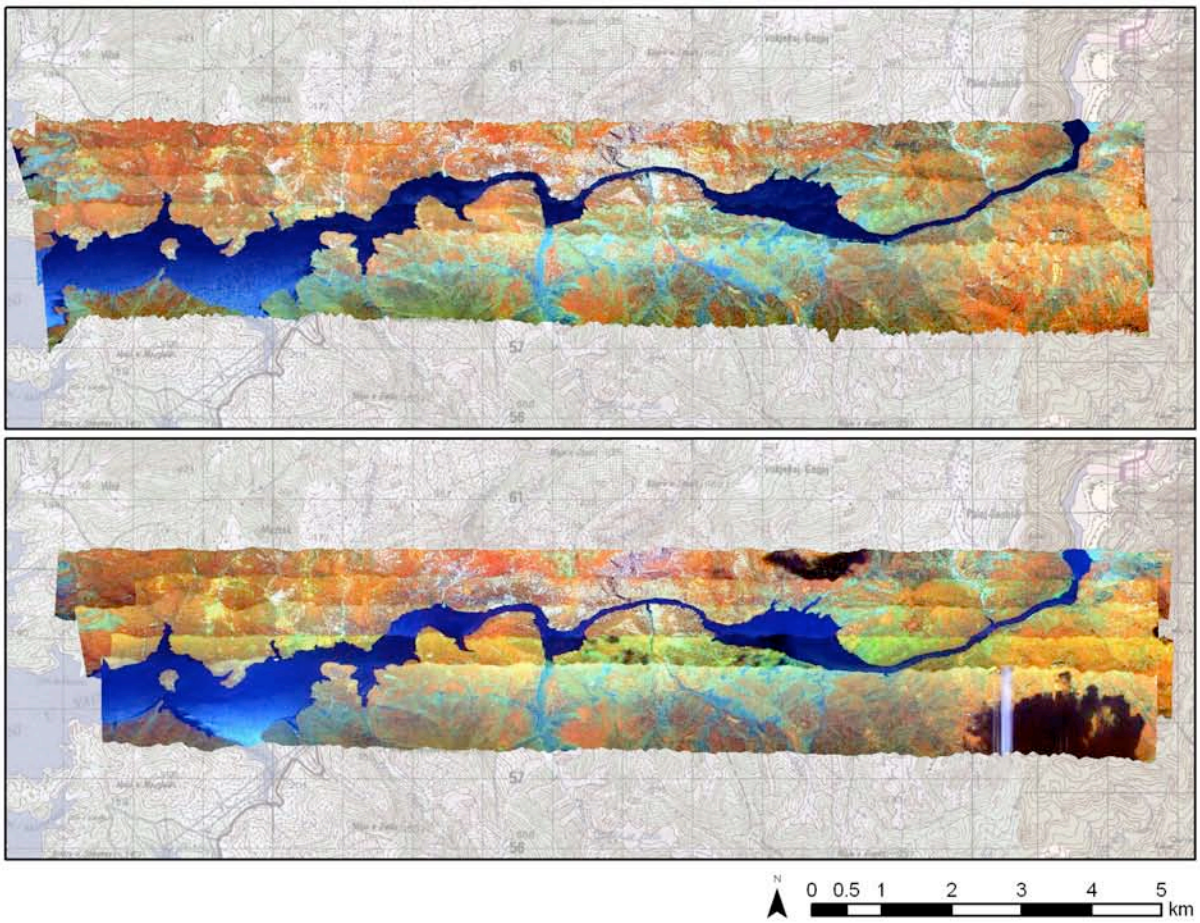
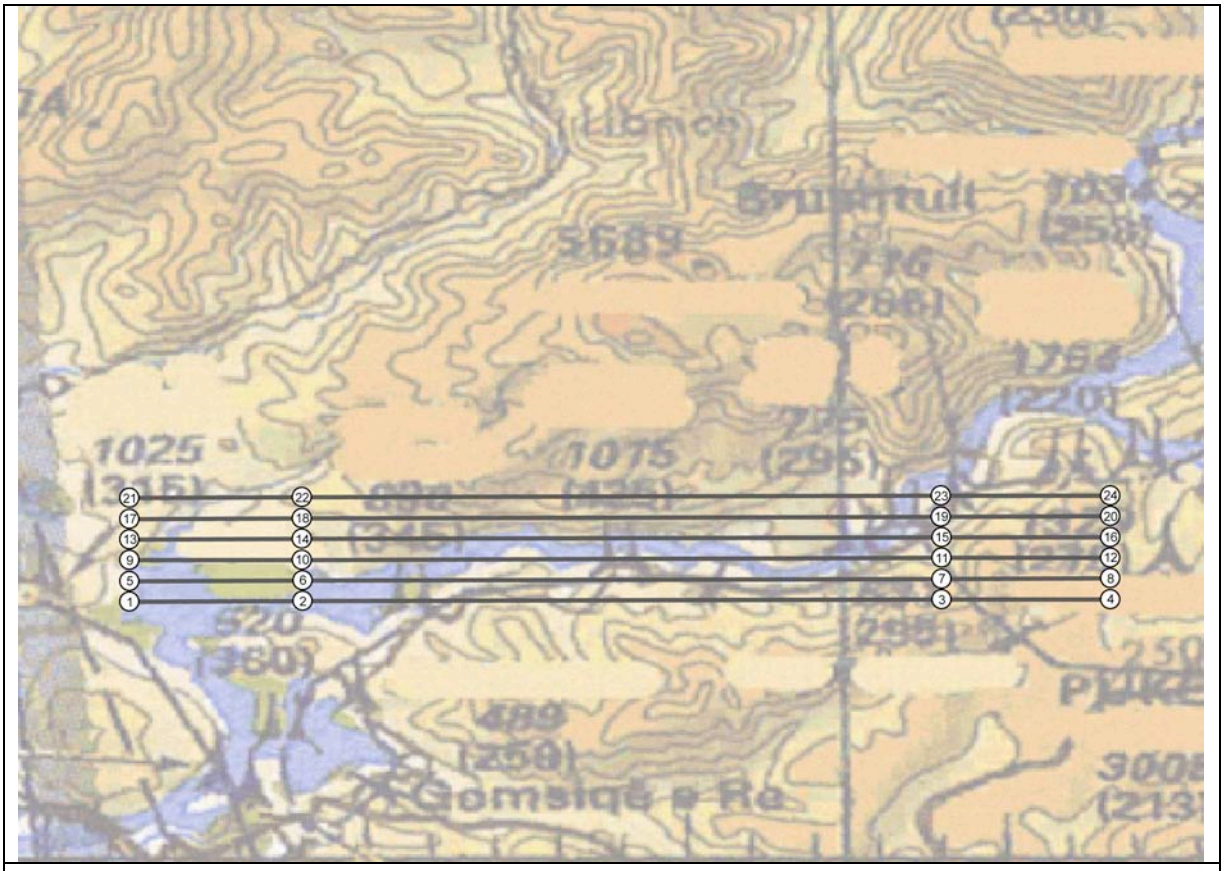


Fig. 12: Airborne remote sensing comparison on Vaui Dejes Lake, Shkodra. Analytic table from planning to post-processing (top), hyperspectral maps dated 2012 and 2013.

The hyperspectral flight, performed in 18 July 2012 and in 19 July 2013 in the Scutari territory, was planned as shown in the following graphic.



Place: SHKODËR LAKE

Boundary coordinates	Runlines	Heading	Flight altitude	Above ground level (AGL)
[NO] 42°5'37"N 19°36'27"E [NW] 42°5'40"N 19°51'43"E [SW] 42°4'3"N 19°51'43"E [SO] 42°4'0"N 19°36'28"E	ID 6	090 degrees	5400 feet	1412 feet

Fig. 13: Flight planning on Vaui Dejes Lake, Shkodra.

The scanning phase, the storage of the recorded data and the pre-processing of the acquired images follow the input in the on-board computer of the geographical coordinates of the scan runlines and of the spectral configuration. Each flight and acquisition phase is recorded automatically in log files of each sensor. For each scan runline planned, the two pushbroom sensors have returned only a raw file, the photographic camera has taken an ordered series of individual frames to be related to the first during the preliminary stages of processing.
The hyperspectral and thermal images, the photographic images, the aircraft inertial and position data, the GNSS permanent stations data, the DSM or DTM models of the studied territory are appropriately archived and organized for the next phases of pre-processing and image processing through software processes.
The image processing is aimed at the correction of the radiometric and geometric errors and at the geo-referencing of the acquired images through three softwares, distinct and sequential: calculation of aircraft position and attitude every second; radiometric correction of hyperspectral or/and thermal images; geometric correction of the latter. Position and attitude processing runs through the integration of GNSS permanent stations data (static acquisition) with inertial and GNSS on board sensors data (dynamic acquisition). GNSS permanent stations, next to the airport and the area of study, must be functioning and operating in a time period that includes the remote sensing flight. During Albanian mission, we have installed two GPS stations because there were not any GNSS Permanent Stations. The Benecon researchers, in 2012 and 2013 remote sensing mission in Tirana, continuously checked the GPS Base Station provided with a pair of Trimble R5700 antennas/receivers.
The GNSS permanent stations data record the satellite coverage of a wide zone, including the airport and the studied area; the inertial- and the GNSS- on-board-sensor data are a combination between

position and attitude data (roll, pitch, yaw), registered every second during the flight, from takeoff to landing. The integrated processing of all these data reproduces the geo-referenced flight path, so that all thermal and hyperspectral images can be automatically referred to scanned area.

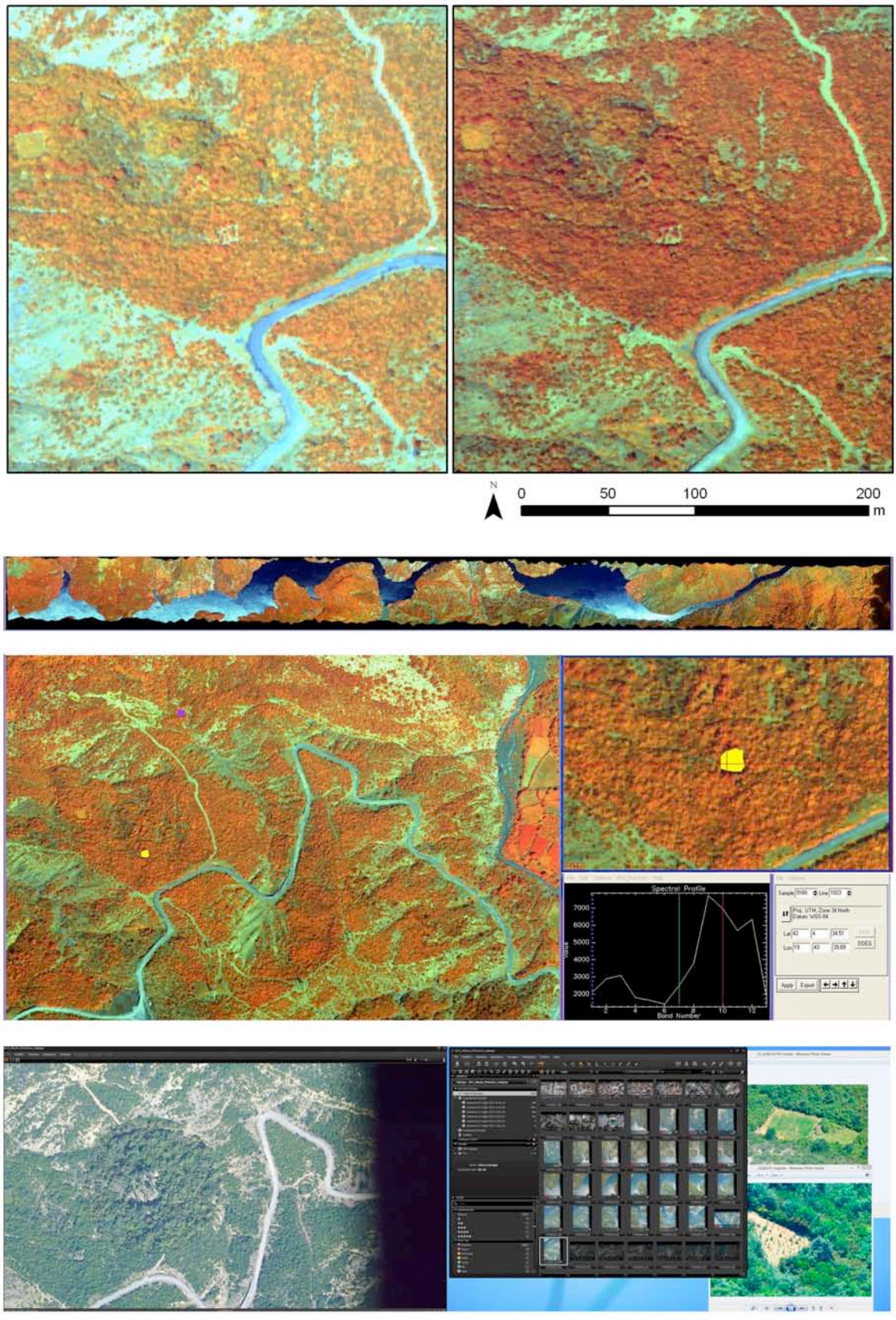
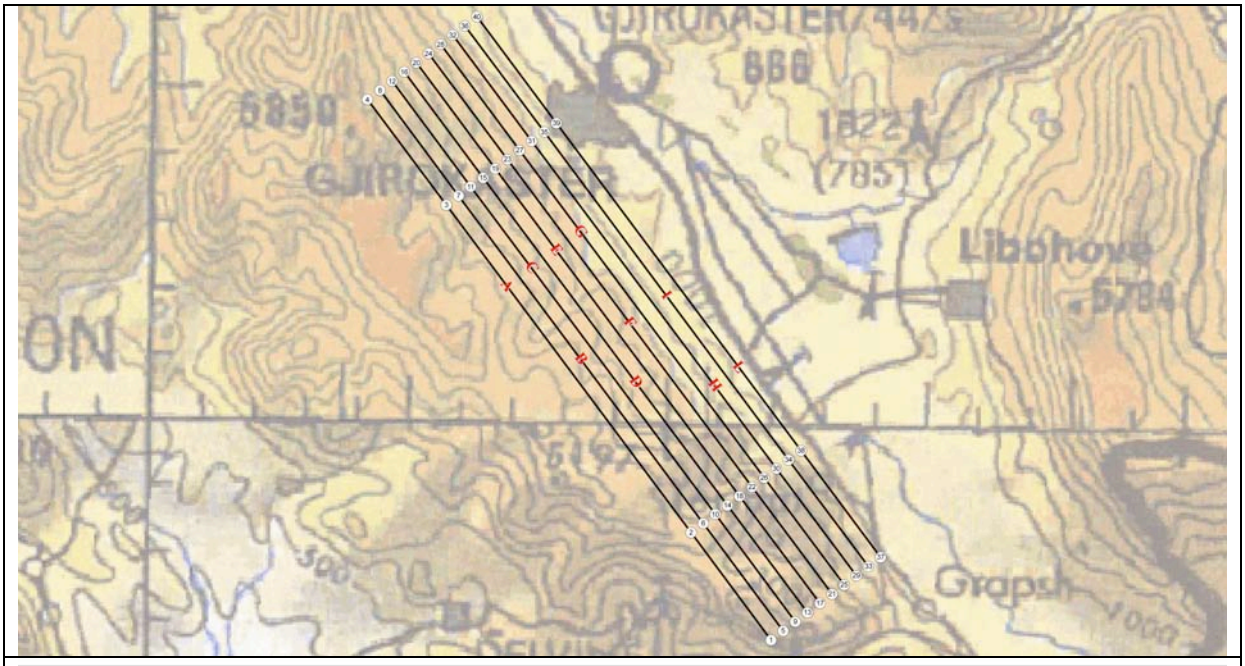


Fig. 14: Vaui Dejes Lake territory scanned by hyperspectral sensor. A resolution comparison between the hyperspectral and photographic data: the spectral profile is characteristic of cannabis; the picture below shows its high resolution.

During radiometric correction of CASI images, the raw digitized pixel intensities are converted into units of spectral radiance, thus estimating the true brightness of the target. Conversion of CASI data to units of reflectance requires that ground spectral measurements be collected coincident to the airborne image data. During geometric correction, the image (radiometrically corrected) is aligned to position and attitude data.
Processing result is a multilayer orthophoto paper in which each layer corresponds to a wavelength reflected by the ground objects scanned and recorded by airborne sensors. The classification of various selective layer allows drawing thematic maps, as interpretation of case study.
In 2012 remote-sensing mission, the discretization of the objects present on the ground was performed by the vertical query of the hyperspectral image on each pixel and the analysis of the data recorded in the various pixels, in different ranges of wavelength, characterizing each pixel compared to those next, and by extracting the spectral signature for each of them. The spectral signature is the reflectivity characteristic of each material (natural or artificial), in function of incident radiation wavelength, in comparable environmental conditions. For the discretization of cannabis sativa cultivation, the analysis of scanned data was of inductive type and allowed the identification and mapping of the cultivation of cannabis by extracting the 'spectral signature' characterizing the material, object of this investigation. On each macro-area identified, a combination of variable indices has been applied according to experimental procedures, in order to carry out the classification compared to cannabis ‘spectral signature’.
In 2013 remote-sensing mission, after characterizing the 'spectral signature' compatible with that of cannabis, it was possible to compare the spectral data with the photographic image with very high resolution, so as to verify and validate the results of the analysis performed on hyperspectral images with 'visible' information. The photographic images, in fact, allow to recognize the presence of cannabis plantations by other parameters, such as the identification of the morphology characterizing these cultivation. This methodological approach in multitemporal analysis’ phase of the acquired data has allowed to obtain the following two results: increase the final data in terms of number of plantations identified; find the illegal cannabis plantations in cases of 'spectral signature' not perfectly recognizable with the cannabis ‘spectral signature’. This condition occurred in the Shkodra territory, where the cannabis plantations are frequently hidden by different types of plantations.

4. From the airborne remote sensing to the multitemporal data analysis: the case study of Lazarat in the Prefecture of Gjirokastra, Albania. (Pasquale Argenziano)

These notes explain the technical-scientific protocol through the activities of multi-temporal remote sensing of Lazarat, one of the two paradigmatic cases of two-year study carried out on the Albanian territory.
The village of Lazarat is in the prefecture of Gjirokastrës, in Southern Albania. The town stands between the slopes of Mali i Gjere Mount and Drinos river, a few miles south of the capital, along the main road SH4 “Durres-Fier-Gjirokaster", the privileged communication route to Macedonia and then Greece.
The vocation of the villages, located on the eastern slopes of the mountain ridge, is purely agricultural. The inhabitants, devoted to agriculture, benefit from the good exposure of the alluvial Drino-Voiussa valley, and from the mountain slopes, formed by limestone and clay covered, punctuated by various sources. The Mali i Gjere mountain ridge also has numerous narrow valleys that open at right angles to the Drino-Voiussa valley, channeling rainwater, as a further element of lushness of the site. Lazarat is indeed further advantaged by one of these narrow valley opened at SW side.
After localized the study area on digital maps, the flights of the July 8, 2012 and July 22, 2013 were planned according to 10 runlines of parallel scans with a SE-NW direction, aligned with Mali i Gjere mountain ridge, and equidistant variable according to the land orography and the expected resolution of the image. After one year, the airborne multi-sensor platform changed: the first acquisition was performed with hyperspectral and thermal sensors, the second one was made by the same hyperspectral sensor coupled with high-definition camera.
During the first flight mission, the data recorded the electromagnetic reflection of the ground between 408 nm and 1200 nm, considering the spectral continuity of the coupled sensors. While in the second year, the scan covered the wavelength segment between 408 nm and 955 nm, with a optical detailed focus in RGB channels. Therefore, the configuration of the hyperspectral sensor remained unchanged while the thermal sensor or the photographic camera ones acceded to the specificity of places, and to the planned mission. The table below is a schematic summary of the main parameters and the analytical description of the workflow until the post-processing.



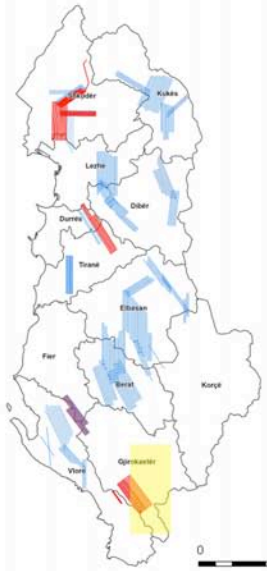
Place: **GJIROKASTËR**

Boundary coordinates	Runlines	Heading	Flight altitude	Above ground level (AGL)
[NO] 40°7'35"N 20°6'16"E [NW] 39°59'36"N 20°14'11"E [SW] 39°58'21"N 20°12'5"E [SO] 40°6'20"N 20°4'10'E	ID 10	323 degrees	5400 feet	6445 feet

Fig. 15: Flight planning on Lazat.

The Lazarat's scanning at 2013 was also supported by simultaneous acquisition of multispectral satellite images produced by the EROS-B sensor. This enabled a more thorough reading of the spectral data, as well as a quality control of the geometric data, acquired from the aircraft.
Despite the intrinsic and strategic importance of downloading and storage data, aimed at the result quality, these stages are more often than not valued and treated superficially. Summarizing the range of collected data during the two annual missions, after the aircraft landing, the team proceeded to estimate the qualitative and quantitative data recorded by: two GPS antennas (the first rover on the aircraft, the second fixed as base station), the IMU sensor on board, and the three sensors (hyperspectral, thermal and photographic). For each flight runline, the first two pushbroom sensors produced a single RAW file, while the photographic camera took an ordered series of single frames to be related to the first ones, during the pre-processing.
The management, systematization and data storage - from planning to post-processing - may seem like a purely technical and operational stages. In fact they are three fundamental aspects for the remote sensing project, especially for the multi-temporal one. Therefore, at the beginning quantifying the number, size and type of digital data, expected in each phase of the work, directs definitely the research quality, just as is done by the intrinsic quality of hyperspectral, thermal, photos and geometric data. To complete the analytical framework of the two missions on Lazarat, just think that at least 450 files were managed during the acquisition step, and more than 580 during processing and mapping.
Completed the data processing, the multitemporal analysis of Lazarat is possible thanks to the same chronology and the uniformity of the planning and flight execution, as well as to the sensors configuration. All this because, the team used and checked same technical and operational protocol during both flight missions.
Some news and videos pointed to many cannabis plantations in the urban area of Lazarat. Therefore, the approach to the identification of those plantations was different from that normally used in rugged areas of Albania.
The NDVI classification, crossed with the RedVeg one, allowed the highlighting of green areas in the urbanized area. The classification "Supervised", compared to previously spectral data for cannabis, concluded highlighting the restricted areas cultivated illegally.
While the data on 8 July 2012 were compromised by adverse weather conditions, those of July 22, 2013 gave a clear image of the cultivation of cannabis in Lazarat. In 2013, almost all of the green areas of the city - usually in adherence to the housing - is cultivated by cannabis with ramifications in the northern town hills and along SW narrow valley that descends from the Mali i Gjere mountain. Reasons of confidentiality does not allow a detailed description of the data.

The exceptionality of the data, already detectable during the early processing steps in 2012 (data not perfect and therefore can not be proved with certainty) has been proved by visual recognition of the cannabis foliage, photographed at high resolution with the PhaseOne iXA camera of Guardia di Finanza.



Place: GJIROKASTËR		
	2012	**2013**
Date:	July 8th	July 22th
Airborne sensors:	CASI 1500 + TABI 320	CASI 1500 + PHASEONE iXA
Wavelength segment:	408-955nm + 958-1200nm	408-955nm + 701(R); 546(G); 455(B) nm
Acquisition time in flight:	6 minutes	7 minutes
Scanned area:	46km^2	62km^2
Ground size pixel:	0,80 meters	0,80 meters
Storage scanned data:	13 GB	15 GB + 160 GB
Processing time:	5 hours	6 hours
Storage processing data:	18 GB	21 GB + 140 GB
Cannabis' plantations detected:	0,383* km^2	3,19 Km^2

* the hyperspectral classification of the vegetation was affected by the adverse weather conditions during the airborne mission, so the value noted in the table is underestimated.

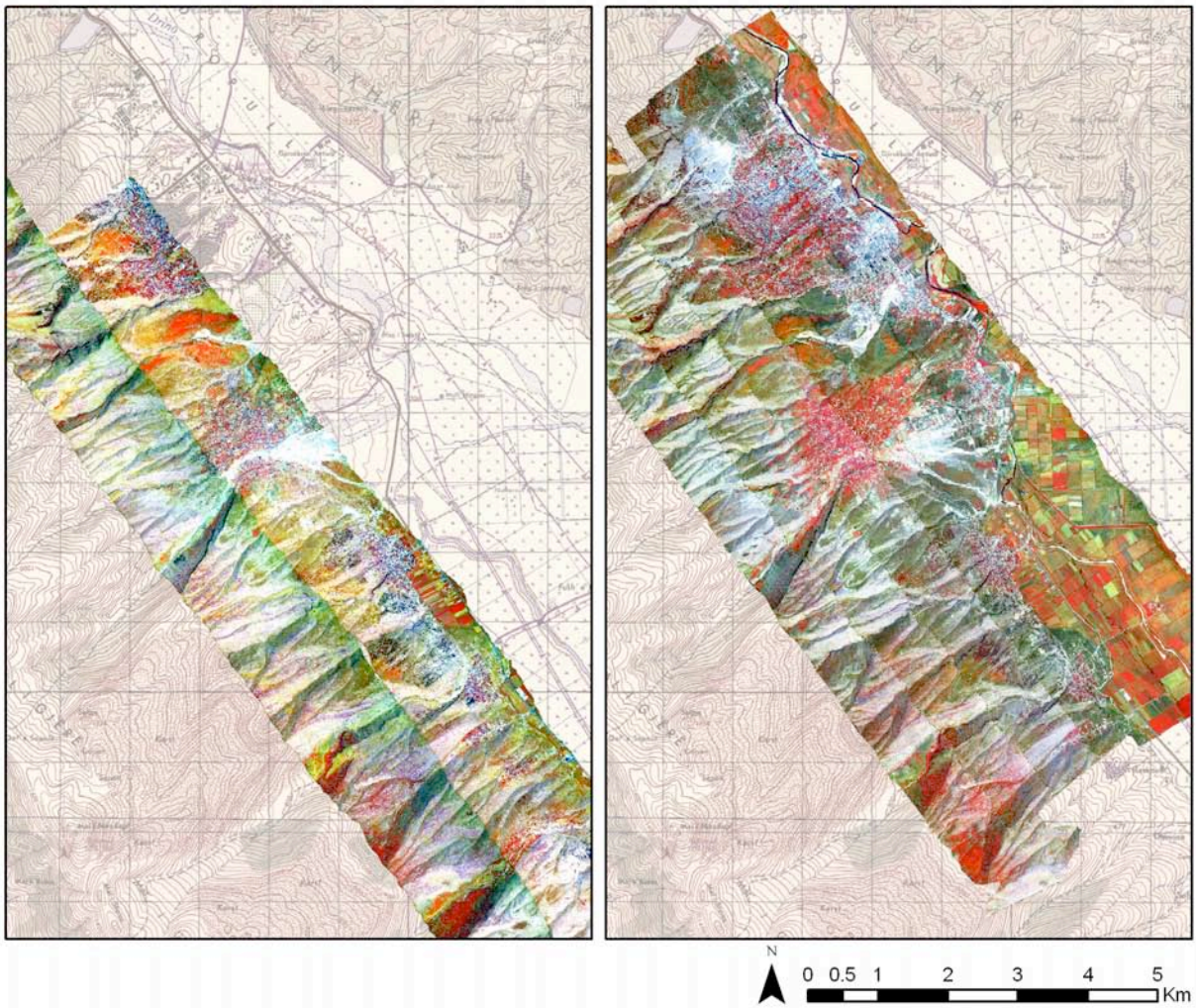


Fig. 16: Airborne remote sensing comparison on Lazarat. Analytic table from planning to post-processing (top), hyperspectral maps dated 2012 and 2013.

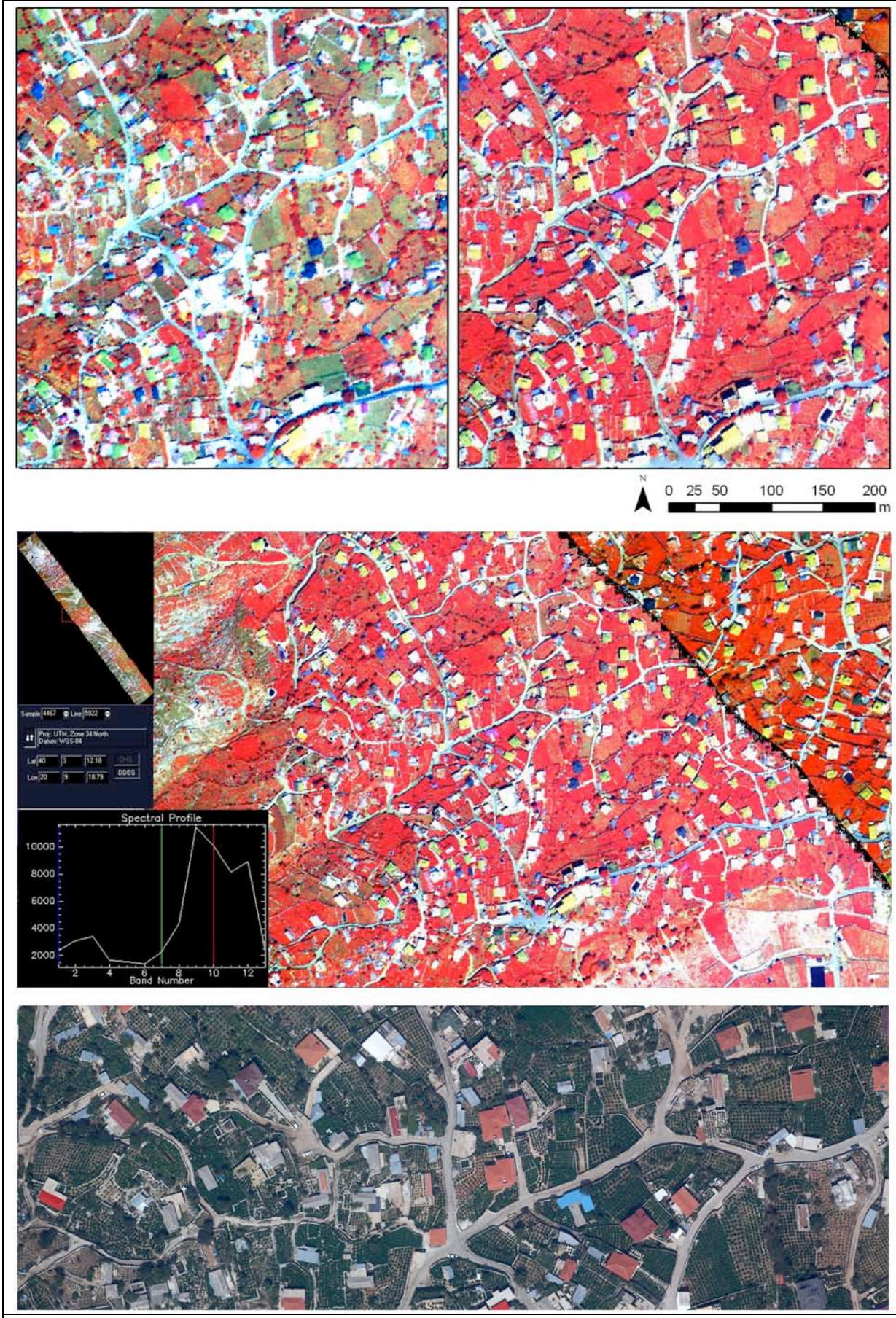


Fig. 17: Lazarat village scanned by hyperspectral sensor. The same urban fabric in 2012 and 2013, by a RedVeg hyperspectral classification (top). A resolution comparison between the hyperspectral and photographic data: the spectral profile is characteristic of cannabis; the picture below shows its high resolution.

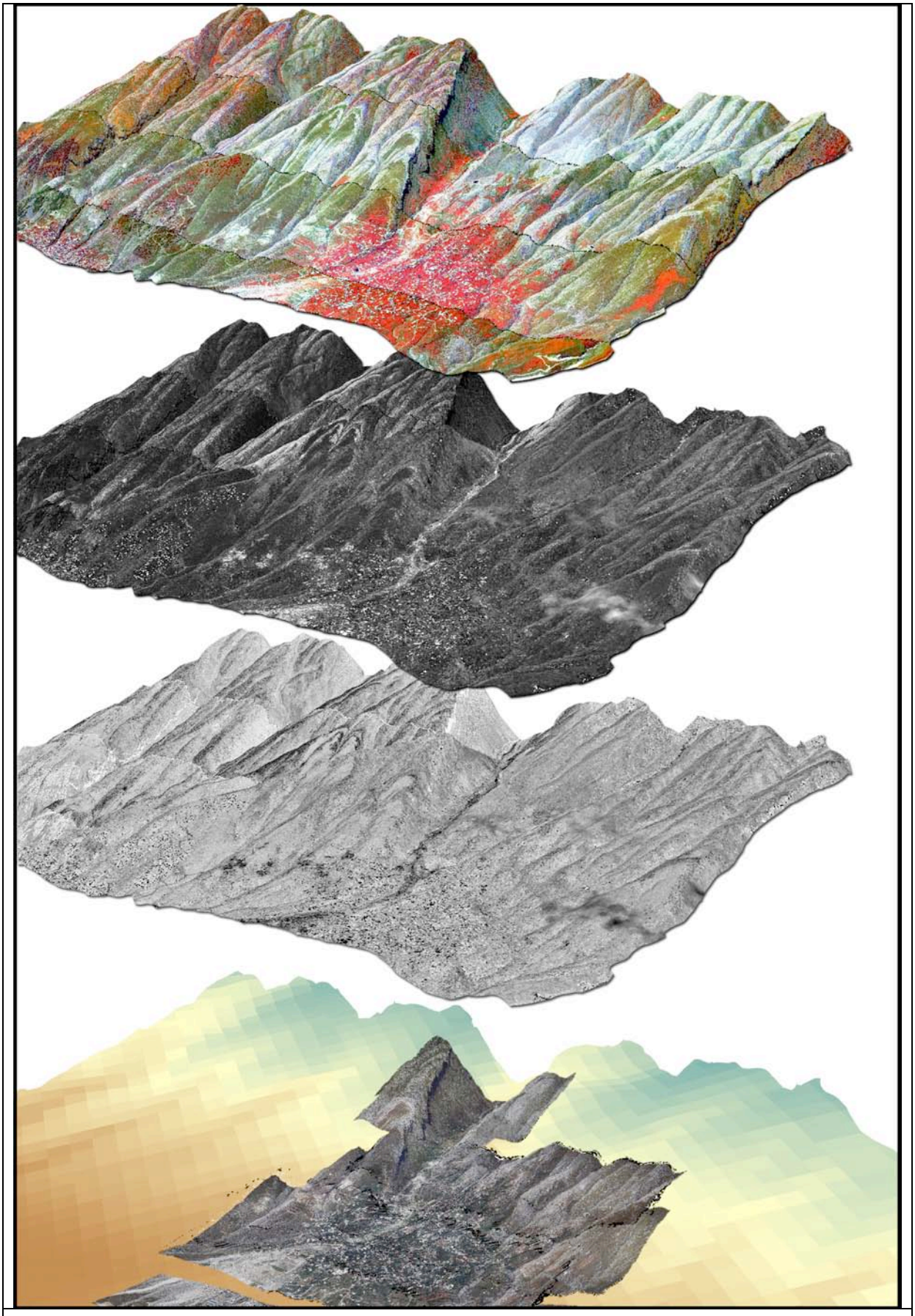


Fig. 18: A 3D axonometric projection of hyperspectral, multi-spectral, thermal,and photographic data of Lazat, scanned in 2012 and 2013. The pixel model below is the 30 meters resolution DEM (CIGA).

The hyperspectral data - not always purifiable from the spectral influence of the materials placed at the plants' boundary, falling in the area of 0,8 square meters pixel, projected on the ground - was "visually" proved by the photo-realistic images in high definition. All this proves that the quality and reliability of the remote sensing is directly proportional to both the precise execution of the technical and operational procedures, as the wise integrability of various disciplinary skills, and many research technologies.
The intersection of the Lazarat's multi-temporal hyperspectral, thermal,multi-spectral and photos data, also allowed perimetering of some green areas most interesting and paradigmatic on which to carry out studies for the improvement of the cannabis 'spectral signature', during the plants' evolution. These test areas were also identified in other parts of Albania.
At the conclusion of the two-year investigation into Albanian territory, the village of Lazarat is definitely the paradigmatic case study of the illicit cultivation of cannabis, as it is hardly possible to find such a large and extensive production in the urban context in the world.
Therefore, the study of the city was also prepared a diachronic evolution of the urban fabric and its green areas (not always cultivated cannabis) through a comparative reading of topographical maps and satellite images. The study in progress is not easy, because it's difficul to obtain homogenous topographic data.
Nevertheless, it is possible to anticipate some reflections on the data collected and arranged chronologically the last decade. The urban (located at 400 average meters above sea level) always occurs infrequently, and it is characterised by scattered houses, mostly two levels, in a continuous stretch to urban gardens, readily identifiable in comparison with the boundary barren hills. The satellite image is that of an indented garden city, according to the places orography and marked by irregular and sprawling road network. Until five years ago, this urban fabric was divided into two sectors by seasonal alluvial gravel bed, which reaches the Drino river from the SW narrow valley. In satellite images, it appears as a clear stripe uncultivated, in the middle to a green stain.
At this date the anthropized area (including houses, roads and gardens) is 1 square kilometer. At the beginning of the remote sensing mission, the anthropized area was 2.5 square kilometers: the green fabric had filled the alluvial river bed, and had occupied part of the SW narrow valley. The data reading from the July 22, 2013 highlights that the anthropized area measures about 4 square kilometers, or it is gradually occupying the entire bottom of the SW valley, and is expanding towards the northern side hills, not particularly rugged, reaching the Drino river.
While hyperspectral, thermal, multi-spectral and photographic scanning data on Lazarat shall be addressed to combat the illicit cultivation of cannabis, the diachronic analysis of anthropized fabric of the city and neighboring areas could be a starting point for critical reflections on the evolution of the human peasant culture, before and during the intensive use of cannabis. All aimed at the definition of valid hypothesis, after the complete eradication of cannabis.

5. Geo-intelligence as new frontier for an effective economic and financial police activity, through multimporal analysis (Stefano Bastoni, Giuseppe Casbarra)

We started our activities of recognition, census and monitoring of the Cannabis plantations on the Albanian territory after the agreement between the Italian Government and the Council of Ministers of Albania signed in Tirana on the 19th July 2007.The main aim of this agreement was the strengthening of the cooperation between these two countries against racquet and especially against drug trade.
On May 16th 2012, in Tirana again, was signed an Operational Protocol between the Public Security Department of the Italian Home Office, International Cooperation Police Service and the Central Department of the National Police of Albania.
The big novelty in this Operative Protocol was the introduction of the airplane with airborne remote sensing in order to research and identify cannabis plantations. That was a really effective change both for safety in research operations and for its innovative scientific results.
The international cooperation given by our country, by the Guardia di Finanza aircraft in order to support the Albanian democratic institutions has also another important aim: It wants to stem the drug trafficking starting in Albania and ending in Italy and Europe through our ports and coasts, fostering the economic power and the territory control of the criminal organizations.
For us, Guardia di Finanza, the operative target of this international mission was to locate and focus on the research of the wide, hidden and often unreachable cannabis plantations whose massive production represents a big danger for the European social and economic order.
According to the cooperation agreement the Albanian police has the task of extirpation of the cannabis plantations.



Fig. 19: Airplane Piaggio P168 DP1 of the GEA-GdF in Albanian territory.

The effectiveness of Guardia di Finanza mission has been due to the extraordinary cooperation with the university researchers of the Regional Centre BENECON, established in the Second University of Naples(SUN).

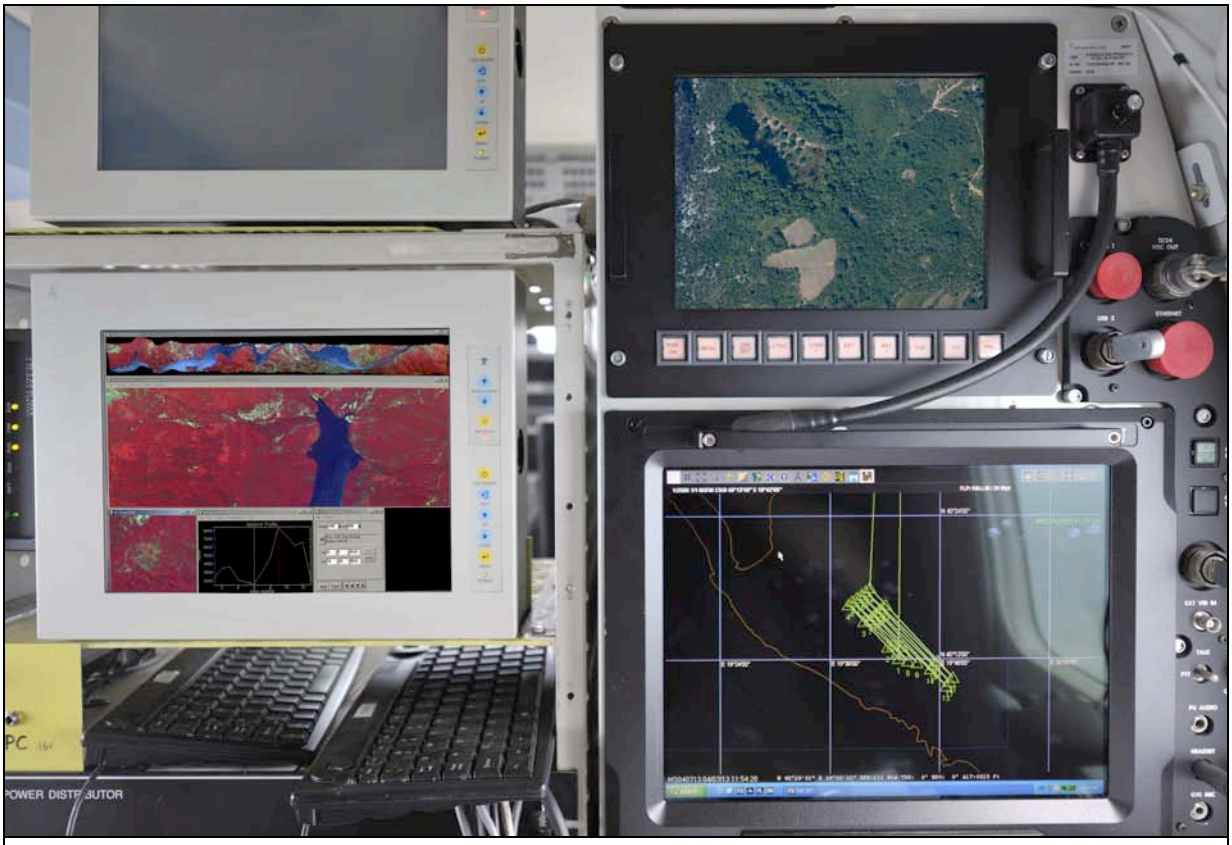


Fig. 20: The instrument's dashboard on board.

The operative-scientific partnership between Guardia di Finanza and the research center Benecon allowed us to create a high resolution thematic geo referred cartography aimed especially to the recognition of the cannabis plantations. So a mixed team of members of Guardia di Finanza and

scientific researchers of Benecon created a temporary lab, in Tirana, where they have planned, organized and processed all the data coming from the devices for remote sensoring and from high resolution cameras placed on the airplane Piaggio P166 DP1.



Fig. 21: An high resolution image of Lazat taken by PhaseOne iXA of Guardia di Finanza.

The activity of airborne survey was addressed to those areas of the Albanian territory particularly suitable to illicit plantations of cannabis for their orography. These areas are usually far from big towns and they are hubs of criminal organizations.
According to the 2012 US State Department report, the production and the consumption of cannabis are growing. However, we think that these data are so alarming, because, with our sophisticated equipment, we know now what some years ago was simply unimaginable.

Now here are some useful data to understand the range of the work done:

- With our 25 flight missions, in two months, we have monitored 3,618 square kilometers of the Albanian territory, something like the 12.5 % of the whole national territory;
- We have acquired 675 Gigabyte of hyper-spectral data and 680 Gigabyte of high-resolution images;
- The processing of all these data has given us the possibility to discover and map, with extreme precision, 304 cannabis plantations on 4.5 hectares of land ready to produce 32 tons of product.
- A very meticulous check has given us a clear knowledge of the very special situation of Lazarat, the town that has more than 319 hectares of land cultivated with cannabis. This area produces more than 900 tons of cannabis whose value on the European market is the same as 4.5 euro billions.

Our mode of operation for the recognition and the monitoring of the cannabis plantations is a reason of proud for our Country. Because we succeeded in putting together in a new and synergic way academic and scientific competences with professional and technical competences all supported by a well-advanced technical equipment.
The ‘Seconda Università degli Studi di Napoli’ had also a very valued collaboration with the Mediterranean Agency for Remote Sensing and Environmental Control (MARSEC) that has increased our knowledge of the territory with its satellite data.
We have, in fact, decided to use optical and hyper-spectral sensors in order to collect data and to produce thematic geo related maps.
In particular our collecting data process on Lazarat has been increased by the digital images supplied by the Eros B satellite that are distributed by MARSEC.
EROS-B is an Israeli satellite launched in 2008 with an orbit at 600 meters of height and an optical resolution of 70 cm on the ground.
The satellite images with those taken by the Guardia di Finanza aircraft, with a resolution of 5 cm, have given us the possibility to know Lazarat territory as never before.
Such big amount of data creates the conditions to control the territory in a better way but also could be useful for its desirable improvement and possible reconversion of the cannabis plantations.
Nowadays the Airborne Remote Sensing represents for Guardia di Finanza the opportunity of widening its operative context. And the work shared with the SUN University underlines the unique value of the advantages coming from a positive collaboration.
We are sure that the geo related cartographic database will open new horizons to an effective economic and financial police activity that goes far beyond the search for drugs.

6. Conclusions

At the end of two years of investigation in Albania, the joint team of university and military researchers gained a good experience in the complex data management from airborne remote sensing, together with good knowledge of places, and practices of cannabis' cultivation. All this aimed at improvement of the expected results. In fact, after one year, the amount of plantations reported and the total size of cultivation increased considerably.
The comparative data reading between 2012 and 2013, however, highlighted the modification and the planting of new areas, especially in northern Albania. While it is to be noted that some areas cultivated in 2012 were uncultivated or burned in 2013, thanks to the intervention of the Albanian Police, following the coordinates provided by the Italian team, at the end of each mission.
The research already planned for 2014 will be devoted to a greater and more detailed multi-temporal scan of the territory, especially in relation to the evolution of the cannabis plant. In this sense, at the end of the second year mission some test areas were chosen to scan cyclicly by hyperspectral, thermal and high-resolution cameras, in order to track the 'spectral signature' of cannabis, depending on the plant growing.

Protocollo tecnico-operativo per il telerilevamento aereo con sensori iperspettrale e termico	
1. installazione della piattaforma sensoristica	**1.1.** scelta del velivolo con specifiche tecnico-aeronautiche idonee al telerilevamento
	1.2. calibrazione radiometrica dei sensori iperspettrale e termico
	1.3. rilievo geometrico della cabina per la disposizione spaziale dei sensori a bordo
	1.4. progetto di installazione dei sensori componenti la piattaforma
	1.5. procedura di certificazione aeronautica militare della configurazione progettata
	1.6. installazione dei sensori a bordo del velivolo, prima accensione (a terra e in volo)
2. calibrazione geometrica dei sensori componenti la piattaforma	**2.1.** misura delle distanze relative tra i sensori installati
	2.2. restituzione del rilievo e immissione degli offset nel software dedicato
	2.3. calibrazione geometrica del sensore iperspettrale
	2.3.1. scelta dell'area di sorvolo
	2.3.2. reperimento della cartografia digitale e del DTM
	2.3.3. pianificazione del volo di calibrazione
	2.3.4. acquisizione in volo delle immagini iperspettrali
	2.3.5. restituzione delle immagini e scelta dei GCP
	2.3.6. rilievo topografico/GNSS dei GCP
	2.3.7. chiusura del processo di calibrazione del sensore iperspettrale
	2.4. calibrazione geometrica del sensore termico
	2.4.1. scelta dell'area di sorvolo
	2.4.2. reperimento della cartografia digitale e del DTM
	2.4.3. pianificazione del volo di calibrazione
	2.4.4. acquisizione in volo delle immagini termiche
	2.4.5. restituzione delle immagini e scelta dei GCP
	2.4.6. rilievo topografico/GNSS dei GCP
	2.4.7. chiusura del processo di calibrazione del sensore termico
	2.5. volo test e collaudo generale della piattaforma installata
3. Architettura del Sistema GIS	**3.1.** individuazione dell'area di studio e oggetto del telerilevamento
	3.1.1. reperimento della cartografia digitale ufficiale e del DTM
	3.1.2. strutturazione del data base geografico
	3.1.3. perimetrazione delle aree di indagine
	3.1.4. individuazione Stazione Permanente GNSS o materializzazione di una stazione ad hoc
4. progetto di telerilevamento iperspettrale e termico	**4.1.** pianificazione del volo di telerilevamento
	4.1.1. determinazione delle bande spettrali di acquisizione e scrittura del file di configurazione
	4.1.2. calcolo: risoluzione media scansione, velocità velivolo, quota volo, copertura areale
	4.1.3. disegno delle runline di scansione in relazione all'orografia dell'area di studio
	4.1.4. cronoprogramma del volo di acquisizione
	4.1.5. immissione coordinate geografiche delle runline e configurazione spettrale nel sistema
5. attività di telerilevamento iperspettrale e termico	**5.1.** volo di acquisizione iperspettrale e termico
	5.1.1. inizio registrazione dati dalla Stazione Permanente GNSS
	5.1.2. accensione della piattaforma sensoristica a bordo
	5.1.3. decollo e raggiungimento dell'area di studio
	5.1.4. esecuzione delle scansioni e controllo real-time delle procedure di scansione
	5.1.5. atterraggio e spegnimento della piattaforma inerziale
	5.1.6. fine registrazione e download dei dati della Stazione Permanente GNSS
	5.2. elaborazione dei dati iperspettrali e termici
	5.2.1. archiviazione dei dati acquisiti
	5.2.2. allineamento dei dati GNSS e inerziali del volo
	5.2.3. correzione radiometrica dei dati iperspettrali e termici
	5.2.4. correzione geometrica dei dati iperspettrali e termici
	5.2.5. estrazione dei file iperspettrali e termici
6. redazione carte tematiche e lettura critica integrata dei dati	**6.1.** ortofoto dell'area di studio nel campo del visibile
	6.2. ortofoto spettrali dell'area di studio classificate in relazione all'oggetto del rilievo
	6.3. inserimento delle carte tematiche nel data base geografico strutturato
	6.4. modellazione 3D dei dati spettrali
	6.5. modellazione multidimensionale del dato
	6.6. interpretazione dei dati in relazione all'oggetto del rilievo

Fig. 22: The technical-operational Protocol.

Bibliographical References

GAMBARDELLA C., ARGENZIANO P., AVELLA A., BASTONI S., CASBARRA G., TESSITORE F. *Hyperspectral and thermal airborne surveying for the characterization and the monitoring of natural and anthropized environment*. In GAMBARDELLA C., *Heritage Architecture Landesign focus on Conservation Regeneration Innovation*, 11th International Study Forum Le Vie dei Mercanti, Fabbrica della Conoscenza n. 39. La Scuola di Pitagora Editrice, Napoli 2013.

CHEIN-I CHANG, *Hyperspectral Imaging: Techniques for Spectral Detection and Classification*, Springer 2003. ISBN 978-0306474835.

Itres CASI-1500 Manual, voll.3, 2005.

Itres TABI-320 Manual, voll.3 2005.

LILLESAND Thomas, KIEFER Ralph W., CHIPMAN Jonathan, *Remote Sensing and Image Interpretation*, John Wiley & Sons 2007, ISBN 978-0470052457

BORENGASSER Marcus, HUNGATE William S. WATKINS Russell, *Hyperspectral Remote Sensing. Principles and Applications*, CRC Press 2008. ISBN 9781566706544.

DENT Borden, TORGUSON Jeff , HODLER Thomas, *Cartography: Thematic Map Design*, McGraw-Hill 2008 ISBN 978-0072943825

GAMBARDELLA, *Carmine. Atlante del Cilento*. Napoli: ESI, 2009. ISBN 978 88 495 1836 8.

HAMLYN G Jones, VAUGHAN Robin A*., Remote Sensing of Vegetation: Principles, Techniques, and Applications*, Springer 2010. ISBN 978-0199207794

LONGLEY Paul A., GOODCHILD Mike, MAGUIRE David J., RHIND David W., *Geographic Information Systems and Science*, John Wiley & Sons 2011. ISBN 978-0470721445

CHEIN-I CHANG, *Hyperspectral Data Processing: Algorithm Design and Analysis*, Springer 2013. ISBN 978-0471690566.

RICHARDS John A., *Remote Sensing Digital Image Analysis: An Introduction*, Springer 2013. ISBN 978-3642300615.

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Technological evolution of the survey: a methodological approach to the Mobile Mapping Systems

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Abstract
The proposed work aims to provide a methodological approach to the Mobile Mapping technology.
In the present research is taken into consideration the survey through laser scanner, which makes possible a two-dimensional and three-dimensional modeling of the natural and built with a high density of the defined points.
More specifically, it is studied the origin and evolution of Mobile Mapping systems, paying attention to the different situations in the market place and quoting systems VISAT™, ARAN and IP-S2. This raises also the emphasis on the possible applications in the field of survey, summarizing the vehicle detectors in the road sector, and the use of inertial sensors in the context of land navigation. The goal of the methodological approach outlined below highlights a survey facilitated in terms of accuracy, reliability, flexibility and range of use; a survey which is measured from time to time with the tools and technologies available to propose an integrated solution of the knowledge.

Keywords: Survey; Land Navigation; Mobile Mapping; Laser Scanner.

1. From laser scanner to Mobile Mapping systems: Introduction
The surveying technique using laser scanning is having an increasingly widespread in the field of detection. The evolution of information technologies has led to a rapid development and refinement of techniques for detection of solid objects opening interesting perspectives for applications in various fields.
The laser scanner for detection are able to detect millions of points in a few moments with satisfying accuracies in various application fields. The technique consists of the acquisition of metric data structures and deformed because of a detecting apparatus to laser beams.
The result is a three-dimensional point cloud which reproduces exactly the condition of things of the analyzed object, allowing the subsequent solid modeling.
The laser scanning systems operate in an almost fully automatic, and are able to acquire a remarkable number of points per second at times even in the thousands.
From the initial rapid evolution of instrumentation for three-dimensional detecting, there is now a marked attention to the development, improvement and refinement of the techniques of data processing software.
During the last few years, therefore, the relevant technologies have greatly evolved through the use of the laser scanner that allows a two-dimensional and three-dimensional modeling of the environment with a high density of defined points.
Mobile Mapping Systems (MM), combining the precision navigation and digital photography, it has been developed from studies of pure academic interest to commercial applications for land, aircraft and marine vehicles. The extension of the use of MM is related to the parallel technological development that affect systems of digital cameras and lasers.

The term Mobile Mapping was born to indicate the detection techniques by moving vehicles, in which the data acquired from the onboard sensors are directly georeferenced, that is expressed in the desired reference system, thanks to a system of positioning and orientation installed on the vehicle.
It defines Mobile Mapping System (MMS) any mobile platform equipped with sensors and measurement systems adapted to provide the 3D position and almost continued of the platform simultaneously able to acquire geographic data, without the use of control points on the ground. The scanning sensor, mounted on a motorized base, by recording all the visible architectural points compared to the scanning center, according to an adjustable step by the user. As for a topographic survey operated with total station, this survey system requires connection to a polygonal network, with the difference in the greater number of measured and recorded points.
The techniques and instrumentation to deal with the issues related to MM are deeply evolved thanks to the diffusion of 2D-3D LiDAR systems with high performance. These systems allow scanning of roads and road infrastructure with speed and performance until recently unthinkable. From the point of view of the media the introduction of Google Maps with Street View has made possible that systems of this type would reach even users not in this industry. In the context of mobile robotics, this issue is best known as Simultaneous Localization and Mapping (SLAM), which is currently one of the biggest challenges that build/upgrade 2D and 3D maps of the environment and at the same time use them to locate improving the performance of the process of location based on GPS data.
Examples of MMS can be found in different areas and applications. This requires a high level of hardware and software integration of all processes of measurement. The high integration often reduces the work of post-processing and data are often available in real-time using reliable estimates. The current upward trend of the request for survey via MMS is due to the need to quickly and inexpensively acquire geographic data. The rapid technological development in recent years is allowing this. The costs of kilometric survey of Mobile Mapping System, with equal number of detected characteristics, are generally content, when compared with techniques such as aerial photogrammetry or the classic topographic survey. With the MMS systems it ha been integrated two fundamental branches of geomatics, geodesy and photogrammetry/remote sensing.
From a systemic and structural point of view, essential components of a vehicle for the MM are therefore the system of positioning and orientation, the onboard sensors, the synchronization system, coordinated by a management system ; auxiliary systems are then the data storage system and power system of devices and computers. The control system must allow the verification during the operations of the state of each system, to control the progress of the survey. In particular, they must be verifiable the quality parameters of the navigation data (GNSS constellation status, and their parameters; the state of RTK solution, if available, the state of the navigation solution Real Time GNSS/INS, if available); similarly, it should be able to check or change the status and the acquisition parameters of the sensors (sampling rates, adjusting the brightness and contrast of parameters or iris for cameras, etc.). Finally, an interface should be provided for storage management, with the possibility of defining new files/projects and monitor the regular data storage, the status of available memory, etc. Usually the vehicle is equipped with two video capture sensors and a GPS receiver. The front camera is oriented along the direction of march and enables you to capture information related to the vertical signage, the cross section and the presence of accesses; the rear camera is oriented orthogonally to the road paving and instead allows the extraction of information about the state of the pavement and the trajectory travelled by the vehicle. The video sequences are performed in order to obtain the synchronous frame acquisition rate of the GPS sensor, which enables the geo-referencing of information extracted from the frame. The method also allows the accurate knowledge of the distance vehicle signage of reference, this allows you to get a new seeding of points coinciding with the horizontal signage, thus making easier the extraction procedure of road geometry. The methodological approach, therefore, can only be based on footage of the roadway by video or photo-cameras installed on the vehicle in motion and treatment of those with photogrammetric techniques, where possible, geo-referenced using GPS/INS for a "direct" photogrammetric restitution. The use of GPS equipment in kinematic mode is particularly suitable for the survey road, in particular, the technique of differential GPS with measurements phase is extremely valuable; using said technique in kinematic mode; it is obtained, in fact, a significant benefit of precision and speed allowing the survey of a sowing of representative points of the trajectory traveled by the vehicle. Although the differential GPS technique based on phase measurement has been used for a long time in kinematic applications, a fully operational however requires the resolution of some issues related to the use of the pair of receivers**.**

2. Origin and Evolution of Mobile Mapping Systems

The origin of the term Mobile Mapping is linked to detection techniques from moving vehicles in which the acquired data thanks to the sensors on board are georeferred thanks to a system of positioning and orientation.
The ultimate goal of such systems is therefore not necessarily the "mapping", intended as survey mapping purposes, but the determination of the position, and possibly structure, of any sensor (or

thermal photogrammetric cameras, laser scanners, gauges the roughness of the road surface) mounted on the moving vehicle, regardless of the final use of the data acquired by them.
The detectors vehicle in the road sector arise from the research of the civil sector on terrestrial inertial navigation, mainly developed at the University of Calgary (Canada) from the second half of the 80s (and continued in the 90s with the integration of GPS) giving rise to a series of prototypes; also the most significant commercial implementation in the road sector is Canadian, while not lacking in examples of detectors vehicle in the U.S. and Europe, primarily of prototype, built by research institutions of important companies or universities.
While GPS technology is basically free, with handset manufacturers and software processing of data distributed in different countries, that of the inertial sensors is still largely subject to constraints and restrictions to prevent the use for military purposes by some third countries; in particular sensors for high-precision navigation (strategic- grade and navigation-grade) are mainly developed in the U.S. by Honeywell and Litton. When these systems are marketed as components of integrated systems, there is a contractual obligation not to disclose the certificate of calibration of the instrument.
There are also a manufacturer of inertial systems in France, Germany, with products suitable for the use in MM. There are also numerous companies in Europe (UK and Germany in particular) but alsoCanadian, U.S. and Japanese, which integrate the two sensors producing navigation systems GPS/ INS; In this case the added value of the product is given precisely by the integration in terms of interfacing and synchronization, signal processing, calculation of the position parameters, kinematic and trim with Kalman filter in its various implementations (loosely coupled, tightly coupled, etc.).
In particular, the first trials of MMS applications for earth vehicle date back to the early 90s, when the GPS was not fully operational yet. In 1993 there were already MMS land and air supplemented with digital cameras. Since then, improvements to these vehicles are due to technological improvement and miniaturization of GPS receivers, to the development of new methodologies to provide the differential correction GPS and to the use of low- medium cost IMU systems available from the second half of the 90s. In the early 90s they used systems INS (Inertial Navigation System) of navigation-grade class, usually the type strapdown of laser-ring. Their cost was around the $ 130,000 (1990). With the fast decrease of the cost of the GPS receivers IMU system becomes the most expensive part of the system. At the end of the 90s IMU systems spread at low cost. Since the 2000s it was developed the fiber optic gyro systems reaching accuracies close to the needs of high-precision measurements at relatively low cost ($ 30,000).
Historically, the first applications were those in the road sector, where the emphasis normally affects a range of about 10-15 m (or greater) straddle on the road and it is carried out at speeds between 30 and 70 km / h. The primary areas of application are the cadastre roads and road maintenance, as well as the importance of elements of infrastructure, networks and urban and suburban services along the roads.
To this day, detection systems that combine navigation and survey, the majority of whom voted for the acquisition of GIS data (such as the Cadastre of roads required by Italian law) or for three-dimensional modeling of the roads and their surroundings, are commonly called Mobile Mapping Systems (MMS).
During their development, these vehicles have been identified in the literature with different terms, such as Automatic Vehicle Location and Navigation (AVLN), Intelligent Vehicle, Highway Systems (IVHS), Intelligent Transportation System (ITS) and only recently the are universally recognized as Mobile Mapping Systems. The wide literature concerning the application of MMS to the detection of road information allows us to classify MMS terrestrial systems according to the architecture, processing techniques and the information needs arising from particular type of application.
In all the reality MMS that have been made and available on the market, there are some that have distinguished themselves over time, as true "milestones" in the development of these systems for their technology, or for particular applications in which they were employed.
Among them, three systems deserve special mention, the VISAT™, ARAN and the IP-S2.
The VISAT™ (Video Inertial Satellite), developed by the University of Calgary in Canada, in the late nineties, is probably one of the first MMS systems provided both of a system for positioning (POS) and one of the survey (photogrammetric cameras). Inside the VISAT™, in fact, in addition to a dual-frequency GPS receiver, a high-precision inertial platform and an odometer, there are six to twelve photogrammetric cameras aimed at the creation of geo-referenced panoramic images.
The cameras, enclosed in a protective shell with high quality glass and low distortion, can be installed in different configurations, to provide the visual coverage required depending on the type of application and survey (signs and road markings, traffic lights, fire hydrants, manhole covers, billboards).
The images are recorded at a programmable regular interval, depending on the elapsed time or distance traveled, in order to ensure an longitudinal overlap adequate for photogrammetric purposes.
As regards the external orientation of the images, the position and attitude of the central outlet of each camera is georeferenced within the reference system of arrival from the integration GPS/INS, performed both in real time and in post-processing.

A second noteworthy MMS is undoubtedly the ARAN (Automatic Road Analyzer). Developed from the second half of the '80s, the ARAN vehicle is the first example of a modular multi-sensor, especially designed for the analysis of road surfaces, their roughness and degree of degradation. With over ninety copies in circulation (including five in Italy, purchased by Autostrade SpA and Sineco SpA) in approximately twenty countries, to date ARAN is without doubt the most widely used MMS, as well as the most significant achievement in the commercial sector road.
The third performed MMS is the IP-S2 (Integrated Positioning System-2) made by Topcon Positioning Systems. Unlike the two systems presented above, the IP-S2 represents the extreme of the concept of modularity dell'ARAN. It overcomes the challenge of the 3D survey with a high degree of accuracy and speed. Accurate vehicle positions are obtained using three technologies: a dual frequency GNSS receiver, an inertial platform (IMU) and external wheel encoders. These three technologies cooperate to ensure a 3D position of the vehicle with high precision.
The IP-S2 is a modular system, it is possible to add sensors based on the needs of the user. It is incorporated in a high performance geodetic GNSS receiver, able to process GPS and GLONASS signals, in order to obtain the maximum capacity of possible tracking. Furthermore, the IMU's inertial technology detects movement in space and provides information on the acceleration and rotation, at an high frequency. If it's combined with the precision GNSS measurements, the IMU allows the system to calculate the positions even when you get close to obstacles such as buildings or trees, or while going through a tunnel or an overpass, without compromising accuracy.
IP-S2 is also able to obtain information on the speed of the wheel due to external encoders with high precision that can be adapted on a vehicle that has no standard installed ABS or traction control. The aim is to estimate the speed and position of the vehicle, based on the position of the previous note. Finally, the system processes the sensor data and provides real-time results, which is given by the fusion of input data. The file recorded data can also be processed and post-processed and filtered off-line in order to obtain better information on the location and geo- registration of the data provided by the sensors. Specifically, the IP-S2 Compact+ includes up to five LiDAR scanner arranged to cover the roadway and the adjacent buildings up to 30 meters away. IP-S2 HD includes a scanner with sixty-four single laser, for generating a very dense cloud of points, with a flow rate of 100 m. Both systems host a high resolution digital camera that provides a 360° spherical images. All tools have a GNSS receiver, an inertial platform, an odometer, six cameras that can produce hemispherical images with high resolution and three laser profilometers, have been compacted within a single system "stand-alone" adaptable to any vehicle. The system is currently used, as well as applications of Mobile Mapping, also by Google™ within its Street View application. The installation of this system can be made either on the vehicle or on tricycle (called Google Trike™), to reach areas not accessible by car, such as parks, pedestrian areas and college campuses. In Italy, and in general throughout Europe since 2000 some vehicle detectors have spread, mainly of a prototype, made by research organizations of large companies or universities**.** Generally, it is abouts vehicles, almost always vans, which are equipped with different tools in a semipermanent, usually one or more GNSS receivers integrated to an inertial navigation system (POS), an odometer, a laser scanning system and a recovery, consisting of one or more cameras**.**
In general, in the current use the MM is now extended to all the systems of the positioning and orientation in movement that have precisely the ability to autonomously georeference the position and alignment of one or more sensors installed on board: from the laser scanning plane, photogrammetry live, etc. More correctly we could speak of sensor orientation through a Position and Orientation Systems or POS; In fact, the goal is not necessarily the mapping (that is the topographic survey), but simply the determination of position and attitude of any sensor, regardless of the way the final of data it has collected.

3. The use of inertial sensors in the field of the land navigation

With the term navigation we indicate the methods and techniques for determining the position and attitude of an object in motion.
An inertial navigation system is an aid that uses a computer and motion sensors to track the position, orientation, and velocity (direction towards and form) of an aircraft without the need of external references. An inertial navigation system includes at least one calculator and a platform or module containing accelerometers, gyroscopes, or other motion-sensing devices. The system is initially provided of its velocity and position from another source (an operator or a GPS satellite receiver), and thereafter computes its updated position and its velocity by integrating information received from the motion sensors. The advantage of this system is that it does not require external references to determine its location, its orientation, or its speed once it has been started. It can detect a change of its geographical position (for example, a shift to the north or to the east), a variation of its velocity (speed, orientation and direction of motion) and a variation of its orientation (rotation around a axis). This is done by measuring the linear and angular accelerations inflicted on the system.
Because external references are not required (after the preparation), the system is immune to false

transmissions and to intentional electronic noise.
The inertial navigation systems were originally developed for the guidance of rockets. They came into use more widely with the advent of spacecraft, guided missiles, and commercial airlines. A famous example of INS system for commercial aircraft was the Delco Carousel system, which provided a partial automation of navigation in the days before the common use of flight management systems. The Carousel allows the pilot to enter a series of reference points, and then to guide the aircraft from one point to another using an inertial navigation system for fixing the position. Some aircraft were equipped with two Carousel systems for safety reasons. The use of inertial sensors in the context of land navigation was subject to a significant increase in the recent past, especially with the continuous development of satellite positioning technologies, such as NRTK (Network Real Time Kinematic) and OTF (On The Fly), as well as the algorithms of integration of different sensors increasingly high performed, both for the real time and post-processing.
Generally, the multi-sensor navigation systems, both land and air, use a Data Acquisition System (DAS) for the synchronization, management and storage of real-time data from sensors on board, and a Positioning and Orientation System (POS), which is responsible for processing (in real time or in post-processing) navigation data.
The navigation sensors normally used are one or more GNSS receivers, an inertial measurement unit IMU (also known as inertial measurement unit) and possibly an odometer (DMI, Distance Measurement Instruments). The integration of these sensors allows the estimation in a fixed reference system, the states of navigation at a high sampling rate, generally equal to or greater than 100 Hz. To define the specifications of a navigation system it needs start from the accuracy requirements of the application where such a system is intended. As soon as we understand the well-know characteristics of intrinsic accuracy, namely those related to its system of reference of the sensors used, it is possible at first glance to obtain an esteem of precision in the final reference system, through the laws of propagation of variance and by numerical simulations.

4. Applications of mobile mapping: methodological approach

The survey of the geometric characteristics of the road infrastructure is very timely and has enabled a number of researchers in the development and field-testing of innovative methods. Applications for land navigation, which this research is about issue are related to the Mobile Mapping systems, namely systems that are fixed on moving vehicles, intended for the production of photogrammetric digital mapping, and for the creation and/or updating of land registers of the streets and local computer systems.
Primary objectives of the application of mobile mapping are to acquire and cataloging some of the information needed to carry out the road asset, such as signs and road markings, signage, cross section, the state of the pavement, geometry axis and side entrances.
In Italy, with the enactment of D.L. April 30, 1992, n. 285, begun a process which, through the publication of rules and decrees, should lead to a more rational organization and management of road infrastructure, including through training and upgrading of a Road Inventory. With D.M. June 1, 2001 was specified the characteristics of the Land register and were prescribed the timing of formation of the same for the different categories of roads. Were then drawn up specifications for the provision of specific data (measured or post-processed) and started its calls by operators of roads, albeit with amendments and interpretations with respect to the original text.
At the moment, besides the motorway sector, where the attention to the problem of maintenance and regular exercise also through the use of vehicle detectors had already formed some time, ANAS and a number of provincial governments have given rise to contracts for the realization of the Land register. Although many municipalities are proceeding in this direction, especially where the management of services is already implemented or relies on geographic information systems.
In road applications is normally always present a shooting system, consisting of one or more cameras, both for documentation and to make measurements with photogrammetric techniques; depending on the profile of the mission are then used other survey instruments (in particular, the scanning laser), or other tools specific to the acquisition of the characteristics of the road surface (such as roughness, cracking, etc.).
From a survey made thanks to mobile mapping systems (Fig. 1; 2; 3) is possible to extract informations on the type and size of the cross section of the infrastructure, the state of degradation of the road surface, the actual path travelled by the vehicle that passes on the infrastructure, the presence of accesses and billboards. From the extracted frames of the posterior chamber is possible to determine at any moment the position of the centerline of the vehicle relative to the road markings, if any, provided that enables you to generate a new seed points called " auxiliary sowing" that best approximates the actual geometry of the infrastructure. In addition to survey for Road Cataster and road maintenance, applications can cover several areas including "City Modeling" (surveys of cities, urban areas or industrial sites and generation of 3D models); surveys of the area with restitution of digital surface models (DSM) and digital terrain model (DTM); pads quarries and plants for calculating

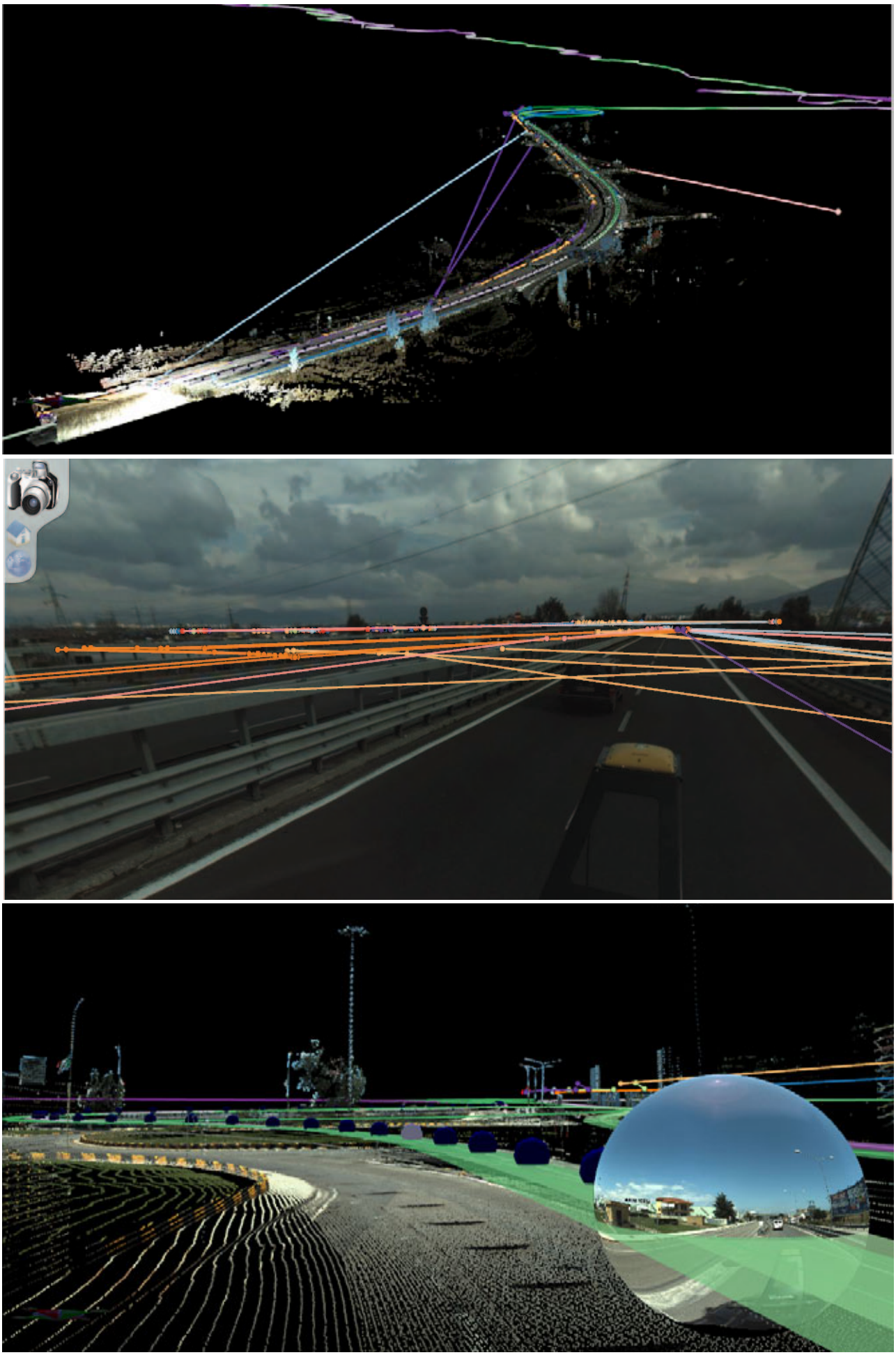

Fig. 1: Survey of a road section through the intersection of photographic images and point clouds.



Fig. 2: Extraction of geometric informations about the elements of the road section.

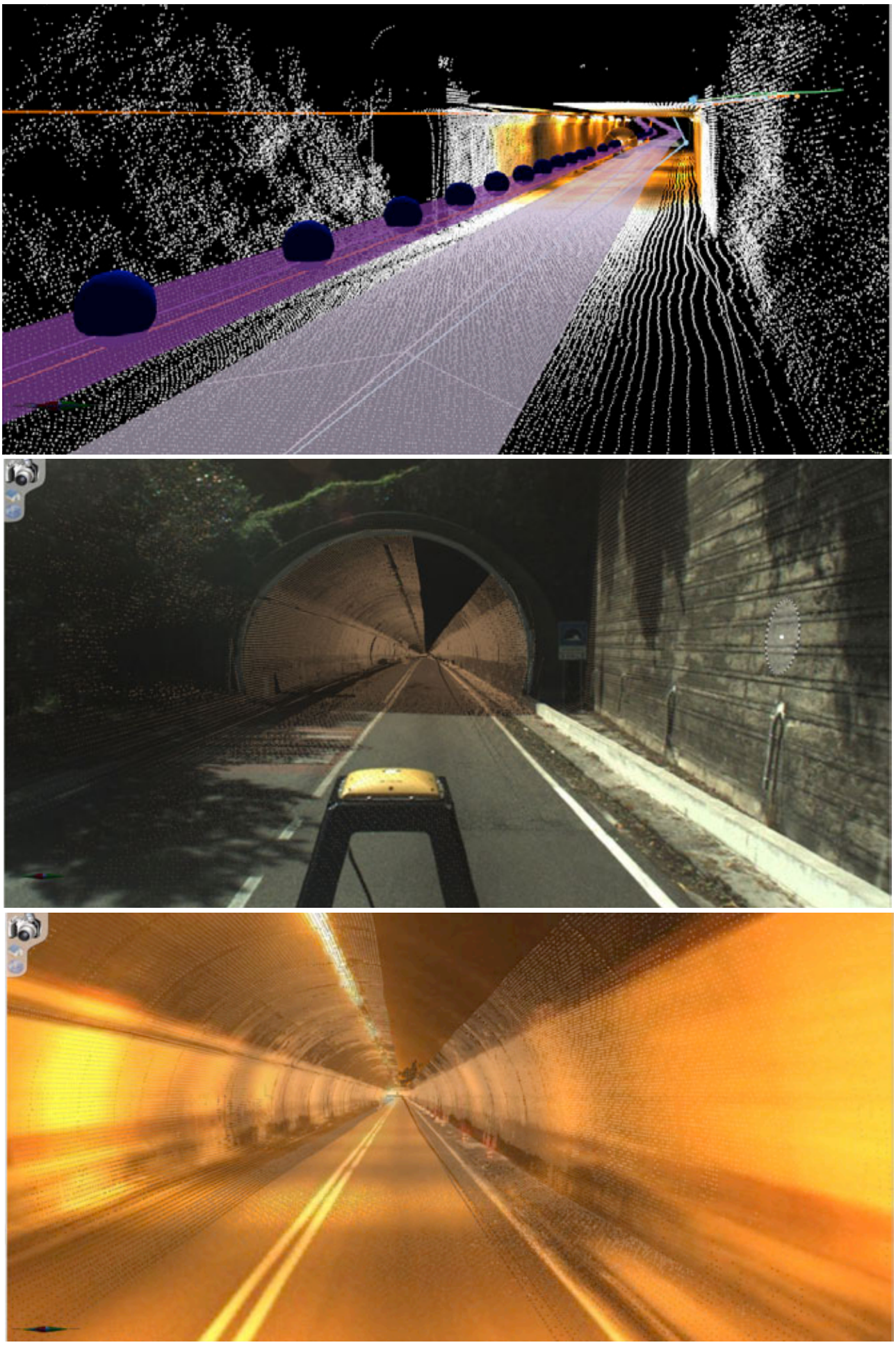

Fig. 3: Example of mobile mapping survey inside the tunnels.

surface and determination of the volumes of storage/excavation; measurements of functional characteristics of road surfaces/airport such as the parameters of longitudinal regularity (IRI) and transverse (rutting), and the values of the surface degradation and macrotexture values. Another area of interest of Mobile Mapping is the bathymetric survey of the river or the coast. Made with profilers or scanner sonar, leaned to the GPS satellite system since the introduction; in some cases, such as the delimitation of the waterways in riverbeds or lagoons or estuaries subject to deposition, the accuracy of the location about the order of the meter is usually sufficient.

5. The GPS technology for MMS

GPS technology as part of the survey by moving vehicles instrumentation is crucial for many aspects. Of all the sensors is the only one that allows a positioning directly in a geocentric reference system and therefore forms the basis of the positioning of the mobile means and sensors for the detection of the magnitudes characterizing the roadway in a broad sense. The accuracies achievable by a GPS system used in kinematic mode are centimetric but this parameter may be variable depending on the instrumentation and the operating mode of the survey adopted. From the literature and from experiments conducted by the various operating units that have studied the problem, the GPS system used in kinematic mode with the aid of a GPS reference station placed at a distance of some tens of kilometers, allows centimetric accuracies provided a good initialization procedure, and provided you do not lose the acquisition of satellites. Such conditions in practice are not warrantable for the obscuration by obstacles of a significant number of satellites in the course of the motion. Currently, those who work in this area are equipped with integrated IMU/GPS which require the use of two GPS receivers. The integration of GPS/INS requires that the navigation system decides in every moment what sensors you can get the most accurate information from, or it mixes together the data from the various sensors to search for the optimal solution. The most commonly used method for the search of the optimal solution provides for the introduction of a filter, which can be generically defined as "a set of equations that combine informations from different sensors in order to provide an optimal estimation of the position of the vehicle". The GPS system provides absolute data, necessary to contain the error - time employee of INS. Between two absolute readings the filter estimates the new position using inertial sensors and odometry (prediction phase); when it reaches an absolute measure, the filter estimates the new state of the vehicle determined by applying a weight function between the prediction and the measured value (being updated). A filter widely used in the GPS/INS systems is the Kalman filter. The manner in which the data are being integrated GPS/INS are essentially two, known as loosely coupled and tightly coupled integration. In the first GPS data they are processed in order to obtain the information of position and speed, and this information to be integrated in the filter with data from IMU. In the second mode, the filter combines directly the raw data of the GPS with the IMU. The tightly coupled mode has the advantage of being able to also use the GPS data coming from less than four satellites to improve the determination of the position. The INS-GPS integration is essential and used, with different technologies, virtually all MMS. As regards the system of positioning and orientation, as said the combination GPS/INS is today the most efficient system (in terms of productivity, reliability and accuracy) that technology can offer; there are also important differences in the ways in which it carries out the integration between the two systems GPS and INS and equally important are the hardware features, especially for the INS, with regard to system performance. Rather than lean on the GPS, you can use other systems (for example, have been used and are still used for navigation apparatus for radiolocation by ground stations or satellite). In practice, however, the GPS, or equivalent system, is now indispensable for the advantages in terms of coverage and precision. The classical methodology could solve the problem about georeference only with a block of partially overlapping pictures and a sufficient number of control points on the ground. There are also vehicles for MM who rely on GPS alone, with systems mono, bi or tri-antenna. In the single antenna systems, the accuracy is very low and does not allow the comparison of the accuracy of Italian standard on the subject: it is in fact possible to determine any parameter set-up, if not by integrating the system with electronic compasses and inclinometers. In systems with two antennas (present, however, even on systems with INS) it is possible to obtain at least azimuth and pitch (the typical arrangement is in fact with antennas spaced along the longitudinal axis); obviously there is an error associated with the angle of roll, the more sensitive the greater is the cross slope of the roadway. The systems with three antennas, positioned at the greatest distance possible always to improve the sensitivity in the determination of the angles, instead allow a complete solution of the orientation (position and attitude). The accuracies obtainable from the refund with vehicle detectors are quite asymmetric: in fact in the longitudinal direction the accuracy decreases rapidly with the distance, because the angle of intersection between ray counterparts is always very small and the ratio between base and remote return varies within rather broad limits (approximately 4 to 15), much greater than those of aerial photogrammetry. The need for angular precision in orientation of the sockets are not as stringent, given the scale frame normally much lower and therefore the lower the ratio of angular error on the frame and the corresponding error on the ground. Even pluriantenna systems based on GPS

only on paper so they are able to meet the required specifications. In any case, to obtain greater precision in the relative positioning of the two or three kinematic antennas sufficient to obtain the values just mentioned, is very important to the ability to process the kinematic data of the GPS antennas in the most efficient possible way, using the constraints of location relative between the antennas. In practice, however, the continuous dependence on the availability of the GPS solution makes these systems not to be proposed for a truly operational use: in most real significant situations the vegetation in fact, over and underpasses, buildings, etc. lead to frequent and complete "loss of lock" with heavy repercussions on the continuity and quality of the GPS solution.

6. Conclusions

Mobile mapping technology is able to meet a wide range of applications thanks to the versatility of the system and the speed of acquisition of information that can achieve high productivity in the field and a consequent lowering of costs. These in fact equal to the information collected, are usually limited when compared with techniques such as aerial photography or classic topographic survey.
It is observed that the appearance of the survey with these detection systems is facilitated in terms of accuracy, reliability, flexibility and range of use.
In fact there are simplifications and savings of time and capital invested very significant and greater productivity of the survey itself; then you have both lower operating costs (fuel, maintenance and depreciation of the vehicle) of the survey, both savings on additional staff necessary for the management and monitoring of the receiver at the known point. These benefits are found both in terms of quality in the way they operate on the territory or rationalization of operations resulting in reduced costs of data acquisition. Moreover, the system is very interesting for its modularity, it can be used several types of laser scanner sensors, inertial platforms and systems to shoot images. Depending on the purpose of the survey and the required quality is therefore possible to use the best of each measurement technique with the right equipment to ensure the best performance and to allow the best result.

7. Bibliographical and web references

[1] JIANLIANG, FENG, WEIAN, GANG. Ou, Bao, Wang, Qiao. *A New Method for Automatic Large Scale Map Updating Using Mobile Mapping Imagery.* In The Photogrammetric Record, 2013. Vol. 28, p. 240–260.

[2] MANCINI, TASSETTI, FRONTONI, ZINGARETTI. Adriano, Nora, Emanuele, Primo. *Scansione georiferita di strade ad alto scorrimento mediante robot mobile semi-autonomo.* In AA.VV. Atti XIV Conferenza Nazionale ASITA. Brescia: 2010.

[3] CAZZANIGA, FORLANI, PINTO. Noemi Emanuela, Gianfranco, Livio. *Esperienze di navigazione geodetica in una rete di SP GPS per l'orientamento diretto di fotogrammi.* In AA.VV. Atti della X Conferenza Nazionale ASITA. Bolzano: 2006.

[4] A. FORNAIA, A. M. MANZINO, M. ROGGERO. *Un sistema GPS multiantenna per la determinazione dell'assetto di un veicolo rilevatore*, In AA.VV. Atti della X Conferenza Nazionale ASITA. Bolzano: 2006.

[5] GANDOLFI, FORLANI. Stefano, Gianfranco. *Catasto stradale, mobile mapping e navigazione geodetica nelle reti di stazioni permanenti.* In AA.VV. Progetto di Ricerca di Interesse Nazionale - PRIN: I Servizi di posizionamento satellitare per l'e-government, 2004.

[6] DA SILVA, CAMARGO. Joao Fernando, Paulo de Oliveira. *Development of a low-cost Mobile Mapping system: a South American experience*, In The Photogrammetric Record, 2003. Vol.18, N. 101, p. 5-26. ISSN 0031-868X

[7] EL-SHEIMY, Naser. *Trends in Georeferencing of Mobile Mapping Data.* In The FIG Working Week, TS7: Trends in Positioning Measurements. Sud Africa: Sun City, 1999.

[8] EL-SHEIMY, Naser. *The Development of VISAT - A Mobile Survey System for GIS Applications.* University of Calgary, Department of Geomatics Engineering. Calgary: 1996

[9] Referring Web Pages: http://www.topcon-positioning.eu

[10] Referring Web Pages: http://www.netgeo.it

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Reading the Territory. Signs graphics and remote sensing images

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Abstract

The study of the shape of the Earth involved philosophers , mathematicians, ' surveyors ' , draftsman who , based on their knowledge and skills, attempted to return with different methods and techniques and on different media , the geographical and spatial information for its three-dimensional and two-dimensional maps of the world from globes to the maps, since ancient times. During the twentieth century , with the progress of aeronautics - military and civilian - the study of the geometry of the Earth and its cartographic representation had significant developments related to aerial surveys and the emerging technique of photogrammetry from architecture (land) was strategically used in the recording of photorealistic large portions of the territory. Technological advances and the political and cultural events always influenced the evolution of the representation of the Earth. In some areas of study and analysis of the natural and built , the reading of the information contained in the maps can be the basis for knowledge both punctual that general of the land . Modern technology , with the development of sophisticated digital atlases and web offers the chance to read the evolutionary processes and the urban transformation of the territory and stands as an indispensable instrument of knowledge, research and forecasting changes and transformations .

Keywords: Remote sensing, Cartography, Territory.

1. Reading the Territory

The cartographic representation of a territory originates from direct experience, from a relief or a combination of different elements, suitably adapted, are shaped in a scaled image.
The representation of the shape of the Earth took on different forms depending on the various scholars that you are passionate about it: by philosophers to mathematicians, surveyors and draftsman.
The maps edited by geographers and travelers, useful to pass the armies and goods, contributed to the knowledge and the government of the territories measured and represented.
The maps, in fact, take on different forms and meanings depending on the requirements that must be fulfilled: those nautical policies, from topographic to thematic map.
Probably, the cartography originated with the beginning of human history; with the evolution of civilization, man had the need to represent the earth in order to facilitate its displacement for both economic and military purposes.
In the history, then, the passion for the representation of the land led scholars to produce globes and maps. The production of paper, in fact, guarantees the possession through the description and reflects the social and the productive capacity of a particular historical

moment. The paper is a reflection of the culture that produced it, and it reflects the values of a particular period.
During the twentieth century , with the progress of aeronautics - military and civilian - the study of the geometry of the Earth and its cartographic representation had significant developments related to aerial surveys and the emerging technique of photogrammetry from architecture (land) was strategically used in the recording of photorealistic large portions of the territory.
In the nineteenth century the majority of European states , aware of the need for reliable maps and updated to serve not only the needs but also those of a military character of technological and social development of their countries , began to draw up appropriate bodies responsible for implementing to work on the structuring of geometric and cartographic survey of the areas of relevance. Italy , because of the particular historical events , only after 1870 formulated a unified mapping project . The "I.G.M." began a long journey in the service of Italy , promoting the development of scientific and technological progress. The great cartographic institutions started to create maps using more advanced systems.
The development of electronic computers , electronic measurement of distances by means of laser beams and light, and the use of computers in the design of the cards, together with the increasingly sophisticated software have enabled a rapid evolution

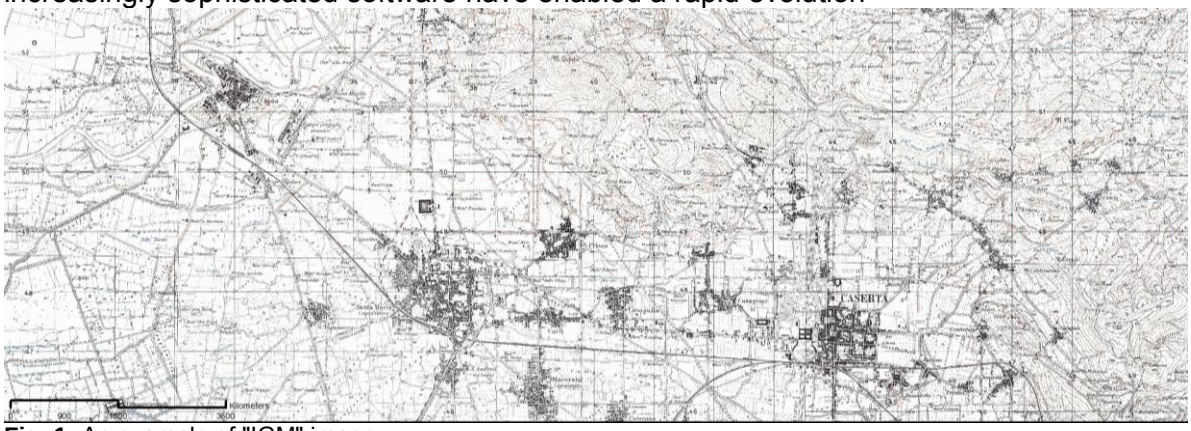

Fig. 1: An example of "IGM" image

The system now widely used for the production of topographic maps is photogrammetric survey, for which we make use of an aircraft flying in a straight line, at constant altitude and speed, and runs at intervals of a predetermined time, a series of photographs on a portion of territory by acquiring spatial data from different angles. The pictures are taken in succession in order to have an overlap between frames. In this way, the whole territory under investigation is covered by image overlap. With the ability to superimpose contiguous images you are able to see what is taken up in three dimensions. The ability to see in 3D allows to have, in addition, a whole series of information in more compared to the vision in 2D. It is thus able to identify forest species, flood zones and areas such as moving landslides.
A real revolution was determined from satellites ERTS (Earth Resource Satellites Technology) , supplied equipment for remote sensing , sensitive portions of the electromagnetic spectrum invisible to the human eye .
The type , the quality and the coloring of the images depend acquisition techniques and by the choice of wavelength capable of bring out a specific phenomenon .
The information is transmitted to the ground stations where appropriate , using very sophisticated programs are decoded and converted into readable images . In this , so you will get the documents that allow cartographic processing of high accuracy for almost inaccessible areas .
Above our heads spinning a large number of satellites that orbits and regular every day detect a portion of territory of variable amplitude.

2. The map: a “snapshot” of reality

There are several reasons that prompted and necessitated the translation into signs of the territory and of the individual elements that make it up: the cartography; is both a small and symbolic representation of the reality that a set of signs ordered and relevant to a space man-made, systematized according to a syntax and grammar graphics.
It represents a "snapshot", a picture of the result of natural and anthropogenic agent of that until that time the portion of the Earth represented but assumes, also, the double value of future scenario of that particular place.
The changes of an area were the subject of graphics editors; the great informatic revolution outlined new areas and geographies paving the way for new methods of representation like dynamic maps, animated and interactive.
Increasingly sophisticated and technology have produced cybermappe where the image changes as the world changes the measurement of distances and relationships between the parts of the world.
The approach on the part of man is come to change and has expanded with the development of technology and some key events in history.
Man has always tried to devise simple and reliable system for determining the location of the place where he was on the earth's surface and tried to imagine and realize the direction in which it was moving.
The GNSS system was the most efficient response to this need of man, it defines the global positioning system based on satellite constellations. At present GNSS systems affecting Italy and Europe. GPS (United States), GLONASS (Russia), and Galileo (European Community).
The GPS was originally designed as a system for the defense and then, initially, largely protected against external interference.
In 2002, however, it was decided to eliminate the Selective Availability or to the limitations and restrictions for safety reasons, so it is now possible to determine the absolute position with submeter accuracy.
The cartography became a tool designed to act as a support to a type of information disseminated and accessible to all.
The Internet has made outstanding contributions in the development of the discipline for which the geographic information is available to everyone.
The mapping language has changed and it is intelligible to more and more spectacular images. The symbols, in fact, can be read by a more careful eye and preparation; reading an image, result of remote sensing, is instead clear and immediate eye not expert.(Fig.2)
The great development of the cartographic distribution is related to the growth of the Internet as a means of communication, and in it the phenomenon of the world seen from above has become increasingly important over the years: just think of the great diffusion of digital atlases. (Google Earth, Google Maps, Bing, EarthView).

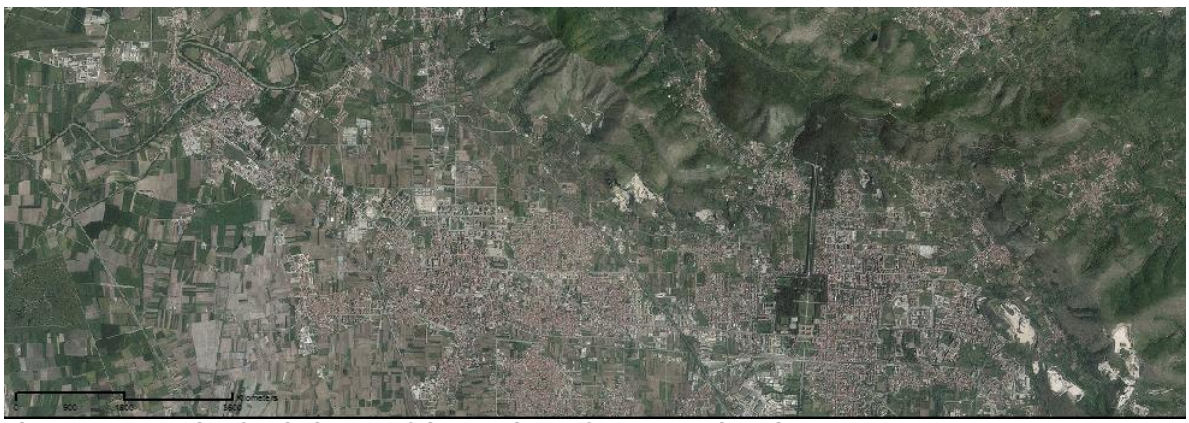

Fig. 2: An example of orthoimage of the province of "Caserta" (2011).

3. Conclusions

In the research , the remote sensing images have assumed a central role in knowledge both puntual that the general of the land.
Modern technology , with the development of increasingly sophisticated digital atlases and web offers the chance to read the evolutionary processes and the urban transformation of the territory and stands as an indispensable instrument of knowledge, research and forecasting changes and transformations .
The research aims to consider the oldest maps as a starting point for the study of a specific area .
A valid path to knowledge lays the foundation temporal analysis of aerial photos , thematic cartography by up to online images of modern digital atlases .
Such a type of integrated analysis , in fact, can afford to rebuild the historical -temporal evolution of an area under study.
The applications of modern technology of remote sensing are considered essential as a method of study, research and forecasting processes of land transformation .
It is essential the ability to interpret the data according to subjective basic interpretive skills in reading complex tracks and signs inherent in the territorial system .

Bibliographical References

[1] GAMBARDELLA, C. (a cura di), *Atlante di Pompei*, La Scuola di Pitagora, Napoli 2012.

[2] GUAITOLI, Marcello (a cura di). *Lo sguardo di Icaro. Le collezioni dell'Aerofototeca Nazionale per la conoscenza del territorio,* Campisano Editore, Roma 2003.

[3] BORENGASSER, M. (a cura di), *Hyperspectral Remote Sensing: Principles and Applications*, CRC Press 2007.

[4] SHAN, J., TOTH, C. (a cura di), *Topographic laser ranging and scanning*, CRC Press 2009.

[5] Referring Web Pages Web: http://www.igmi.org/

XII International Forum Le Vie dei Mercanti
BEST PRACTICE IN HERITAGE CONSERVATION MANAGEMENT FROM THE WORLD TO POMPEII
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Regeneration of Carditello

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Abstract
The Real Estate of Carditello, located in the municipality of San Tammaro in Caserta Province, is a part of the Bourbon Sites acquired by the Crown in the reign of Charles of Bourbon and Ferdinand IV. These sites were typically farmhouses, rich vegetation, pastures and game, suitable for leisure activities, such as hunting.
The Real Estate of Carditello, called Real Delight, was intended by Charles of Bourbon for hunting place and breeding of horses (1716-1788) and accommodate in the architectural complex, designed by Francesco Collecini, a student of Vanvitelli, the royal family to return from hunting. Later it was transformed by Ferdinand IV of Bourbon in a model farm for the cultivation of grain and livestock of special breeds of horses and cattle. The entire estate in the intentions of Ferdinand IV was to serve as a prime example of its adherence to the policy farm.
The project of restoration and renovation of the architectural complex is compatible with the original function, briefly described, and in particular it recovers the historical productive vocation of the Estate.

Carditello

Carditello
The Real Estate Carditello, located in the municipality of San Tammaro in Caserta Province , is part of the Sites Bourbon acquired by the Crown in the reign of Charles of Bourbon and then Ferdinand IV . These sites were generally old country, rich in vegetation, pastures and game, suitable for leisure activities, such as hunting . Among these, the Casino Royal Carditello called Real Delight, which was designed by Charles of Bourbon in place for hunting and breeding of horses (1716-1788) and to welcome in the architectural complex , designed by Francesco Collecini , a student of Vanvitelli, the royal family to return from hunting. It was later transformed by Ferdinand IV of Bourbon in a model farm for the cultivation of grain and the breeding of quality breeds of horses and cattle. The entire estate of Ferdinand IV in the intention was to serve as a prime example of its accession to agricultural policy. [1]
The activity detection with integrated digital platform plurisensore Mobile Mapping the route of the track perimeter of the Palace of Carditello, action is preparatory to the project activity within the programming of the Plan Management .
In this direction the first phase and the phases that follow the Management Plan of the UNESCO site in question are aimed at opening up new perspectives which must include other resources that are not yet included , such as the Palace of Carditello and its territorial scope, and that can not be excluded or marginalized . [2]
The second session involved the instrumental side roads the Palace of Carditello according to the route of the SP229 Carditello.
The processing of the data thus acquired has returned a single digital model integrated georeferenced (permanent reference station of the Laboratory ARS Benecon in Frignano) and full scale (1:1) of the

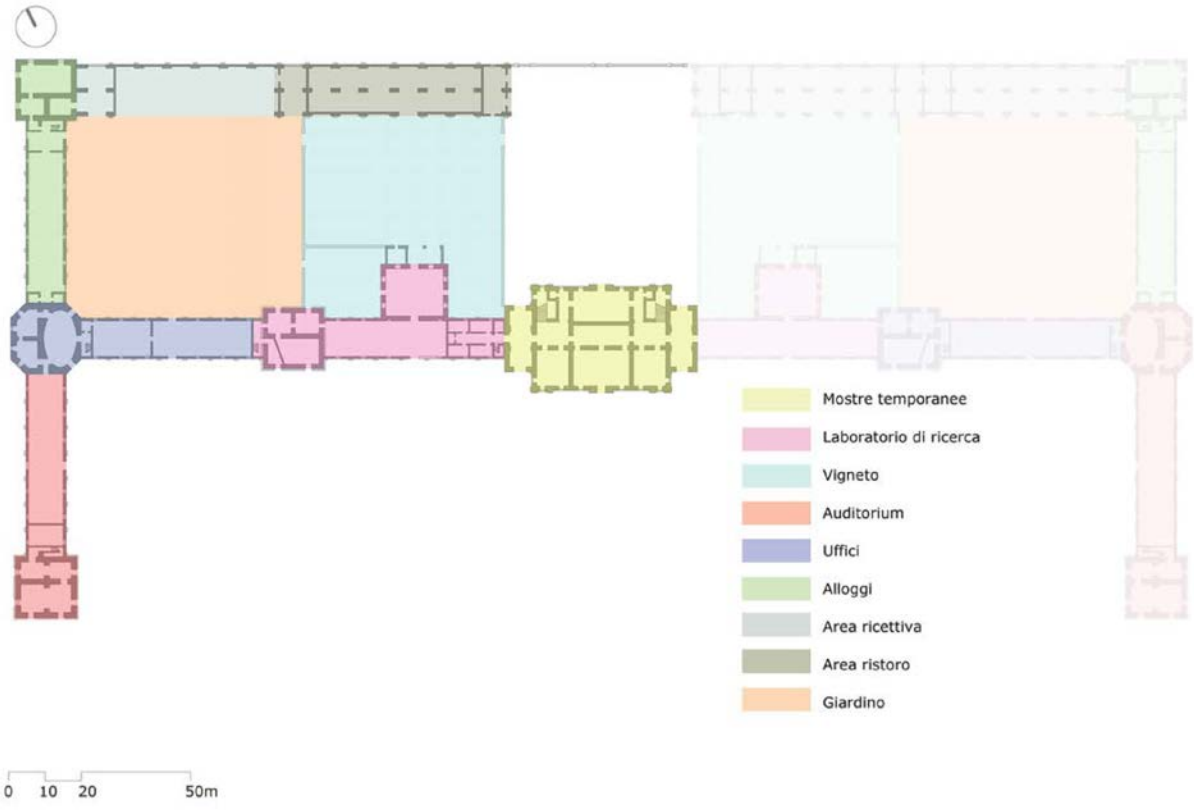
perimeter roads of the Palace of Carditello, which are intelligible model geometric 'point cloud' model and the photo of the building facades and street scenes traveled.
The project of restoration and renovation of the architectural complex of the Estate of Carditello .
The project of restoration and renovation of the architectural complex of the estate is compatible with the original function of the complex, briefly described , and in particular recovers the historical vocation of farm productive character of the palace built by Ferdinand IV of Bourbon.
The restoration project has focused in particular parts of the roof of the complex that retrieves the lines wrap around the old roof with the introduction of strips of wood to restore the original appearance of volume ; was also introduced the theme of the botanical garden with glass panels covered with photovoltaic film to change cromatica.
In particular, the new functions, the two-storey main building was entrusted to a representative function and exhibition halls used by the adaptation of temporary exhibitions on the ground floor and conference rooms and banquet on the first floor, respecting the historical function of these spaces designed to accommodate th

e royal family and halls for receptions held back from hunting.
In the left arm were included research labs and offices; in the right arm restoration laboratories and rooms for the display of local products. The northern area has been devoted to the garden, the vineyard and the bioclimatic greenhouse closely related to the exhibition halls of the products. In the east wing of the complex was placed rural museum and the museum multimedia .
In the west wing directly related to the representation of the auditorium was placed on a structured auditorium with light steel structures. The part of the building at the northwest was instead given way to a small guesthouse with temporary housing for researchers engaged in research activities in the complex.



Fig. 1: Carditello Orthophoto - Current situation




Mostre temporanee
Laboratorio di ricerca
Vigneto
Auditorium
Uffici
Alloggi
Area ricettiva
Area ristoro
Giardino

0 10 20 50m

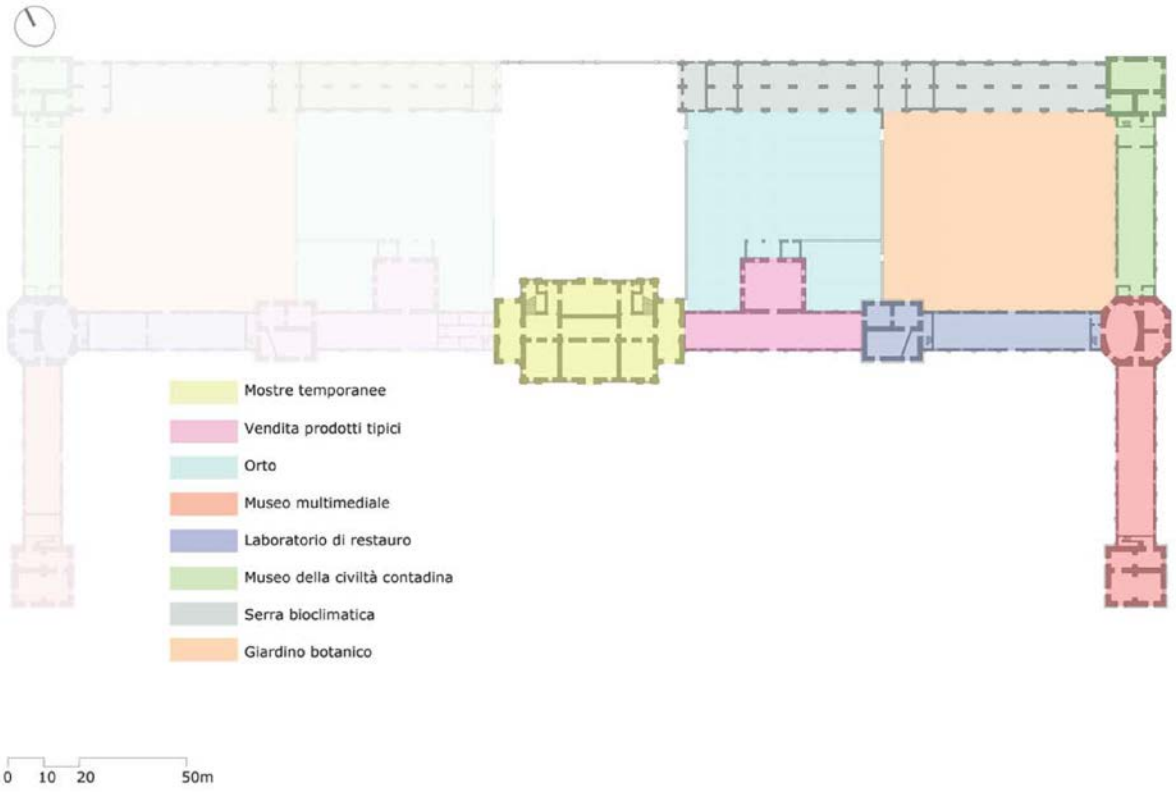

Mostre temporanee
Vendita prodotti tipici
Orto
Museo multimediale
Laboratorio di restauro
Museo della civiltà contadina
Serra bioclimatica
Giardino botanico
0 10 20 50m







Fig. 2-7 : Degree Thesis _ Degree Course in Architectural Science and Engineering | Department of Architecture and Industrial Design "L. Vanvitelli," SUN.
Supervisor: Prof.Arch. Carmine Gambardella
Co-Supervisor: Prof. Arch Gianluca Cioffi
Candidates: Marco Mollo, Ilenia Esposito.

Bibliographical References

[1] SERRAGLIO, Riccardo. *Francesco Collecini: architettura del secondo Settecento nell'area casertan*a. 1ª ed. Napoli: Edizioni Scientifiche Italiane, 2001. 241 p.

[2] SERRAGLIO, Riccardo. *Architetture per i lavoratori tra Napoli e Caserta: progetti e realizzazioni dal XVIII al XX secolo.* 1ª ed. Napoli: Edizioni Scientifiche Italiane, 2001. 317 p. ISBN 9788865421383

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Recovery Plan and Redevelopment of an area in "Salice" (Foggia)

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Abstract
The project is inspired from the idea of studying an urban settlement model, which gives order to the impulsive will of urbanizing a piece of territory in the Foggia's country, an extra-urban area named 'Salice'.
For years, this area has been victim of an abusive colonization, where private citizens have autonomously subdivided portions of the extra-urban territory. So, they substitute for municipal competent authorities, for the urban development planning and for the arrangement of a few project areas for residences and not, breaking the provisions and the planning instruments in force.
The reshape of this portion of territory in Foggia provides a particular attention to the paths, which are studied for allowing to delimit the area, as well as to design a straight park scheme, used as a green public area and, at the same time, as a connection between different points of the area.
In this way, the project aims to repair the impulsive primitive urbanization, fitting the area out with first and necessary instruments for starting the project of a new complex urbanization of the area [1].

Salice

Setting 1
1 The settlement is located near the SS16 towards the south- east of the town of Foggia. l'intervento circumcamminamento an O-ring that goes around the areas perimetrate recovered.
The project is based on the need to provide minimum elements of usability of the area , such as: adaptation road (1711 sq m) , sidewalks (503 square meters) , PV street lighting (for both road and pedestrian lighting) , planters, trees , various items of street furniture (benches and wastepaper baskets) and the island green space dedicated to the collection of waste .
In the space in front prospettante road is on an area of 125 square meters dedicated to parking with the availability of n . 10 stalls for cars.
Along the dedicated to parking is on the pitch also dedicated to ecological island (collection of waste) of about 35 square meters, this is designed as a green space where the containers are allocated for the collection.
The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .
The green is expected according to a double register , before a line is formed by low hedges (approximately 165 m) which will signal further limit road , located behind the cordon of stone. Then there is a second line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.

Widening the road: 1711 sqm
Parking: 125 sqm
Sidewalk: 503 sqm
Green bounding: 165 sqm
Green with Trees: 72 sq.m No. 165_ _ 2 trees every 10ml
Cord: 419 ml _ 83.8 sqm
Bumps: 751.64 ml _ 225.49 sq.m.
Grids: No. 75 _ 1 grid per 10 ml
Ecological island: 35 sqm
PV street: n. 39

Setting 2

The project presents difficulties of insertion as the area appears to be consistently populated with buildings all the way to the road boundaries , creating some difficulty to intervene.
The project involves the upgrading of existing roads (1239.66 sq m) , sidewalks (614 square meters) injection of 248 square meters of parking split between the front main road (no. 12 stalls) and a small part (# 4 stalls) in the space behind .
Along the main road is also located on the island of 35 square meters ecological placed in a position to facilitate the collection of separated waste .

The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .
The green is expected according to a double register , before a line is formed by low hedges (200 sqm) which will signal further limit road , located behind the cordon of stone. Then there is a second line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.
In the southern area , in a more secluded than the rest of the intervention has been inserted a room for the testing of an urban vegetable garden of 310 square meters.

Widening the road: 1239.66 sqm
Sidewalk: 614 sqm
Parking: 16 200 sqm (248 sqm area occupied)
Green bounding: 204 sqm
Green with trees: 165 sq.m. No. 72 _ 2 trees every 10ml
Cord: 512 ml _ 102.4 sq.m.
Bumps: 1303 ml _ 391 sqm
Grids: No. 124 _ 1 grid per 10 ml
Ecological island 35sqm
Urban garden 310 sqm
PV street: n. 59

Setting 3

The intervention in its geometry looks quite tidy with a regular and a perimeter road system , in essence, already outlined.
The project involves the upgrading of existing roads (1634 square meters) , the insertion of 812.5 square meters of parking spaces divided between the front of the main road (no. 17 stalls) and another portion is arranged parallel to the avenues of penetration (no. 48 stalls) .
The pavements (1400 square meters) and the one-way cycle track (1750 sq m) with a width of 1.50 m walk and simultaneous ring around an area behind the most densely built up and configuring a kind of ideal circuit around it . The two paths are separated by a central strip of low hedge interspersed with elements of street furniture such as the wastebaskets .
Along the main road is also located on the island of 170 square ecological placed in a position to facilitate the collection of separated waste .
The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .

The green is expected according to a triple register , before a line is formed by low hedges (hedges low total 936 sqm) which will signal further limit road , located close to the cord of stone, followed by a second line too low and formed by hedges to separate the bike lane from the pedestrian . Then there is a third line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.

Widening the road: 1634 sqm
Parking: No. 65 _ 812.5 sq.m.
Green trees with interstitial (parking lot): No. 12 _36 square meters of greenery
Sidewalk: 1404 sqm
Cycle track: 1755 sqm
Green bounding: 936 sqm
Green with Trees: 468 sqm No. 234 _ 2 trees every 10ml
Masts green belt: No. 272
Cord: ml 1170 _ 234 sqm
Bumps: 3203 ml _ 961 sqm
Grids: n ° 320 _ 1 grid per 10 ml
Ecological island: 171 square meters
PV street: n. 114

Setting 4

The intervention in its geometry looks pretty neat with a smooth perimeter for the most part to the west, while more irregular and discrepancies with respect to the road system to the east .
The project involves the upgrading of existing roads (470 square meters) , the inclusion of 68 square meters of parking inserted parallel to one of the roads extended (No. 6 stalls) .
The pavements (888 square meters) and the one-way cycle track (1343 sq m) with a width of 1.50 m walk and simultaneous annular area around the rear (west) setting up a kind of ideal circuit around it . The two paths are separated by a central strip of low hedge interspersed with elements of street furniture such as the wastebaskets .
Along other roads or sidewalks are provided only as in the most irregular to the east there is only one row of trees to act as a border area confiscated.
Along the main road is also located on the island of ecological 171 square meters located in a position such as to facilitate the collection of separated waste .
The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .
The green is expected according to a triple register , before a line is formed by low hedges (hedges low total 806 sqm) which will signal further limit road , located close to the cord of stone, followed by a second line too low and formed by hedges to separate the bike lane from the pedestrian . Then there is a third line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.

Widening the road: 470 sqm
Parking 68 sqm
Sidewalk: 888 sqm
Cycle track: 1343 sqm
Green bounding: 806 sqm
Green with trees: 404 sqm No. 202 _ 2 trees every 10ml
Cord: 785 ml
Bumps: 1008 ml
Grids: No. 101 _ 1 grid per 10 ml
Ecological island 171 sqm
Range with trees: 446 ml _ 1338 _ No. 89 sqm 2 alberi_ trees every 10ml
PV street: n. 31

Setting 5

The intervention in its geometry looks pretty neat, triangular-shaped , with a perimeter of regular and a major axis of penetration which is adjusted to the point limit of the buffer zone due to the constraint of inedificabilità Plan Tratturi , in fact and in its under this occasion it was decided to bring in the presence of traces of Tratturo and make it usable by supplementing it, sidewalk and bike path then continues along the perimeter of the area. The project is also designed for a possible subsequent extension of the intervention mirroring the same type on the other side does not object , at present, of intervention.
The pavements (3183 square meters) and the one-way cycle track (4022 sq m) with a width of 1.50 m walk and simultaneous ring around the entire perimeter , including the band falling in the restricted area . The two paths are separated by a central strip of low hedge interspersed with elements of street furniture such as the wastebaskets . Along the way are then designed items such as plaques or signs such as to explain the role and history of the cattle tracks .

The project involves the upgrading of existing roads (406 square meters) and the inclusion of 950 square meters of parking inserted parallel to the axis of the spine extended (no. 77 stalls) . Also along the axis of the plug, and aligned to the parking is inserted the ecological island of 41 square meters for the collection of separated waste .
The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .
The green is expected according to a triple register , a first line is formed by low hedges (total low hedges 2966 sqm) that mark further limit road , placed close to the bead of stone , followed by a second line which is also low and formed by hedges to separate the bike lane from the pedestrian . Then there is a third line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.

Widening the road: 406 sqm
Parking: 950.35 sq.m.
Sidewalk: 3264.75 sqm
Cycle path: 4080.50 sqm
Green bounding: 2176.80 sqm
Green with Trees: 805 sqm No. 403 _ 2 trees every 10ml
Cord: ml 3167 _ 548 sqm
Bumps: 966.80 sqm ml 4149_
Grids: No. 415 _ 1 grid per 10 ml
Ecological island 41.11 sq.m.
PV street: n. 286

Setting 6

The intervention in its geometry presents fairly ordered , the area is configured as an elongated parallelepiped , with regular perimeter , characterized by the layout of the buildings along the axis of the plug.
The project involves the upgrading of existing roads (2054.50 sq m), the inclusion of 2569 square meters of parking inserted parallel to the central street of penetration (no. 139 stalls) . The parking bays have the characteristic to be paved with lawn having reinforced , ie , the characteristic of being plots of green when the machine is not in park and separated from one another by low hedges .
The pavements (2015 square meters) walking in parallel on both sides of the road penetration , configuring a walk straight along the length of the intervention.
On the short side of the box is also located on the island of 125 square meters ecological placed in a position to facilitate the collection of separated waste .
The adjustment involves the insertion road on the edge of zanelle and grids for the collection of water and stone beads for beading edge road and allow a small difference in height elevation .
The green is expected according to a double register , before a line is formed by low hedges (approximately 672 sqm) which will signal further limit road , located behind the cordon of stone. Then there is a second line , the higher , which encloses the inner area under redevelopment. The row of trees (2 trees every 10 m) is designed with essences of strawberry tree (Arbutus unedo), which

allow an efficient shading during the hottest months , so as to regulate , in a natural way , the microclimate .
The lighting is designed with lampposts double armor so as to allow an effective illumination of the roadway is that of the pedestrian . The lighting system is designed without the provision of sub-systems or network being photovoltaics.

Widening the road: 2054.50 sqm
Surface for parking: 2569 sqm
Sidewalk: 2015.4 sq m
Green bounding: 672,30 sqm
Green with Trees: 986 sqm No. 493 _ 2 trees each 10ml + trees parking
Cord: 1739.5 ml _ 331.00 sq.m.
Bumps: 2054.5 ml _ 599.66 sq.m.
Grids: No. 206 _ 1 grid per 10 ml
Ecological island 125 sqm
PV street: n. 83



Fig. 1: General plan



Fig. 2: Setting 1



Fig. 3: Setting 2



Fig. 4: Setting 3



Fig. 5: Setting 4



Fig. 6: Setting 5



Fig. 7: Setting 6

Bibliographical References

[1] SALVATO, Vincenzo. *Foggia città territorio e genti*. 1ª ed. Foggia: Claudio Grenzi Editore, 2005. 416 p. ISBN 88-8431-155-1

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The Sanfelician portal in neapolitan architecture of XVIII century

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Abstract
Since old times the portal assumed a dual function. Concretely its represents opening, a passage that allows the physical movement from one place to another, from a public space to a private one. Symbolically, its genesis can be traced back to Roman triumphal arch, erected to be crossed as a sign of victory and supremacy, also, in philosophical meanings its represents the knowledge. Specifically in the Neapolitan historical residential buildings, from the XV century, the portal has always been subject to an architectural experimentation geometric-configurative, but in the Baroque period it becomes the protagonist of the urban scene. To rename it is without doubts was one of the main architects members of the Neapolitan Baroque: Ferdinando Sanfelice. Will be analyzed below, the architectural production of the Sanfelician' residential building portals, through the examples of noble representation that we will return the critical reading of the genesis of forms and matrices that are typical of Ferdinando Sanfelice.

Keywords: Ferdinando Sanfelice, neapolitan historical residential buildings, portal, architectural survey.

1. Neapolitan historic residential buildings portal
The portal is an architectural element which attracts attention of passers-by's size, shape, material, decoration, and its function as a passage from an internal to an external space. This role of passage, since ancient times, became a tangible sign of distinction between two worlds, two existential conditions, therefore load of symbolic meaning. Functionally, in fact, the portal has a dual function. Physically its represents, an opening that allows the passage, a displacement between different environments. Ideologically, however, manifests a plastic effects research that can impose them, as privileged presence in the territory, expressing a form of representation of families of origin or those acquired by marriage, and, in a more philosophical, from ignorance to knowledge.
Specifically in the Neapolitan historical residential buildings, the portal is one of the most expressive of building interesting expressions, because the portal function is not only linked to the need to cross two different spaces, but it forms a whole with the definition of a path, where the profile of the arch, the shape of the piers and other elements, form the definition of an imposing presence, which highlights the agreement between the harmonic architectural and structural function.
But the analysis of a portal cannot be separated from analysis of the building to belongs and especially it is not possible to extrapolate it from a more complex system, one that allows the gradual separation of public from private: System hall, courtyard, staircase, which defines the gradual move as a space of the report. Whether it's a noble or residential building, the portal has preserved symbolic passage, which, by virtue pattern offered (vegetal, geometric, animal) that the techniques of carving, refers to the figurative tradition of membership [11].
As a result, the portal so full of meaning, has always been object of particular attention: emphasized adorned, banded, (whether it was an entrance to a building or a religious building is that it was access to humble dwelling). This attention, usually manifested by placing the portal in the center of the front building and to endow it with figurative elements, that can give more emphasis both structural and formal.

The planimetric configuration of neapolitan historical residences comes from Hippodamian city scheme adapted to a ground sloping on the sea and to the need to follow the shape of the torrential watercourses, which generated with the rains [6] [7]. Therefore characterized by an urban scheme cardini and decumani and, in general, narrow sections of road, for a result that did not allow residences to be able to show off an architectural composition of the front. So, the program focused expressive in all proscenium portal and scale straircase [5].
Futhermore, thanks to its spatial dynamism (formed by flying buttresses supported by a complex system of vaults) it becomes the real front of the building, giving the context of a multi-dimensionality of which the portal is its means.
The neapolitan historical residential and in particular the presence of the portal, is therefore characterized by elements that take on a different architectural language over centuries.
In fifteenth century, we begin to establish the type of civil residence as an independent issue from architecture in general. Through the portal, the viewer sees a scene which is repeated in each case: a large hall surrounded by a large depressed arch in piperno stone, a courtyard, a loggia with arches resting on massive octagonal pillars on the first floor.
The most frequent catalans decoration present in neapolitan residential architecture is limited to the portal. This element, called the arc-type durazzesco-catalano, both of which structure is archivolted and architrave, is configured in two main variants: the first, most frequent in his joints, arched opening with depressed arches; the second with the addition of clips from the previous frames tangent the extrados of the depressed arch.
In sixteenth, instead, the portal arch's profile assumes a more linear shape, with the adoption of the circular arch and the use of an ashlar predominantly smooth or diamond tip.
At beginning of seventeenth and eighteenth century, was common to reuse some decorations from catalan architecture in various forms: for example, the depressed arch is one of the typical features of the portal and Neapolitan Baroque openings, but presents a matrix with predominantly polycentric.
Among the outstanding examples of what is written is the monumental Sangro palace portal, built by Giuliano Finelli (XVI-XVII sec.) and in which is expressed the contrast of piperno stone and accompanying marble alveolated columns, consisting of blocks that frame the entrance, and they represent a form of attention that the architect gives to the portal, making to pass in the shade the rest of the renaissance front (fig.1-A). During the sixteenth century, also Cosimo Fanzago (1591-1678), designed baroque portals, which the most important was the Palazzo Carafa di Maddaloni where the central arch is enclosed by a composition of tuscanic pillars which rest on a base reinflated ashlar, which ends on an ephemeral decoration marble, while at the sides there are connection vaults [4] (fig. 1-B).

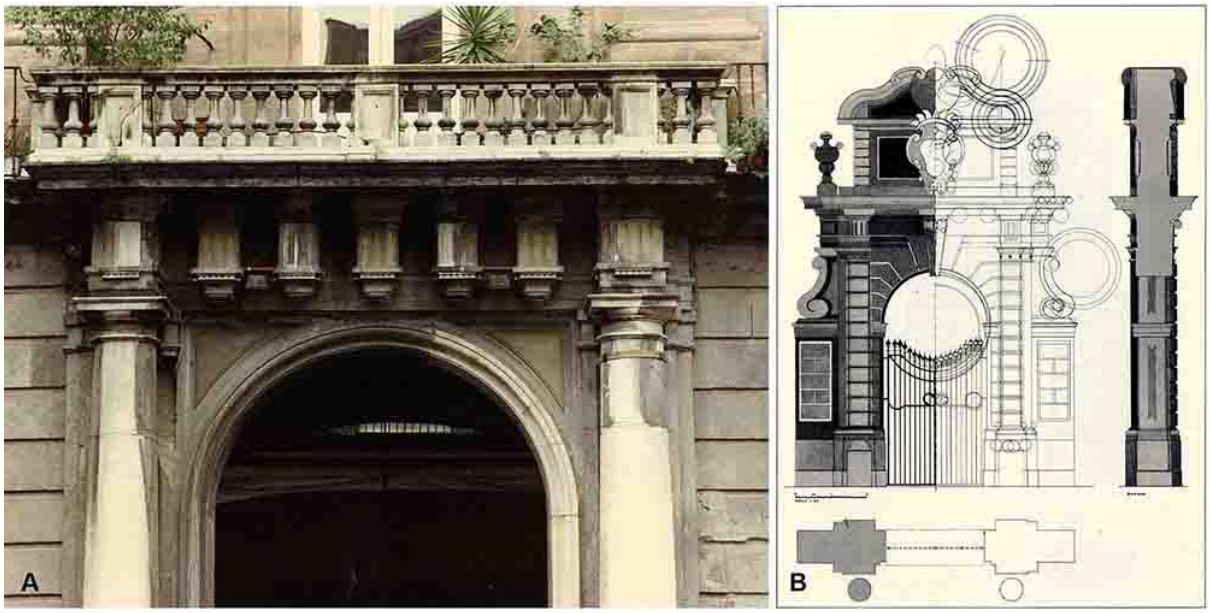

Fig. 1: Di Sangro palace portal; B-Carafa di Maddaloni palace portal.

2. Typological configuration portal : elements and material

The portals of the historical residences in Naples, are Attributable from a structural point of view of two types of building systems: architrave and archivolted. Specifically, the system will allow the differentiation archivolted dictated by the variability of the profile of the arc. The categories of portals archivolted differ based on the use of curvilinear arrays (central arch, depressed arch, ogival) and mixtilinear (sanfelician polycentric type with concave-convex direction) which characterize not only a static language but also an architectural language.

There are several element that make up the apparatus of portal: the piers, the ornamental shelf, the frame classification, the pediment and the architectural order. The figurative and structural configuration of the piers is a function of more general reference system (architrave or archivolted). However, they can be divided into two main cases: the first where the piers are intended as a continuous strip that follows the trend of the portal; the second where the same constitute a more external apparatus adapted to support the entablature [8].

Another feature of the portal is the ornamental shelf, a support structure in horizontal projection, usually located in the upper corners of the gate. The pediment, by contrast, portals residential Neapolitans, may present or not, or appear with the central part missing. The architectural order, however, may appear in accordance with the classic rules or supported by capitals from animal motifs, natural or anthropomorphic [11].

Portals are generally constructed in piperno stone, a magmatic rock in neapolitan area, was born from volcanic activity. This lithified type of rock, different from the yellow tufo, assumes a particular texture characterized by the concentration of lenticular isorientation gray, called flames, surrounded by a matrix of the same color but lighter. The piperno stone was not easy to remove, if not through a subterranean separation of large blocks that were then processed. It is resistant to wear of the atmospheric agents, and for this reason it was very used for the cladding of Naples. Sometimes the piperno stone is accompanied by marble which gives a plastic configuration.

3. The Sanfelician portal

Among the architects who are interested in portal from Naples, Ferdinando San Felice (1675-1748) is surely on of the most important.

Sanfelice worked as apprentice in the workshop Solimena's where he was show his skills at the creation of ephemeral architecture.

After the onset of the implementation of the coffin at the funeral of Charles II of Spain, will then be successively occupied with preparation for the entry into Naples of Philip V's kingdom.

In this occasion the architect had the opportunity to collaborate with Bolognese Francesco Bibienas, considerable ability astist. From the perspective latter diagonal assimilated the characters, the spectacular taste typical of Benini, the traditional architectural style objection and the use of anthropomorphic architectural elements to support trabeations. From Bibienas, Sanfelice will resume and proposed a his dialectic: the plant diamond ashlar pillars, columns and piers of the portals, and where he later adds curvilinear and rectilinear geometries assimilated by the poetry of Austrian architect Hildembrandt.

It 'clear that the lucky of the Sanfelice, was to have had close ties with influential people, starting from customers and ending with artistic personalities of considerable thickness [2].

Examples of greater representativeness of Sanfelice are portals of Pignatelli di Monteleone palace (Calata Trinità Maggiore) and Filomarino (Benedetto Croce street, 12). Respectively, in the first building we see one of his stylistic reinventions given by th presence of arched columns which overlaps another sanfelician dialectic constant: point diamond ashlar, often made of white marble. In the second episode, however, his language moves from the columns directly in the internal profile of the portal and replacing the columns with the rusticated piers, which support a projecting pediment, with central part omitted, in which you place a badge of the house of belonging [3].

But the activity of Sanfelice is not only limited to creation of portals for noble families, but also for residential architecture. Among the many examples we find: Santoro palace portal (Salita Capodimonte, 10), Maciocco palace portal (Salvator Rosa street, 98-103) and the portal of Olivella square, 13; everything characterized by architrave and archivoltated concave-convex profile.

Thanks to the classical tradition language, always conducted in a dialectical, and its continuous effort to seek new forms with the use of geometric patterns and modular, and at the same time to give a precise role to its urban factories, imparts elegance and brilliance to the its artefacts. Through the use of forms which he invents himself gives the portal of an attempt to geometric-configurative research, in which there is provided a synthesis between figurative elements and method of construction, giving a dynamic consciousness of the form that cannot be met solely by the old formalist aesthetics and property [2].

The use of a matrix curvilinear-mixtilinear (whether consisting of fluctuating forms), the prominence and the projections of some constituent elements of the portal are reprocessed characters from

Sanfelice conception taken from Hildebrandt architect, with whom he had close relationships during the austrian the austrian kingdom. In addition, the use of ashlar leads to an immediate reading of the sanfelician dialectic used architectural order of the columns, piers or can last a frame or paragraph in the arc. The ashlar also limited to a mere indentation of the lines of junction between the segments, or offer clues to cushion or spearhead.
The richness of the elements that characterize the sanfelician portal are manifold, to which we add, the wooden doors of the gate, these elements becomes the main character of the urban scene. Consequently, with the presence of Sanfelice, the portal is become an architectural attractor an also the urban scene main character [10].
In the scene is possible to see daily life that characterized the relationship between Neapolitan people and the city. There is no doubt, that what is manifested during the Baroque Sanfelice highlights the union between the popular imagination and the shining of the Spanish court [12].
The tendency towards the theatrical and the search for illusionary effects absorbs most of sanfecilian expressions expecially with the "party machines", this machines are set up in the streets and squares in various civil and religious celebrations. This elements, however, are made, like portals, with a tendency to cancel the separation between ephemeral and constructed reality , changing casually standing in the interim.
In context of the scene, the portal seems to become a permanent place to celebrate the ephemeral presence, and the architectural language of the Neapolitan nobles, but also lower class houses.
Furthermore Sanfelice, was assigned to given an additional feature to the portal, this new meaning is not only the transition between two spaces, or as a clear eloquence to assert vigorously the presence of a noble house. He gives the portal a feature sensory-perception, which, thanks to its shape suggests the extraordinary spectacle that is going to be just beyond the doorway. One show theatrics made with the magnificence of the stairs opened, invaded by a bright light coming from the courtyard that is offered and denied at the same time.
The sanfelician portal, therefore, seems to be an invitation for the viewer to throw in the eye of the hallway to see the theatrical backdrop of the scale that assumed a composition that calls for the imaginary to the idea of an area of illusion.
Characteristics, which are Sanfelice's the best solution to the problem of the front, because from fifteenth century, was the source of experimentation.
The ability to manipulate the space, to translate the architectural composition (which could not occur outside) inside the courtyard, and the transition between the street light, the shadow of the hallway and the light from the courtyard to the full scale, give to the site a symbolic meaning. It is the means to achieve not only a physical place, the light or knowledge, it is the gateway to a theater where the staircase and courtyard becomes the stage where you can see the unfolding theater.

4. Sanfelician model portal: structure and geometric- configurational genesis

The survey of all types of portals, even if is restricted to the city of Naples, it would be almost impossible, because of the the survey would be amost endless. It is preferred, therefore, the investigation of a sanfeliciano sample, as homogeneous as possible, with references deliberately not distinguished to identify the highest linguistic expression, but a kind of vernacular architecture.
There are many contributions for the construction of the portals, which Sanfelice features in the landscape of neapolitan residential buildings, with a focus not only to the high class buildings something like "dialect talk architecture". Mentioning only a few examples, among the most illustrious of the construction that he makes for the creation of portals to stately mansions, we could remember: Filomarino Palace (Benedetto Croce street, 12), Serra di Cassano Palace (Monte di Dio street), Pignatelli di Monteleone Palace (Calata trinità maggiore, 124). These building which have already were the subject of extensive studies (Fig. 2-A, 2-B, 2-C).
The object of research, which is presented below, instead, was moved on a repertoire of attribution and derivation sanfeliciana portals, which are part of the constructive choral industry, but that sum up the whole dialectic operating sanfeliciana (fig. 3).
First of all, it is proposed the portal of Sanfelice palace (Arena alla Sanità street), designed and built for his personal residence in the early eighteenth century. The portal shows a broken straight profile, with a rectilinear broken profile, alternating with strip, wrapped and embossed with a diamond tip (Fig. 5 -A).
This type of solution, it will be a recurring feature in other portals, such as the one located in Pontecorvo square. This presents quite similar characteristics with the only variant of the light given by the size and height of the gap, and the size of the section of the molding (Fig. 5-B).
Different solution instead is adopted in the portal site in Salvator Rosa street at number 273, where the profile of the portal comes with a curved array, where the portal has a curvilinear profile.
The molding, even in this case, is of type alternating, bandaged and embossed. The rustication is highlighted with the curtain wall parallel to the road (smooth and projected), terminating in an ashlar diamond, tapered towards the inside of the gate (fig. 5-C).



Fig. 2: A- Filomarino palace portal; B- Pignatelli di Monteleone palace portal; C- Serra di Cassano palace portal.

In analogy with the portal in Salvator Rosa street 273, built for the Palmarice Palace (Banchi nuovi street). In this case, the same type of matrix curvilinear is adopted on, and the only difference is found in the different way in which the molding has been treated, which shows a simple ashlar (Fig. 5 -D). Simplicity, which does not reflect, however, the other portal placed in the same building. In this case, we can read one of the attempts geometric design and layout of the Sanfelice experimental art that strongly contrast with the traditional schemes. The profile is similar to that proposed for Palazzo Sanfelice: broken and ashlar with the upper profile, consists of a matrix curvilinear concave type that connects to the piers in the sides and to the rectilinear band, located in the upper central zone.

This example introduces a feature geometric-configurative, which often assume various forms, and that will be instantly recognizable and attributable to Sanfelice and his school of thought: the portal with concave-convex mixtilinear (Fig. 5-E).





This type belong to their respective portals Santoro palace (Salita Capodimonte, 10) (Fig.4), Maciocco palace (Salvator Rosa street, 98-103) which consist of two portals belonging to two different buildings assembled on the street by a single front, and two other examples which are respectively: Salvator Rosa street, 259 and Olivella square palace portal, 13 (Fig. 6-F, 6-G, 6-H, 6-I, 6-L). These portals are all characterized by the same type of genesis: offering a profile predominantly banded with the presence of the ashlar, placed in the points of discontinuity between the piers and the attack of the arc from the mixtilinear profile (concave-convex) and sometimes in the joints of the key bow. This configuration seems to point out the weakest points from a static point of view and geometric as the most important ones; strengthened and projecting than the other and along with other factors that contribute to ensuring Ferdinando Sanfelice as the most brilliant Neapolitan Baroque architect. The reason of this survey wasn't the completeness, but the indication of a method of interpretation and emphasis on how to intervene without rape or form, or structure; that is, without changing the appearance, as is often the case when working on objects which are not distinguished, and especially unprotected.

Fig. 3: A- Sanfelice palace portal; B- Piazzetta Pontecorvo square portal; C- Salvator Rosa street, 273portal; D-Palmarice palace portal (extern); E- Palmarice palace portal (intern); F- Santoro palace portal; G- Maciocco 103, palace portal; H- Maciocco 98, palace portal; I- Salvator Rosa street, 259, palace portal; L- Olivella square 13, palace portal.

Fig. 4: Santoro palace portal detail del (Salita capodimonte,10).

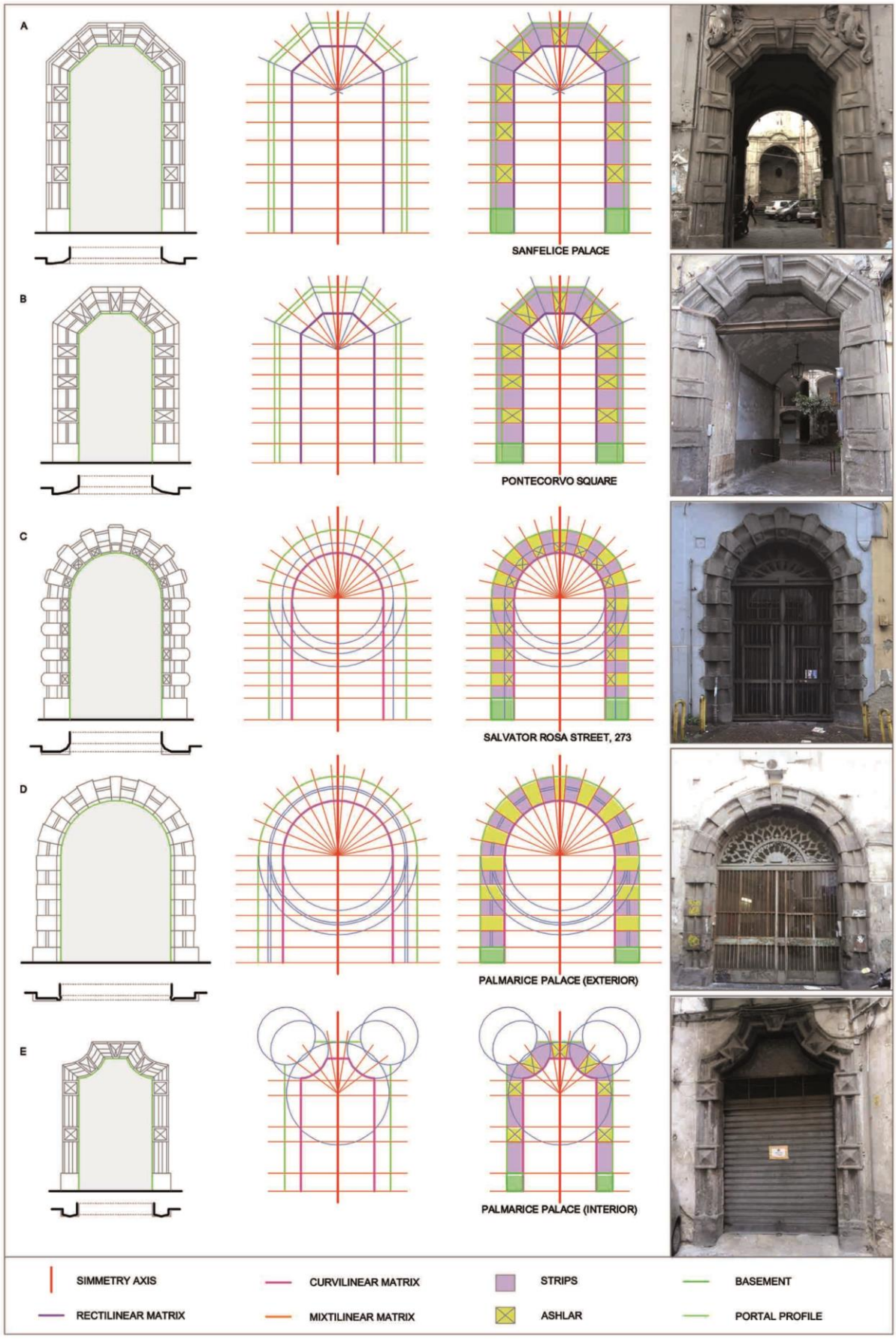

Fig. 4: Geometric-configurative portal analysis: A- Sanfelice palace portal; B-Pontecorvo square palace portal; C- Salvator Rosa street, 273, palace portal; D- Palmarice palace portal (extern); E- Palmarice palace portal (intern).



Fig. 5: Geometric-configurative portal analysis: F- Santoro palace portal; G- Maciocco,103, palace portal; H- Maciocco,98, palace portal; I- Salvator Rosa street, 259, palace portal; L-Olivella square, 13, palace portal.

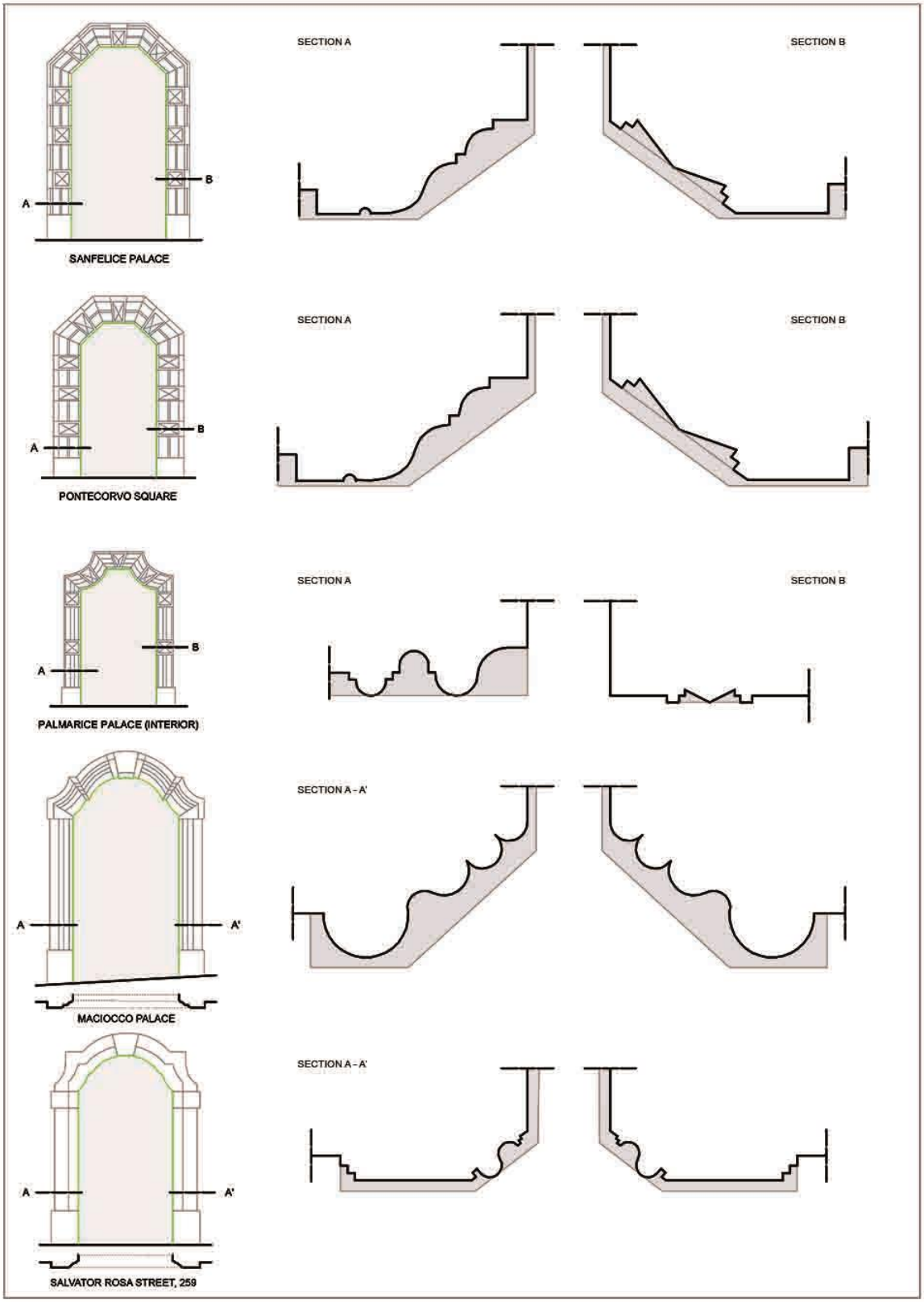

Fig. 6: Portal planimetric section : A- Sanfelice palace portal; B- Pontecorvo square palace portal; C-Salvator Rosa 273, palace portal; D- Palmarice palace portal (extern); E- Palmarice palace portal (intern).

Bibliographical References

[1] BLUNT, Anthony. *Architettura barocca e rococò a Napoli*. Milano: Electa Napoli, pp. 189-229.
[2] GAMBARDELLA, Alfonso. *Note su Ferdinando Sanfelice architetto napoletano*. Napoli: Istituto territoriale del mezzogiorno.
[3] GAMBARDELLA, Alfonso. *Barocco napoletano*. Roma: Istituto poligrafico e Zecca dello Stato, 1992.
[4] PENTA, Rosa. SGROSSO, Anna. *Vedere attraverso. Lo spazio del costruito*. Napoli: Officine grafiche Francesco Giannini & Figli, 1990.
[5] RAGO, Giuseppe. La *residenza nel centro storico di Napoli*. *Dal XV al XVI secolo*. Pisa: Carocci editore, 2012.
[6] SAVARESE, Lidia. *Il centro antico di Napoli: Analisi delle trasformazioni urbane*. Napoli: Electa Napoli, 1991.
[7] STRAZZULLO, Franco. *Edilizia e urbanistica a Napoli dal '500 al '700*. Napoli: Arte Tipografica Editori, 1995.
[8] ZERLENGA, Ornella. *La catalogazione dei portali del costruito storico napoletano*, in *Fra le mura. Dai portali al verde nascosto.* Napoli: Elio de Rosa Editore, 1998, pp.31-36.
[9] ZERLENGA, Ornella. Criteri e metodi per rilevare, conoscere e rappresentare livelli differenziarti di complessità. Il sistema degli accessi al costruito storico residenziale napoletano, in *La formazione nella rappresentazione dell'edilizia.* Atti del Convegno, Roma, 22/24 settembre 1994; Roma: Kappa, 2000, pp. 307-310. (ISBN 88-7890-376-0).
[10] ZERLENGA, Ornella. Memories in stone, in Carmine Gambardella. *Heritage Architecture LanDesign*. Le vie dei Mercanti, XI Forum Internazionale di Studi, Aversa-Capri 13-15 giugno 2013. Napoli: La scuola di Pitagora, 2013. Collana 'Fabbrica della Conoscenza' (direttore C. Gambardella), n° 39, pp. 245-255. ID 061, ISBN 978-88-6542-290-8.
[11] ZERLENGA, Ornella. I portali in piperno dei palazzi storici napoletani, in Carmine Gambardella, La cavità antropica di pianura.
[12] Soprintendenza per i beni Ambientali e Architettonici di Napoli e Provincia. *Fra le mura dai portali al verde nascosto.* Napoli: Elio de Rosa Editore, 1998.



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